

205. LITERATURE CITED^{8/}

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206. APPENDIX

The Appendix contains soil maps covering the entire project; laboratory data and descriptions of sampled pedons; and descriptions of soils in the moisture study (section 51).

All aerial photographs in this publication are from 1936 photography except for the following. The soil maps in sections 131 and 149 are from 1967 photography, and the soil map in section 162 is from 1942 photography. In the Appendix, maps on pages 737, 744, 745 and 752 are from 1942 photography.

Reference is made to the Soil Monograph in C14 sections of pages of laboratory data. This reference is made in case the laboratory data and description sheets are used later in a separate publication. The C14 sample numbers are given in table 66 of this publication.

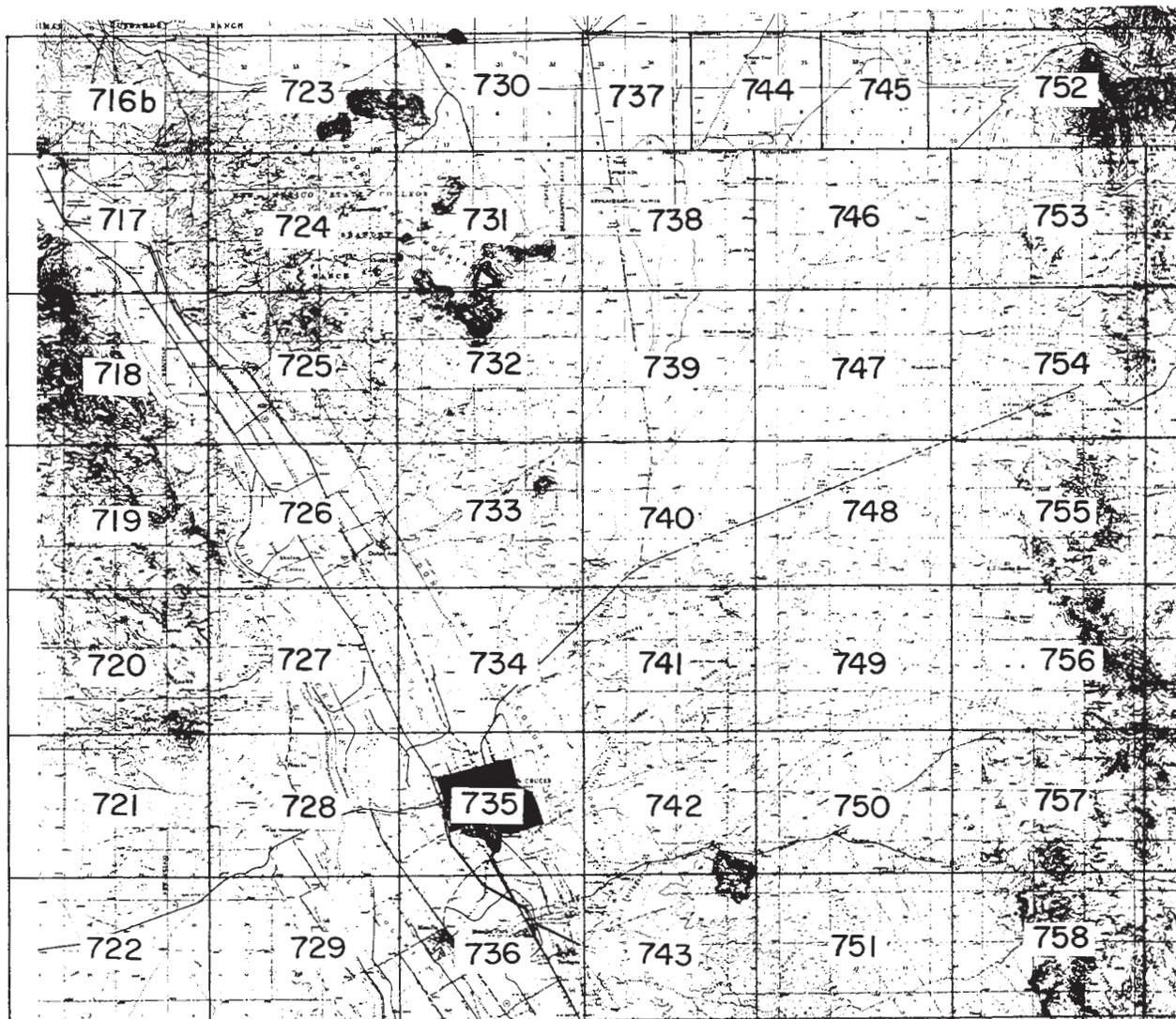
207. SOIL MAPS

The mapping was done at a scale of 1:15,840. The maps in the Appendix were reduced to fit the monograph size and their scale is approximately 1:25,000. The section corners provide useful scale checks of individual maps.

Few cultural symbols have been used on the soil maps in order to minimize obliteration of landscape patterns shown on the 1936 photographs. Roads, pipelines and power lines are shown because these are important location devices for those who wish to study the soils and landscapes in the field.

The sampled pedons are located on the soil maps by a black dot and adjacent pedon number (e.g., 60-7). Index 3 locates the soil maps. Index 4 gives the map page on which each sampled pedon is located and the page in which the laboratory data are located. Index 5 locates mapping units in the text and in the soil maps. Index 6 has the sampled pedons arranged alphabetically by series.

Index 3. Location and page number of soil maps.



Index 4. Location of sampled pedons on soil maps and in the data and description section, by year of sampling.

Pedon no.	Page location in:		Pedon no.	Page location in:	
	Soil map	Data section		Soil map	Data section
59-1	754	760	62-1	726	866
59-2	754	762	62-3	748	868
59-3	754	764	65-1	752	870
59-4	747	766	65-2	752	872
59-5	747	768	65-3	752	874
59-6	748	770	65-4	752	876
59-7	748	772	65-5	744	878
59-8	748	774	65-6	745	880
59-9	741	776	65-7	740	882
59-10	742	778	66-1	743	884
59-11	751	780	66-2	750	886
59-12	743	782	66-3	726	888
59-13	751	784	66-4	726	890
59-14	757	786	66-5	727	892
59-15	750	788	66-6	738	894
59-16	751	790	66-7	738	896
59-17	743	792	66-8	740	898
60-1	742	794	66-9	754	900
60-2	743	796	66-10	754	902
60-3	750	798	66-11	742	904
60-4	757	800	66-12	722	906
60-5	757	802	66-13	2/	908
60-6	740	806	66-14	717	910
60-7	740	808	66-15	754	912
60-8	754	812	66-16	751	914
60-9	754	814	67-1	747	916
60-10	750	816	67-2	751	
60-11	743	818	67-3	747	920
60-12	757	820	67-4	750	922
60-13	748	822	67-5	750	924
60-14	746	824	67-6	737	926
60-15	746	826	68-1	740	928
60-16	739	828	68-2	722	930
60-17	738	830	68-3	739	932
60-18	738	832	68-4	739	934
60-19	753	834	68-5	739	936
60-20	753	836	68-6	737	938
60-21	738	838	68-7	738	940
60-22	747	840	68-8	721	942
60-23	1/	842	68-9	739	944
61-1	737	844	69-8	739	946
61-2	737	846	70-1	754	948
61-3	737	848	70-5	739	952
61-4	730	850	70-6	739	954
61-5	731	852	70-7	739	956
61-6	731	854	70-8	750	958
61-7	721	856	72-1	729	962
61-8	722	860	72-2	722	964
61-9	717	862	72-3	722	966
61-10	750	864			

1/ Northeast of pedon 60-12; precise location not known.

2/ Not in Desert Project.

Index 5. Location of mapping units in text and in soil maps,
by mapping unit name.

Mapping unit name (field symbol in parenthesis)	Page location in:	
	Soil map ^{1/}	Text
Adelino clay loam (13P)	722 ^{2/}	.394
Aladdin gravelly sandy loam (13MO)	754	.477
Aladdin gravelly sandy loam, calcareous variant (13LGO)	753 ^{2/}	.524
Algerita sandy loam (57)	737	.682
Algerita sandy loam, eroded (56)	737	.695
Algerita sandy clay loam (16L)	738	.575
Algerita complex (16MA)	741	.366
Andesite rock outcrop and Argids (40V)	732	.704
Anthony complex (13V, 13ML, 13LG)	752	.499
Arizo complex (13F)	742	.257
Berino sandy loam (15MA)	730	.557
Berino-Bucklebar association (15M)	740	.529
Bluepoint sand (13Y)	734	.262
Bluepoint complex (13X)	729	.270
Boracho complex (10RO)	757	.637
Boracho very gravelly fine sandy loam, carbonatic variant (10LO)	752 ^{2/}	.622
Bucklebar complex (14P)	717	.285
Canutio gravelly sandy loam, loamy subsoil variant (103ML)	756	.471
Caralampi very gravelly sandy loam (14RO)	767	.597
Caralampi-Nolam complex (12MO, 123R)	755	.613
Casito-Terino complex (12V)	732	.609
Conger complex (10LL)	753	.604
Cruces fine sandy loam (12P)	721	.406
Dalby clay (53)	739	.645
Dalian complex (13G)	726	.278
Delnorte complex (10R)	742	.317
Dona Ana fine sandy loam (16LS)	744	.563
Dona Ana sandy clay loam (16VG)	739	.568
Dona Ana-Algerita complex (16M)	740	.558
Entisols, eroded (40B)	721	.700
Glendale-Reagan complex (13L)	746	.516
Hap gravelly sandy loam (15MG)	754	.551
Haplargids, dissected (11Y)	741	.699
Jal sandy loam (11L)	745	.586
Kokan-Bluepoint complex (11X)	742	.347
Kokan-Nickel complex (10W)	725	.294
Monterosa very gravelly sandy loam (10MLO, 10OR)	756	.616
Monterosa complex (10RR)	750	.358
Monterosa very gravelly sandy loam, carbonatic variant (10OL)	752 ^{2/}	.618
Monzonite rock outcrop and Argids (40M)	754	.703
Nickel complex (11R)	743	.327
Nickel-Delnorte complex (10V)	732	.600
Nolam complex (12RR)	751	.303
Onite sandy loam (13MM)	754	.464
Onite-Pajarito complex (13M)	747	.445
Onite-Pintura complex (15P)	722	.379
Pinaleno very gravelly sandy loam (13R)	750	.425
Reagan clay loam (51)	738	.659
Rhyolite rock outcrop and Argids (40R)	757	.703
Santo Tomas-Earp complex (13RO)	757	.436
Sedimentary rock outcrop and Entisols (40L)	753	.701
Sonoita loamy sand (15S)	751	.369
Stellar clay loam (16V)	738	.673
Stellar clay loam, overflow (55)	738	.677
Tencee complex, eroded (10C)	721	.399
Tencee-Upton complex (10L)	727	.339
Terino very gravelly sandy loam (12R)	750	.590
Terino very gravelly loam, thick solum variant (12RO)	757	.628
Tres Hermanos-Onite complex (14V)	731	.493
Weiser-Dalian complex (11LG)	727	.300

^{1/} Only one page number, for an example, is given per mapping unit.

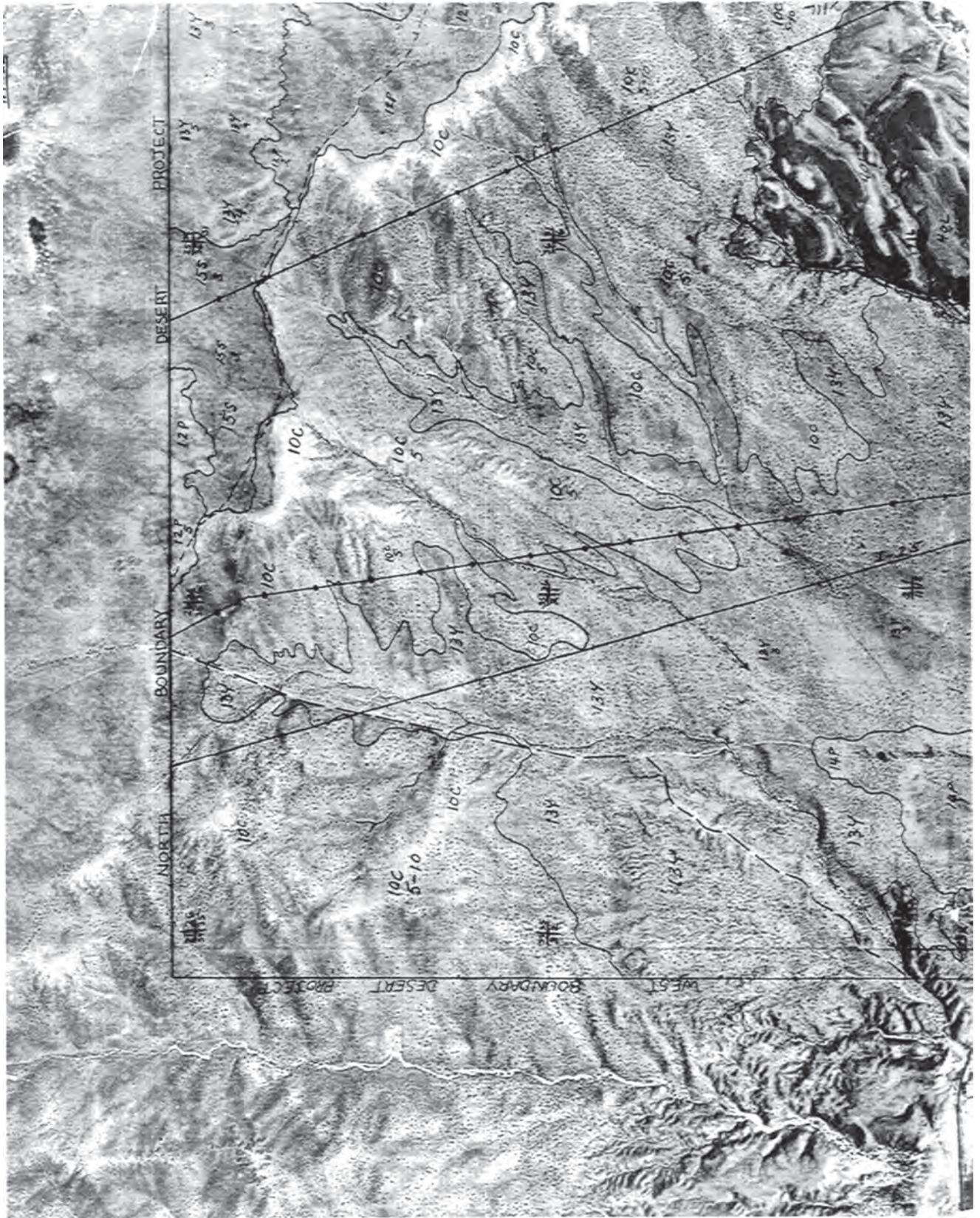
^{2/} This mapping unit occurs only on the cited page.

The field sheets follow this page. Each field sheet was assigned a number for use in the field. These numbers were placed in the upper right hand corner and were related to the New Mexico Quadrangle number or to an aerial photograph number. Most of the maps are in New Mexico Quadrangles 441 and 442, with a strip along the northern part of the area occurring just north of these Quadrangles. If the field sheets being used lack the page numbers given in Index 3, such field sheets may be related to those numbers by the code given below.

<u>Quad 441</u>		<u>Quad 442</u>		<u>North strip</u>	
Number in upper right corner of field sheet	Page number, Index 3	Number in upper right corner of field sheet	Page number, Index 3	Number in upper right corner of field sheet	Page number, Index 3
441-1	731	442-2	753	417-22	716b
441-2	724	442-3	746	417-23	723
441-3	717	442-4	738	417-24	730
441-6	718	442-5	739	14-106	737
441-7	725	442-6	747	14-158NW	744
441-8	732	442-7	754	14-159	745
441-9	733	442-10	755	32-154	752
441-10	726	442-11	748		
441-11	719	442-12	740		
441-14	720	442-13	741		
441-15	727	442-14	749		
441-16	734	442-15	756		
441-17	735	442-18	757		
441-18	738	442-19	750		
441-19	721	442-20	742		
441-22	722	442-21	743		
441-23	729	442-22	751		
441-24	736	442-23	758		

The columns below show the location (on the soil maps, where the indicated pedon numbers are shown as P-1, P-2, etc.,) of described pedons that have not been analyzed in the laboratory. Exceptions are P-2, P-19, and P-37 which occur in the Jornada Experimental Range, north of the Project Area.

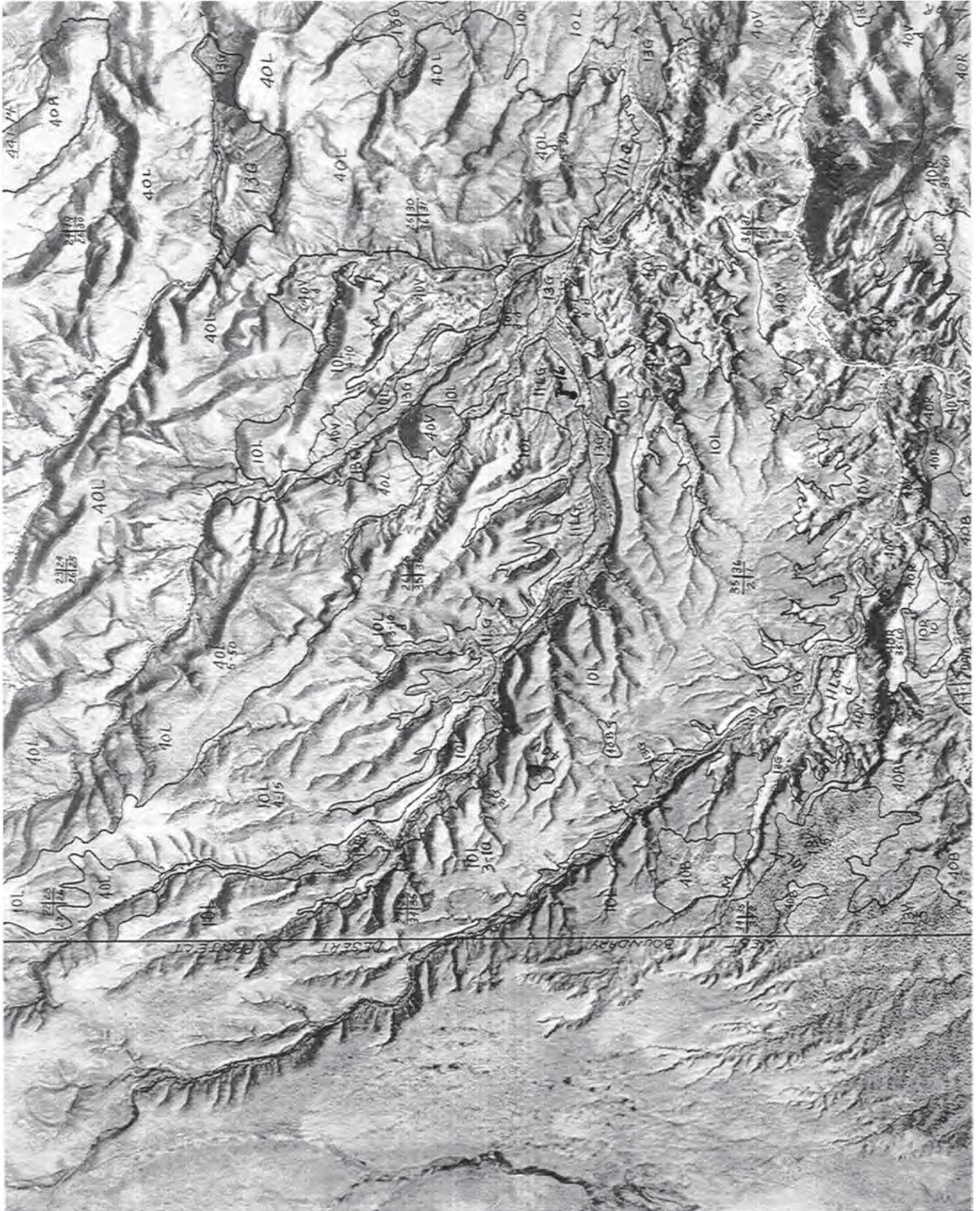
<u>Page of soil map</u>	<u>Pedon number</u>	<u>Page of soil map</u>	<u>Pedon number</u>
748	1	740	17
751	3	737	18
754	4	722	22, 33
731	5, 24, 31	752	26, 36
750	6, 12	755	27
738	7, 8, 9, 20	734	28
721	10, 25	729	29, 32
732	11, 13	756	30
742	14, 15, 21, 23	757	34, 35, 38
720	16		

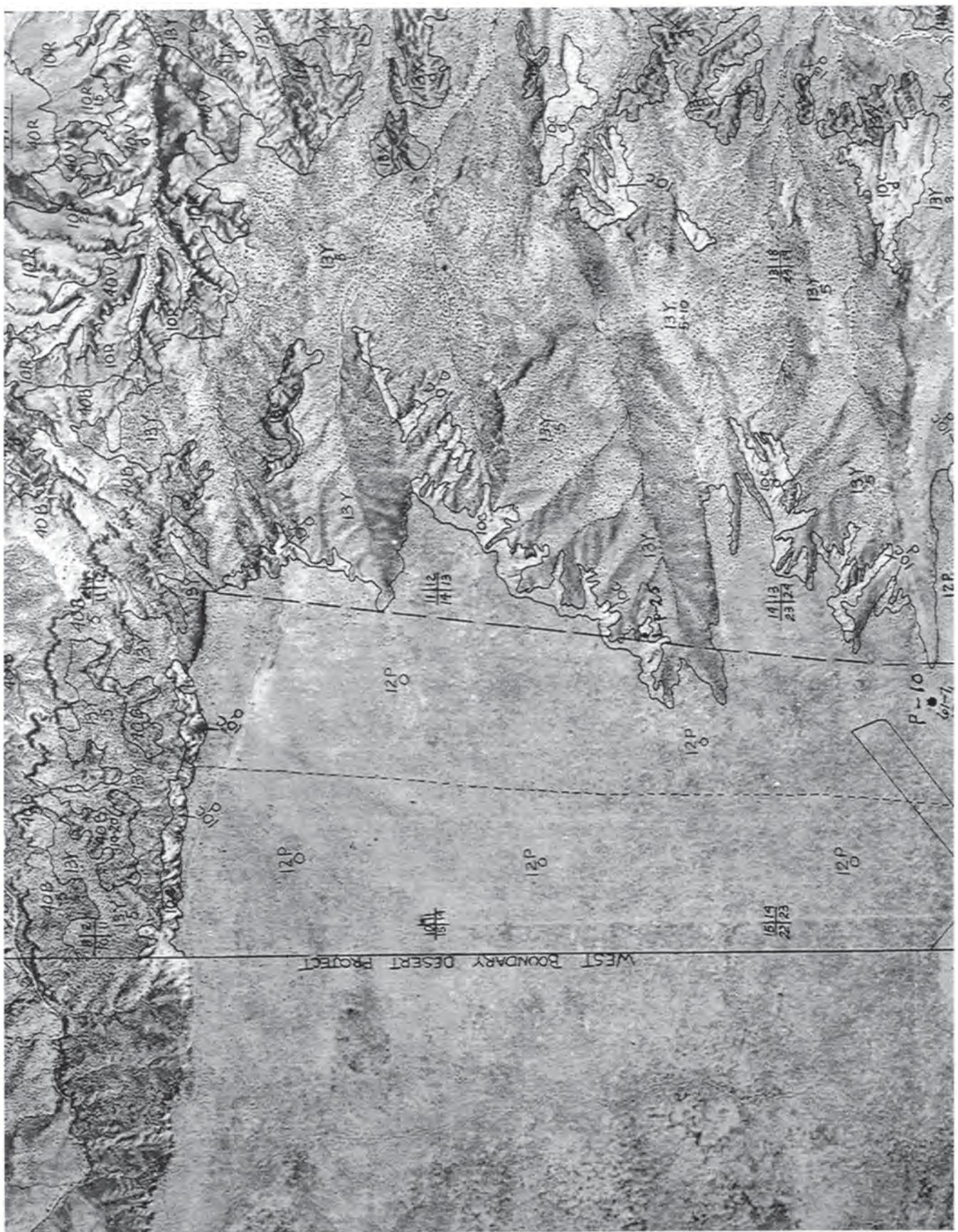


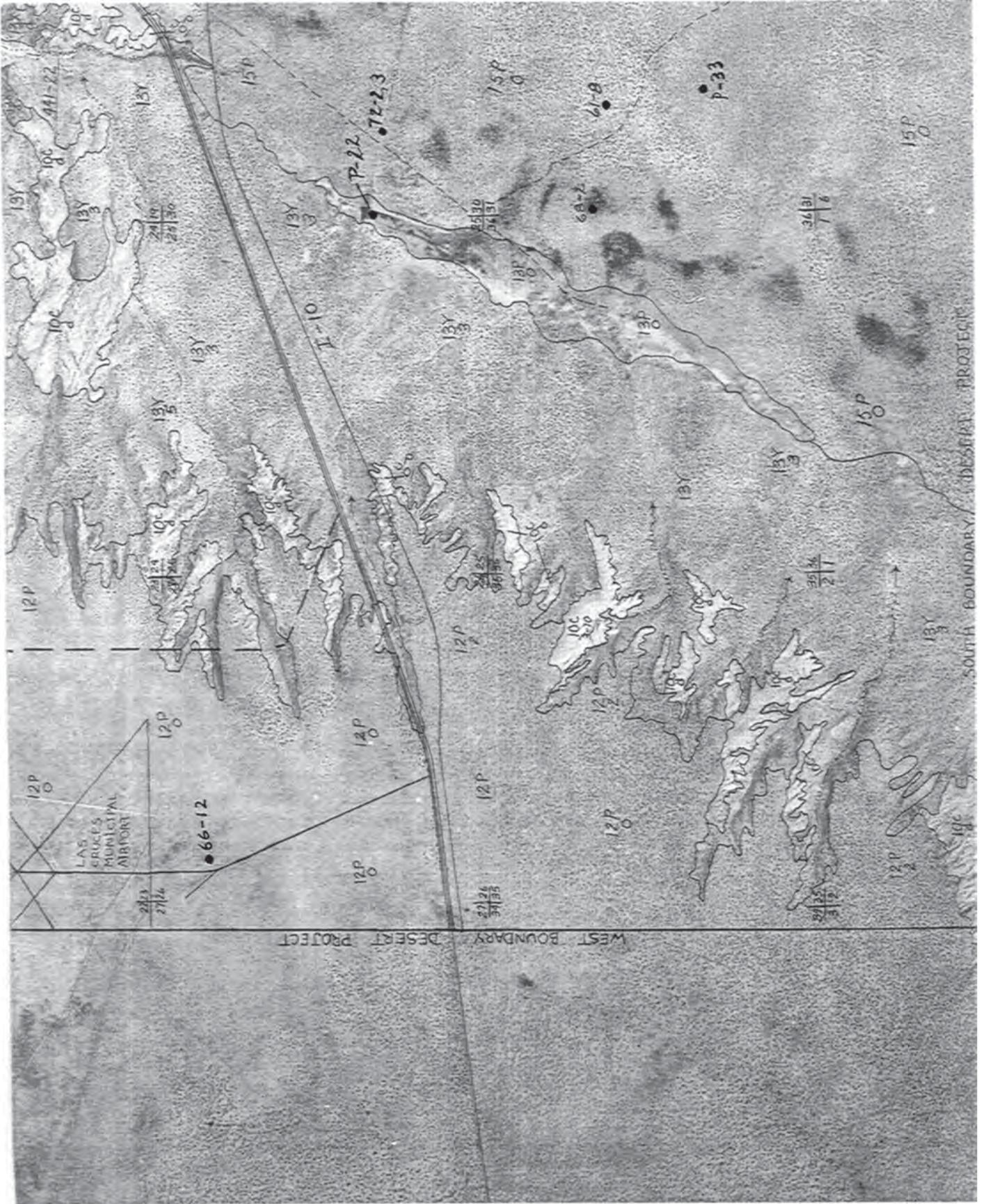


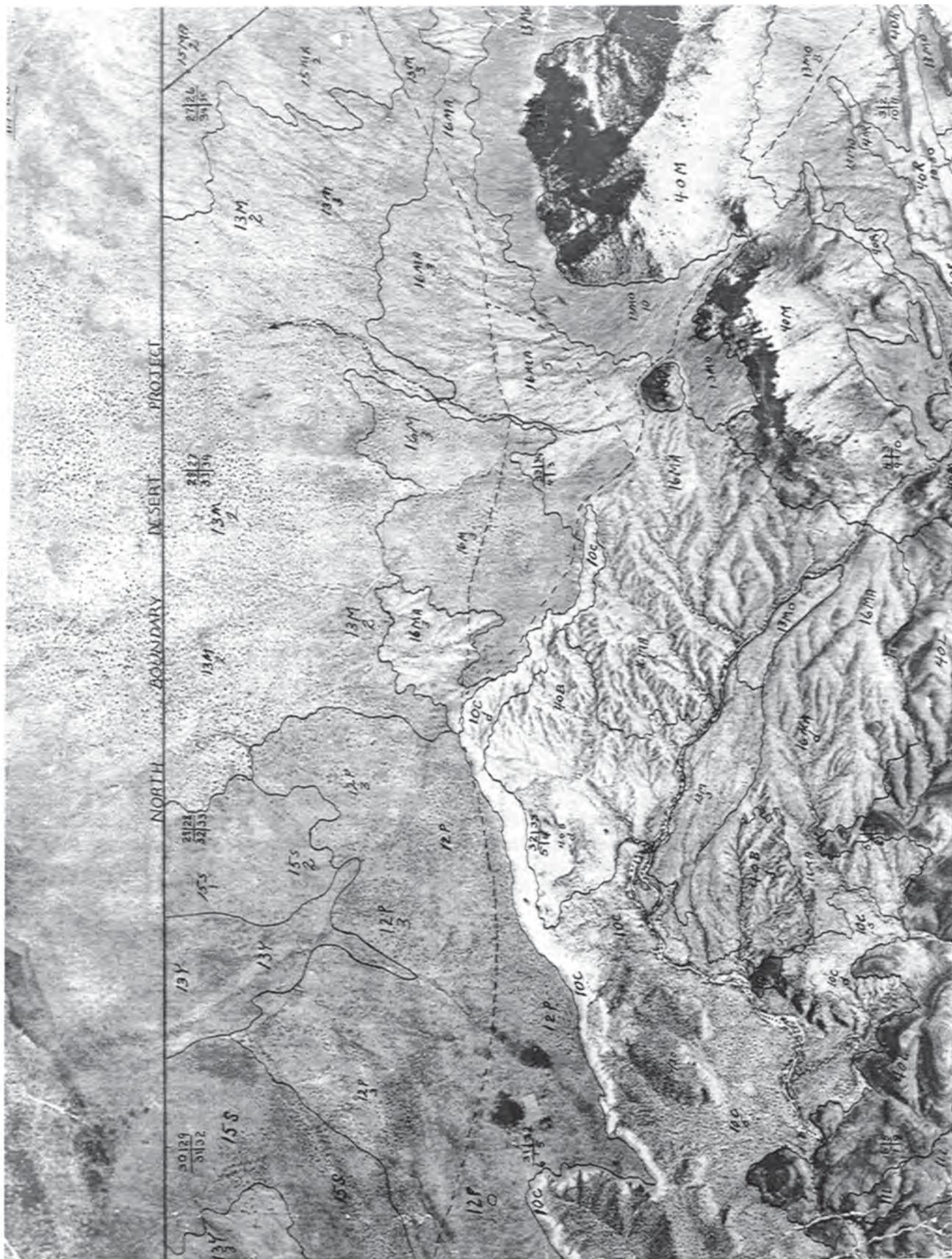




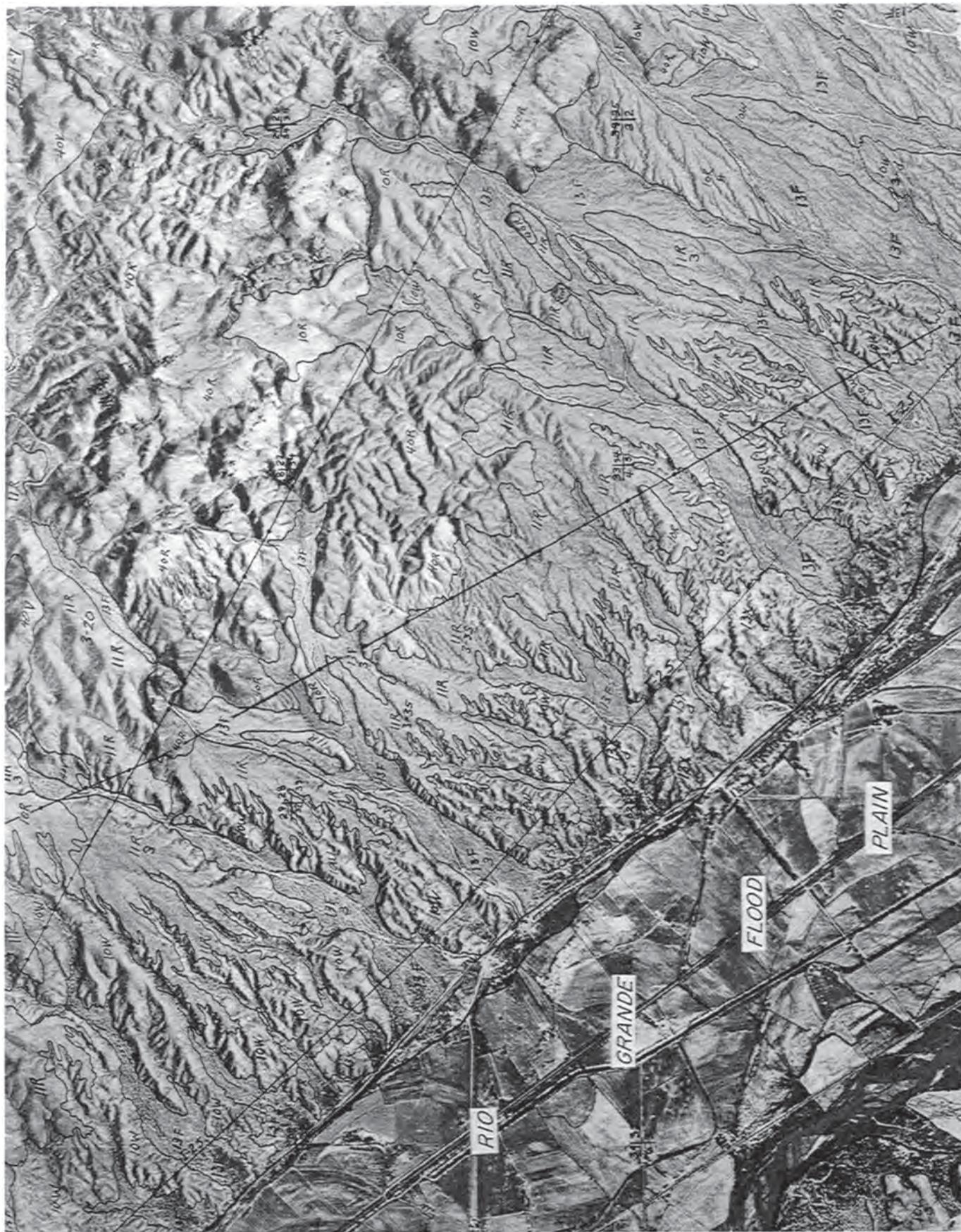








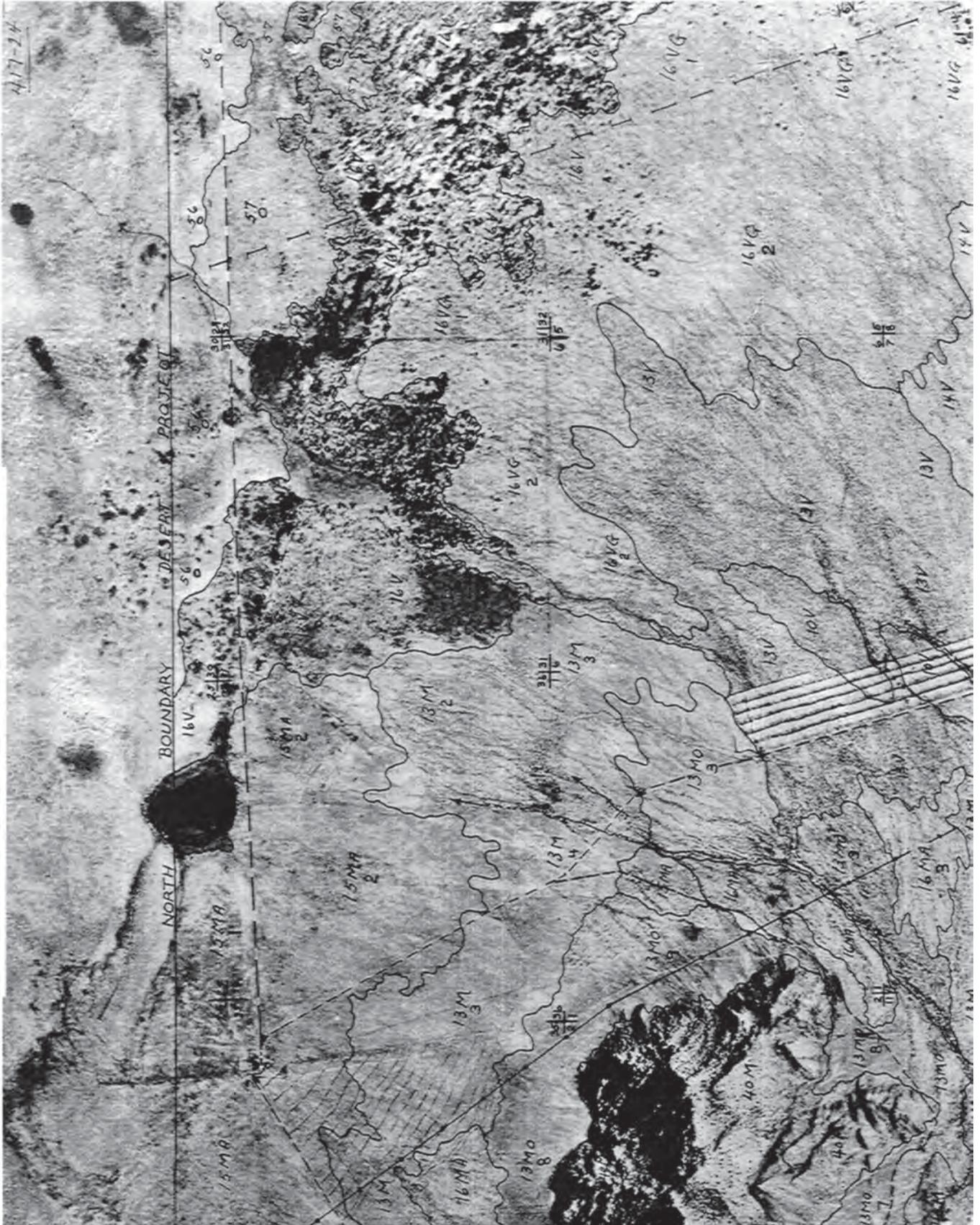










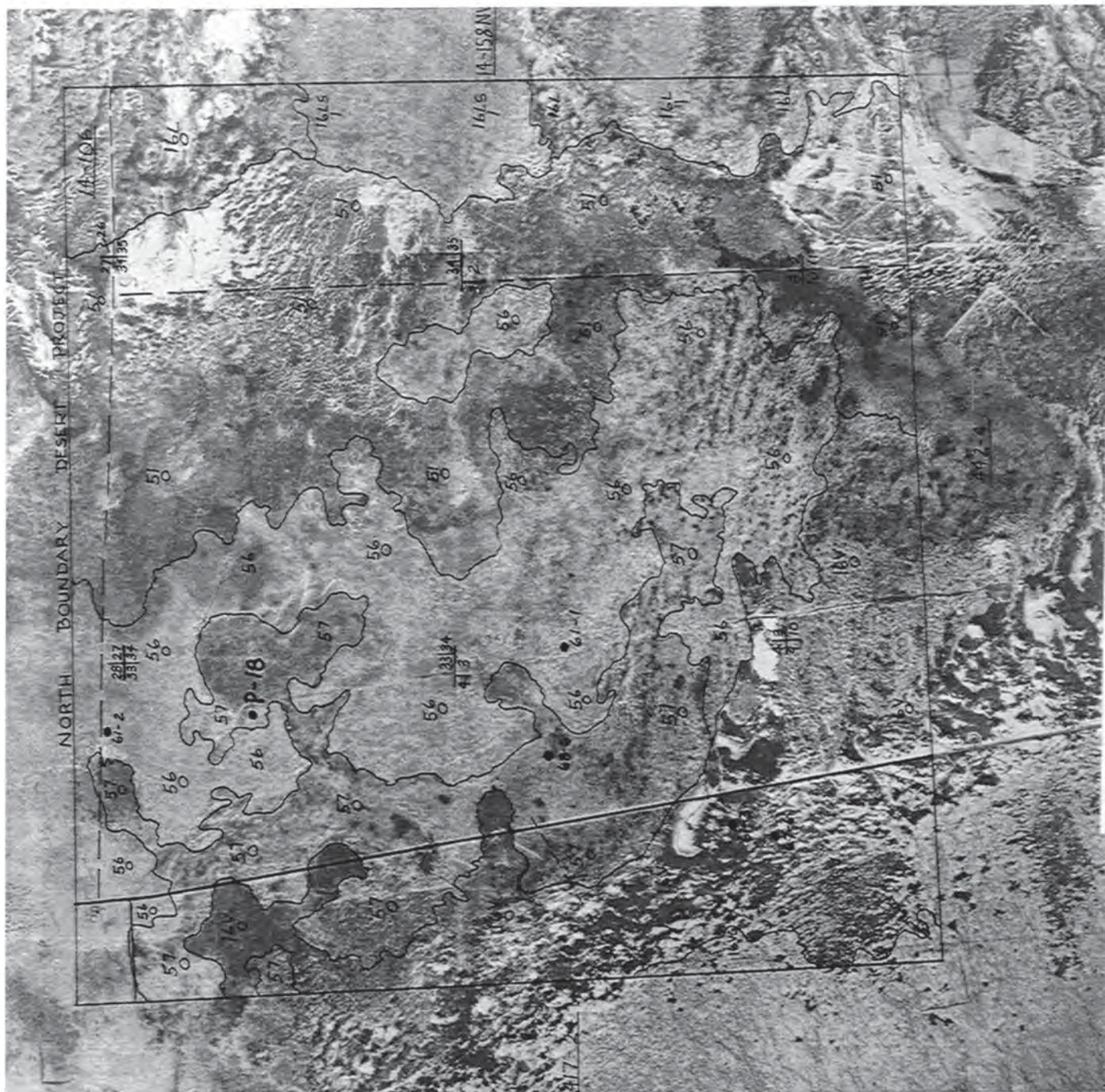














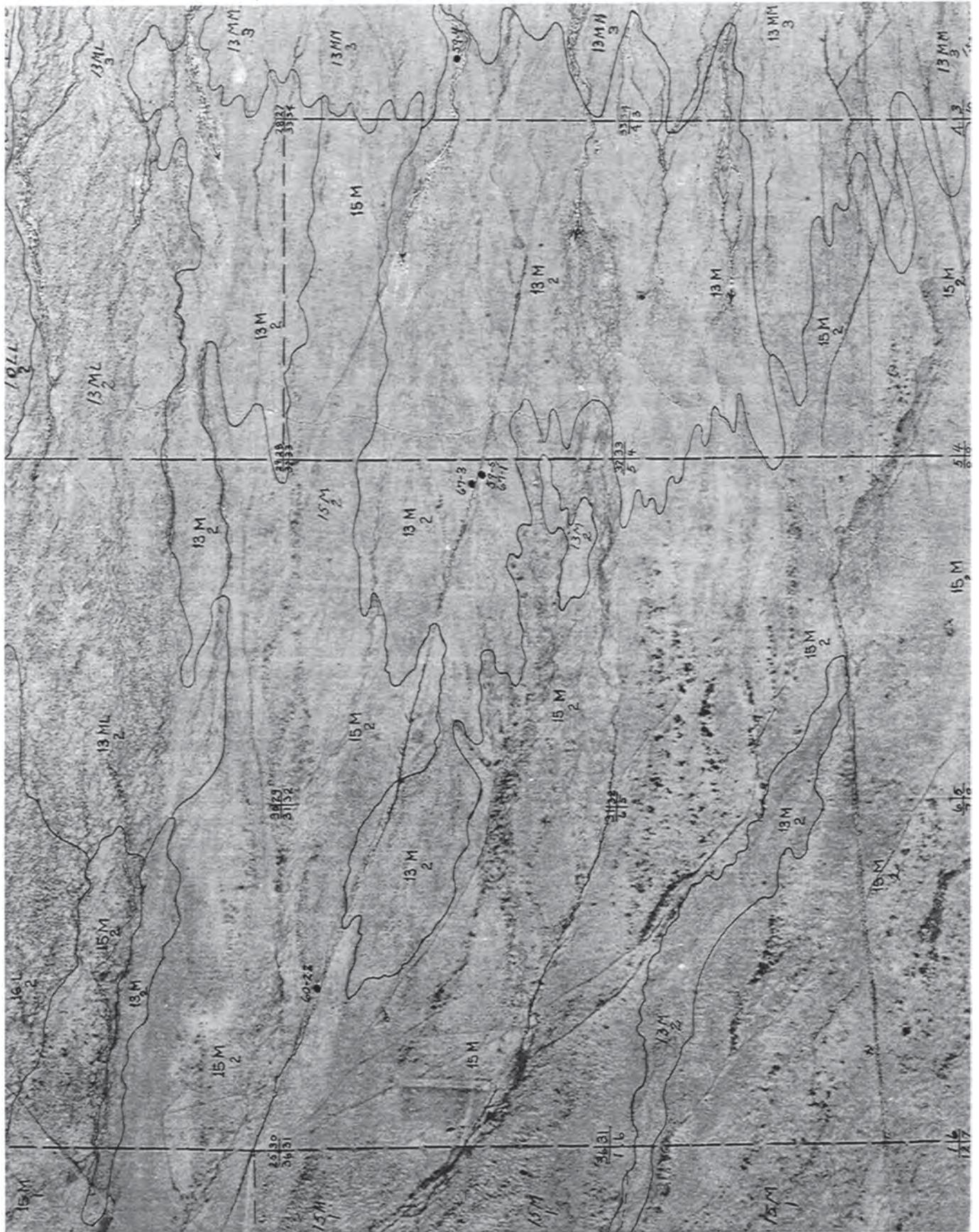






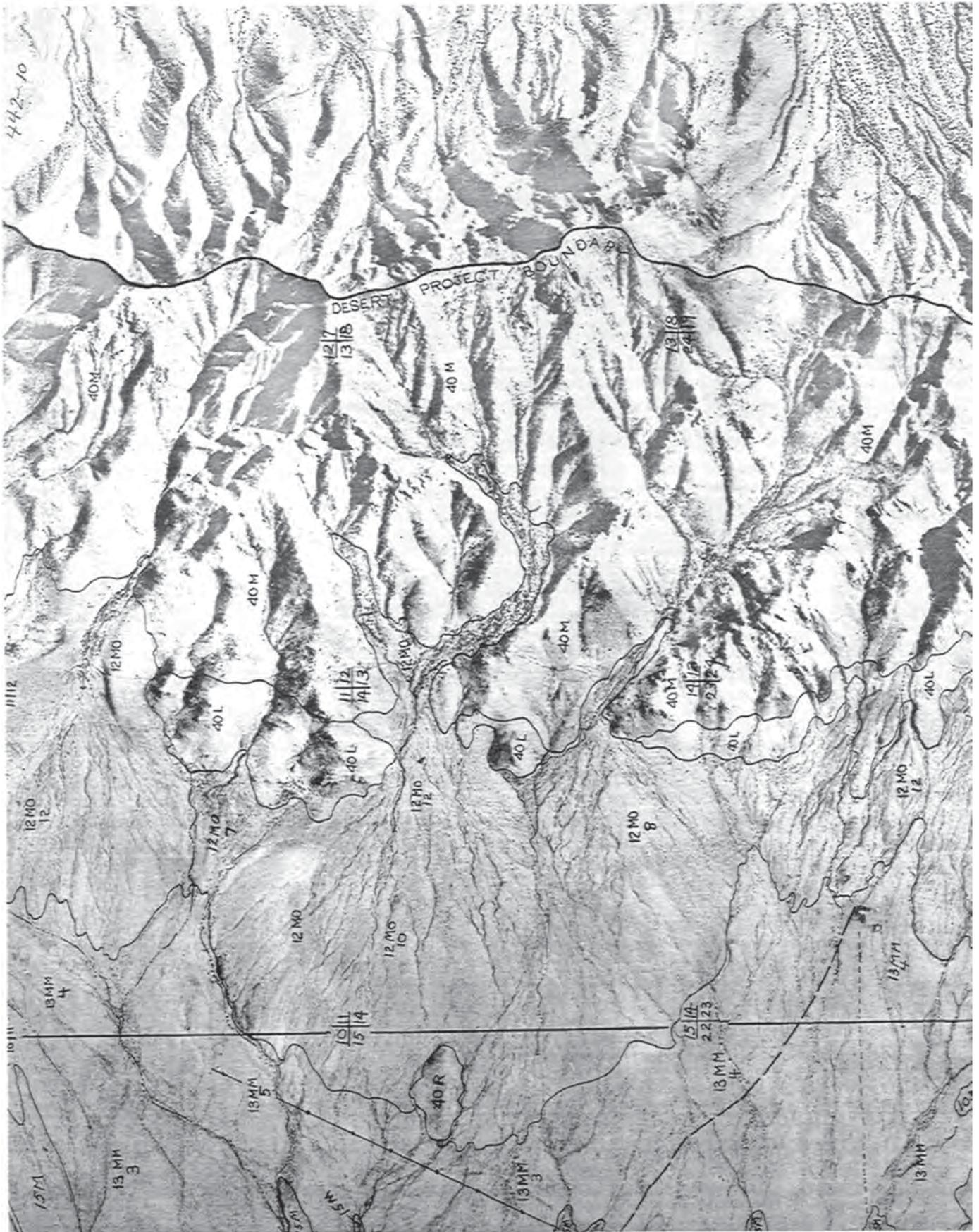












208. LABORATORY DATA AND DESCRIPTIONS OF SAMPLED PEDONS.

Index 6. Location of sampled pedons in data and description section, by series, phase and variant designation.

Soil name and pedon no.	Page	Soil name and pedon no.	Page
Aladdin (59-1)	760	Monterosa (67-2)	.918
Aladdin, calcareous variant (60-19)	834	Nickel (59-13)	.784
Algerita (61-2)	846	Onite (62-3)	.868
Algerita, partially indurated variant (61-1)	844	Onite (70-5)	.952
Anthony (65-3)	874	Onite (70-6)	.954
Anthony (65-4)	876	Onite, calcic variant (66-1)	.884
Anthony, loamy skeletal variant (65-2)	872	Onite, deep petrocalcic phase (61-8)	.860
Arizo (60-3)	798	Onite, deep petrocalcic phase (72-1)	.962
Arizo (61-6)	854	Onite, deep petrocalcic phase (72-2)	.964
Berino (60-7)	808	Onite, gravelly variant (61-5)	.852
Berino (60-13)	822	Onite, sandy subsoil variant (59-5)	.768
Berino (68-9)	944	Onite, sandy subsoil variant (68-3)	.932
Berino (70-7)	956	Onite, thin-solum variant (68-5)	.936
Berino, Ustollic variant (59-6)	770	Pajarito (61-9)	.862
Bluepoint (59-10)	778	Pajarito (67-3)	.920
Bluepoint (59-17)	792	Pinaleno, stony phase (60-9)	.814
Bucklebar (59-7)	772	Pinaleno (66-16)	.914
Bucklebar (60-22)	840	Pinaleno (67-4)	.922
Bucklebar (66-8)	898	Pinaleno (67-5)	.924
Bucklebar (68-2)	930	Pintura (66-11)	.904
Bucklebar (68-4)	934	Pintura (66-13)	.908
Bucklebar (68-8)	942	Pintura (68-1)	.928
Bucklebar, overburden variant (59-8)	774	Reagan (60-14)	.824
Canutio (66-3)	888	Reagan (60-17)	.830
Caralampi (59-14)	786	Reagan (65-1)	.870
Caralampi (59-15)	788	Reagan (66-6)	.894
Caralampi (60-23)	842	Reagan (68-7)	.940
Casito (60-1)	794	Reagan, light subsoil variant (66-7)	.896
Conger (60-20)	836	Rilloso, Ustollic variant (60-11)	.818
Coxwell, shallow variant (66-9)	900	Santo Tomas (60-12)	.820
Coxwell, shallow variant (66-10)	902	¹ /SND-1 (59-12)	.782
Coxwell, shallow variant (70-1)	948	SND-2 (59-9)	.776
Cruces (61-7)	856	SND-3 (67-6)	.926
Cruces (66-12)	906	SND-4 (66-15)	.912
Cruces, loamy skeletal variant (59-16)	790	SND-7 (59-3)	.764
Dalby taxadjunct (60-16)	828	Simona (59-11)	.780
Dalian (66-4)	890	Simona (60-10)	.816
Dona Ana (60-6)	806	Sonoita (60-8)	.812
Dona Ana (61-4)	850	Sonoita (72-3)	.966
Dona Ana (65-5)	878	Stellar (61-3)	.848
Dona Ana (68-6)	938	Stellar, overflow phase (60-21)	.838
Dona Ana, deep petrocalcic phase (65-7)	882	Tencee (62-1)	.866
Glendale (60-15)	826	Terino (70-8)	.958
Hawkeye (59-2)	762	Terino, thick solum variant (60-5)	.802
Headquarters (60-18)	832	Upton (66-5)	.892
Headquarters, clayey subsoil variant (69-8)	946	Vado (60-4)	.800
Jal (65-6)	880	Vinton (59-4)	.766
Mimbres, overwash phase (66-14)	910	Vinton (67-1)	.916
Monterosa (66-2)	886	Whitlock (60-2)	.796
Monterosa (61-10)	864		

¹/ Series not designated.

SOIL CLASSIFICATION: Torriorthentic Haplustoll; coarse-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Aladdin SOIL Nos. S59NMex-7-1 LOCATION Dona Ana County, New Mexico
SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 11235-11242
GENERAL METHODS: 1A1, 1B1a, 2A1, 2B, a/

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1						
		Total			Sand				Silt				Clay (2-0.1)	2A2 Coarse fragments					
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.02-0.002)	Vol.		Wt.	3B1				
Pct. of < 2 mm											250-2			76-2			19-2		
Carbonate Not Removed											% < 250			% < 76			% < 19		
0-5	A11	71.3	21.7	7.0	18.9	16.0	7.4	14.2	14.8	15.0	6.7	37.8	56.5	15	25	25			
5-36	A12	66.6	22.5	10.9	17.2	14.5	7.5	14.2	13.2	14.4	8.1	35.5	53.4	15	26	26			
36-53	A13	69.7	19.1	11.2	30.4	15.1	5.8	9.0	9.4	11.4	7.7	25.3	60.3	20	31	31			
53-89	A14	68.9	19.8	11.3	25.7	15.5	6.0	10.6	11.1	11.8	8.0	28.8	57.8	20	35	35			
89-117	A15	73.2	17.4	9.4	29.2	18.5	7.4	10.2	7.9	9.6	7.8	22.7	65.3	20	36	36			
117-147	AC	68.4	20.3	11.3	17.3	16.0	7.9	14.8	12.4	12.6	7.7	32.9	56.0	26	31	31			
147-173	C1	76.2	14.6	9.2	18.7	21.8	10.6	15.7	9.4	9.3	5.3	26.6	66.8	20	35	35			
173-218	C2	78.0	13.8	8.2	21.8	20.4	10.0	16.1	9.7	8.9	4.9	26.7	68.3	15	28	28			

Depth (cm.)	6A1a Organic carbon d/ Pct.	6B1a Nitrogen Pct.	C/N	6C1a Ext. Iron as Fe Pct.	Carbonate as CaCO ₃		Bulk density			5A1a CEC NH ₄ OA me./100g.	Water content			Composition Whole Material b/				Carbonate as CaCO ₃
					6E2a <2mm. Pct.	<0.002 mm. Pct.	c/ g/cc	g/cc	g/cc		4B1a 1/10-Bar Pct.	4B1a 1/3-Bar Pct.	4B2 15-Bar Pct.	NONCARBONATE			Carbonate as CaCO ₃	
					> 2mm. Pct.	Sand Pct.	Silt Pct.	Clay Pct.	Pct.		Pct.	Pct.	Pct.	Pct.	Pct.			
0-5	0.83	0.068	12	0.6	-(s)	1.4	1.4	6.5	14.6	7.4	3.1	25	54	16	5	-		
5-36	0.57	0.045	13	0.7	-(s)	1.4	1.4	9.0	13.4	9.1	4.3	26	50	16	8	tr		
36-53	0.49	0.046	11	0.7	-(s)	1.4	1.4	10.4	17.8	10.0	5.6	31	48	13	8	tr		
53-89	0.36	0.038	11	0.7		1.4	1.4	10.2	17.9	9.4	5.4	35	45	13	7	tr		
89-117	0.32	0.023	14	0.6		1.4	1.4	9.3	14.0	8.2	4.0	36	47	11	6	-		
117-147	0.21			0.7	tr(s)	1.4	1.4	7.8	13.7	9.3	4.4	31	47	14	8	tr		
147-173	0.14			0.7	-(s)	1.4	1.4	6.9	12.4	7.2	3.4	35	49	10	6	-		
173-218	0.11			0.7	-(s)	1.4	1.4	6.8	11.1	6.7	3.4	28	56	10	6	-		

- a/ The < 2 mm. removed from the > 2 mm. by gentle agitation in water was added to the < 2 mm. obtained by dry sieving. All analyses on this sample unless otherwise indicated.
- b/ Inclusive of coarse fragments, carbonate, and gypsum.
- c/ Assumed bulk density of moist fine-earth fabric for calculations.
- d/ 5.0 kg/m² to 89 cm (Method 6A).

Soil Classification: Torriorthentic Haplustoll; coarse-loamy, mixed, thermic

Soil: Aladdin

Soil Nos.: S59NMex-7-1

Location: SW 1/4 SW 1/4, Sec. 31, T21S, R4E, on south bank of arroyo, Dona Ana County, New Mexico.

Geomorphic Surface: Organ.

Land Form: Alluvial fan sloping 8 percent to the west.

Elevation: 5,500 feet.

Parent Material: Organ fan alluvium derived from monzonite.

Vegetation: Snakeweed, *Yucca elata*, few clumps of blue grama, few cholla, prickly pear, sumac, and fluffgrass.

Collected by: J. S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 11, 1959.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Surface 1/2 inch consists primarily of loose, angular to subangular monzonite pebbles, mainly less than 1/4 inch in diameter.

A11 11235 0 to 5 cm. Grayish-brown (10YR 5/2 dry) or very dark grayish-brown (10YR 3/2 moist) fine gravelly coarse sandy loam; moderate medium platy; slightly hard; roots common; noncalcareous; abrupt smooth boundary.

A12 11236 5 to 36 cm. Dark gray (10YR 4.5/1 dry) or black (10YR 2/1.5 moist) fine gravelly coarse sandy loam; massive; slightly hard; roots common; few insect burrows 1/4- to 1/2-inch diameter, and a few krotovinas 1- to 2-inch diameter; noncalcareous; clear wavy boundary.

A13 11237 36 to 53 cm. Dark grayish-brown (10YR 4.5/2 dry) or very dark brown (10YR 2/2 moist) fine gravelly coarse sandy loam; very weak fine subangular blocky; hard; fine roots common; few insect burrows and krotovinas; noncalcareous; gradual wavy boundary.

A14 11238 53 to 89 cm. Dark grayish-brown (10YR 4.5/2 dry) or very dark brown (10YR 2/2 moist) fine gravelly coarse sandy loam; very weak fine subangular blocky; slightly hard; few fine roots; few krotovinas; noncalcareous; gradual wavy boundary.

A15 11239 89 to 117 cm. Dark grayish-brown (10YR to 7.5YR 4.5/2 dry) or very dark brown (10YR 2.5/2 moist) fine gravelly coarse sandy loam; generally massive, with some portions single grain; slightly hard; few fine roots; noncalcareous; gradual wavy boundary.

AC 11240 117 to 147 cm. Dark grayish-brown (10YR 4.5/2 dry) or dark brown (7.5YR 3/2 moist) fine gravelly coarse sandy loam; few parts of dark brown (7.5YR 2.5/2 moist) - possibly krotovinas; massive and single grain; loose and very friable; few fine roots; noncalcareous; irregular boundary.

C1 11241 147 to 173 cm. Brown (10YR to 7.5YR 5/3 dry) or dark brown (10YR to 7.5YR 3.5/3 moist) fine gravelly coarse sandy loam; massive and single grain, loose and very friable; few fine roots; noncalcareous; gradual boundary.

C2 11242 173 to 218 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/4 moist) fine gravelly loamy coarse sand; massive and single grain; very friable and loose; few fine roots; very few thin, discontinuous clay coatings; very few carbonate filaments; few parts effervesce weakly.

SOIL CLASSIFICATION: Torriorthentic Haplustoll; sandy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Hawkeye SOIL Nos. S59NMex-7-2 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 11243-11249

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B, a/

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1			2A2 Coarse fragments		
		Total				Sand					Silt		Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	Vol. 250-2	Wt. 76-2	3B1 19-2
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	0.02-0.002	0.2-0.1						
Pct. of < 2 mm																		
Carbonate Not Removed																		
0-3	A11	72.1	20.1	7.8	16.5	17.8	9.3	15.8	12.7	13.7	6.4	34.7	59.4			5	8	8
3-20	A12	81.4	12.4	6.2	25.1	21.9	9.7	14.5	10.2	7.3	5.1	24.2	71.2			20	32	32
20-41	A13	81.1	12.6	6.3	22.2	20.6	10.6	16.4	11.3	8.0	4.6	27.2	69.8			15	28	28
41-71	A14	80.7	12.7	6.6	19.4	20.0	11.0	17.8	12.5	8.1	4.6	29.2	68.2			15	28	28
71-99	C1	73.7	18.0	8.3	26.0	15.9	7.3	12.5	12.0	11.4	6.6	29.8	61.7			15	29	29
99-132	C2	72.9	18.6	8.5	17.4	16.5	8.8	15.6	14.6	12.2	6.4	34.9	58.3			15	25	25
132-173	C3	78.7	14.5	6.8	15.7	19.6	11.6	19.1	12.7	9.5	5.0	31.3	66.0			20	35	35

Depth (cm.)	6A1a Organic carbon e/ Pct.	6B1a Nitrogen Pct.	C/N	6C1a Ext. Iron as Fe Pct.	Carbonate as CaCO3		5A1a CEC NH4OAc me./100g.	Bulk density d/ g/cc		Water content			Composition Whole Material b/				
					6E1a < 2mm c Pct.			d/ g/cc		4B1a 1/10-Bar Pct.	4B1a 1/3-Bar Pct.	4B2 15-Bar Pct.	NONCARBONATE				Carbonate as CaCO3 Pct.
					Pct.	< 2mm c Pct.							> 2mm Pct.	Sand Pct.	Silt Pct.	Clay Pct.	
0-3	1.03	0.085	12	0.8	-(s)tr(s)	8.7	1.4		15.6	8.0	4.0	8	67	18	7	-	
3-20	0.67	0.048	14	0.9	-(s)tr(s)	7.4	1.4		10.8	6.2	3.5	32	56	8	4	-	
20-41	0.52	0.030	17	1.0	-(s)tr(s)	7.2	1.4		10.4	6.5	3.8	28	59	9	4	-	
41-71	0.29	0.025	12	0.9	-(s)tr(s)	7.1	1.4		8.9	5.4	3.4	28	58	9	5	-	
71-99	0.26	0.023	11	0.9	-(s)tr(s)	8.8	1.4		15.6	8.3	3.9	29	52	13	6	-	
99-132	0.20			0.8	-(s)0.1	7.2	1.4		13.3	7.2	4.0	25	55	14	6	-	
132-173	0.17			1.0	tr 0.6	6.7	1.4		12.8	6.1	3.3	35	52	9	4	tr	

a/ The < 2 mm. removed from the > 2 mm. by gentle agitation in water was added to the < 2 mm. obtained by dry sieving. All analyses on this sample unless otherwise indicated.

b/ Inclusive of coarse fragments, carbonate and gypsum.

c/ < 2 mm. obtained by washing the > 2 mm. that had been separated originally by dry sieving. By Methods 6E2a and 6E1c.

d/ Assumed bulk density of moist fine-earth fabric for calculations.

e/ 4.9 kg/m² to 99 cm (Method 6A).

Soil Classification: Torriorthentic Haplustoll; sandy, mixed, thermic
 Soil: Hawkeye
 Soil Nos.: S59NMex-7-2
 Location: NW 1/4, SW 1/4, Sec. 36, T21S, R3E, on north bank of arroyo, Dona Ana County, New Mexico.
 Geomorphic Surface: Organ.
 Land Form: Alluvial fan sloping 5 percent to the west.
 Elevation: 5,125 feet.
 Parent Material: Organ fan alluvium derived from monzonite.
 Vegetation: Dominantly snakeweed, with few Yucca elata, mesquite, Mormon tea, cholla, and fluffgrass.

Collected by: J. S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 11, 1959.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Surface 1 cm. consists of dominantly loose, angular to subangular monzonite pebbles, mainly less than 1/4 inch in diameter (included with sample LSL No. 11243).

A1 11243 0 to 3 cm. Dark grayish-brown (1OYR 4.5/2 dry) or very dark brown (1OYR 2.5/2 moist) coarse sandy loam; massive and weak coarse platy; soft; no roots; noncalcareous; abrupt smooth boundary.

A12 11244 3 to 20 cm. Dark gray (1OYR 4/1 dry) or black (1OYR 2/1.5 moist) fine gravelly loamy coarse sand; single grain to massive; soft; fine roots common; noncalcareous; gradual wavy boundary.

A13 11245 20-41 cm. Dark gray (1OYR 3.5/1 dry) or very dark brown (1OYR 2/2 moist) fine gravelly loamy coarse sand; massive; soft; roots common; noncalcareous; gradual wavy boundary.

A14 11246 41 to 71 cm. Horizon composed of 2 colors: 60 percent dark gray (1OYR 3.5/1 dry) or very dark brown (1OYR 2.5/2 moist), and 40 percent brown (1OYR 4.5/3 dry) or dark brown (1OYR 3.5/3 moist); fine gravelly loamy coarse sand; massive and single grain; soft and loose; roots common; few krotovinas; noncalcareous; gradual wavy boundary.

C1 11247 71 to 99 cm. Eighty percent brown (1OYR 5/3 dry) or dark brown (1OYR 3/3 moist), and 20 percent very dark grayish-brown (1OYR 3/2 moist); coarse sandy loam; massive and single grain; soft and loose; roots common; mica flakes conspicuous; few krotovinas, several inches diameter; noncalcareous; gradual irregular boundary.

C2 11248 99 to 132 cm. Brown (1OYR 5/2.5 dry) or very dark brown (1OYR 2.5/2 moist) fine gravelly sandy loam; massive with a few single grain parts; soft and loose; few roots; slightly firmer in place than underlying horizon; discontinuous; effervesces weakly; wavy to irregular boundary.

C3 11249 132 to 173 cm. Brown (1OYR 4.5/3 dry) or dark brown (1OYR 3.5/3 moist) fine gravelly sand; massive and single grain; soft and loose; roots few to common; some pebbles over 1/2 inch in diameter have thin, discontinuous carbonate coatings; matrix noncalcareous.

Sand Mineralogy, Method 7B1. The A13 horizon was studied. Counts were made on the very fine and the fine sand separates from the standard particle-size analysis. The 2-0.25 mm. was mounted in plastic and thin sections were prepared. To obtain a random distribution in the thin section by size and by shape, a wafer was prepared, which was then broken into pieces. The pieces were reimpregnated and the block was cut into strips, which were then remounted in plastic. The line or point intercept procedures are used for the counts on all fractions. The mica percentages for the very fine and the fine sands were reduced by four-fifths and the other percentages raised proportionately to make the values more nearly volume percentages.

The very fine sand contains 25 percent quartz, 55 percent feldspar, 10 percent microcrystalline aggregates, 5 percent opaques, 4 percent hornblende, 2 percent biotite, and 2 percent other minerals, mostly epidote, pyroxene and zircon. The feldspar is mostly orthoclase and albite, with about one-fifth plagioclase of intermediate calcium composition.

The fine sand contains 20 percent quartz, 50 percent feldspar, 15 percent microcrystalline aggregates, 5 percent opaques, 3 percent hornblende, 2 percent biotite, and 2 percent other minerals. The quartz was corrected for feldspar of intermediate calcium composition based on the proportion measured for the very fine sand.

The 2-0.25 mm. contains 30 percent quartz, 50 percent feldspar, 10 percent microcrystalline aggregates, 5 percent opaques, 5 percent biotite, one percent hornblende, and one percent assorted minerals. Included in the quartz percentage would be the feldspar of intermediate calcium composition. The quartz percentage is therefore a maximum figure. Uncertainty as to the refractive index of the mounting material precludes a detailed analysis of the kinds of feldspar.

The microcrystalline aggregates mostly consist of small optical domains of feldspar and inclusions of mica(?). In thin section, where the thickness has been reduced to about 0.03 mm., twin planes commonly may be observed in grains rich in inclusions. In the very fine and fine sand mounts, since the mineral is thicker, the optical continuity of the feldspar matrix is more likely to be obscured by the inclusions. This may be a contributing reason for the higher proportion of microcrystalline aggregates in the very fine and fine sand than in the 2-0.25 mm. The biotite flakes in the very fine and the fine sand commonly exhibit pale yellow interference color. A minority of the discrete quartz and feldspar grains has thick, patchy coatings of reddish-brown silicate clay; these grains may be inherited from previous cycles of soil development. Generally, the discrete grains have highly irregular boundaries.

Clay Mineralogy, Method 7A2, 7A3. A12 and C3 horizons. Clays in the two horizons are similar: a moderate amount of mica and a small amount (10 percent) of kaolinite. There is an additional small component of interlayered mica-montmorillonite. This component expands more in the A12 (more montmorillonitic) than in the C3.

SOIL CLASSIFICATION: Typic Torriorthent; sandy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SND-7 SOIL Nos. S59NMex-7-3 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 11250-11257

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B, a/

Depth (cm.)	Horizon	Size class and particle diameter (mm)												2A2 Coarse fragments					
		Total			Sand						Silt			Vol.	Wt.				
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)		250-2	76-2	19-2		
Pct. of < 2 mm																			
Carbonate Not Removed																			
0-4	A11	66.0	25.0	9.0	13.8	12.0	8.0	15.2	17.0	18.3	6.7	43.1	49.0	5	11	11			
4-15	A12	78.4	14.9	6.7	24.0	18.4	8.9	15.4	11.7	10.1	4.8	29.7	66.7	20	30	30			
15-30	A13	78.4	14.4	7.2	19.7	17.8	9.4	17.6	13.9	9.9	4.5	33.3	64.5	15	29	29			
30-61	C1ca	82.4	12.0	5.6	26.0	18.7	9.3	17.1	11.3	7.7	4.3	27.9	71.1	20	36	36			
61-102	C2ca	79.7	13.6	6.7	22.9	19.5	9.8	16.9	10.6	8.8	4.8	28.0	69.1	20	35	35			
Carbonate Removed																			
81-109	IIIB2cab	62.8	24.2	13.0	24.2	13.3	5.0	8.4	11.9	16.9	7.3	33.5	50.9	10	15	15			
109-132	IIIB3cab	65.4	23.0	11.6	20.6	13.0	6.0	11.1	14.7	16.1	6.9	37.1	50.7	10	19	19			
132-193	IVCcab	72.0	18.3	9.7	14.4	13.0	8.3	18.4	17.9	13.2	5.1	41.5	54.1	10	15	15			
Depth (cm.)	6A1a Organic carbon f/ Pct.	6E1a Nitrogen Pct.	C/N	6C1a Ext. Iron as Fe Pct.	Carbonate as CaCO ₃		5A1a Bulk density			Water content			Composition Whole Material b/						
					c/ Pct.	d/ Pct.	me./ 100g.	g/cc	g/cc	4B1a 1/10- Bar Pct.	4E1a 1/3- Bar Pct.	4B2 15- Bar Pct.	NONCARBONATE			Carbonate as CaCO ₃ Pct.			
													> 2mm. Pct.	Sand Pct.	Silt Pct.		Clay Pct.		
0-4	0.80	0.082	10	0.9	-	tr(s)	9.1	1.4											
4-15	0.64	0.058	11	0.8	1.0		6.9	1.4				7.8	6.5	3.3	30	54	10	5	tr
15-30	0.33	0.027	12	0.8	1	3.8	6.5	1.4				6.2	5.5	2.9	29	55	10	5	1
30-61	0.29	0.024	12	0.8	1	3.0	6.0	1.4				9.9	6.1	3.7	36	51	8	4	1
61-102	0.26	0.024	11	1.0	1		5.9	1.4				10.9	7.4	3.0	35	51	9	4	1
81-109	0.26	0.022	12	0.8	1		10.4	1.4							15	52	20	12	1
109-132	0.20	0.020		0.8	1		10.0	1.4							19	52	18	10	1
132-193	0.11	0.013		0.9	2		8.5	1.4							15	60	15	8	2

a/ The < 2 mm. removed from the > 2 mm. by gentle agitation in water was added to the < 2 mm. obtained by dry sieving. All analyses on this sample unless otherwise noted. For 11255-11257 the carbonate was removed by Method 1B3 and the determinations made on and reported for the sample so treated.

b/ Inclusive of coarse fragments, carbonate, and gypsum.

c/ Determination by Methods 6E1a and 6E1c on whole material and calculated as a percentage of the < 2 mm.

d/ Determination on < 2 mm. obtained by washing the > 2 mm. gently in water; methods 6E2a and 6E1c.

e/ Assumed bulk density of moist fine-earth fabric for calculation purposes.

f/ 4.0 kg/m² to 102 cm (Method 6A).

Soil Classification: Typic Torriorthent; sandy, mixed, thermic
 Soil: SND-7
 Soil Nos.: S59NMex-7-3
 Location: NE 1/4 NW 1/4, Sec. 35, T21S, R3E, Dona Ana County, New Mexico

Geomorphic Surface: Organ.
 Land Form: Alluvial fan sloping 4 percent to the west.
 Elevation: 4,900 feet.
 Parent Material: Organ fan alluvium derived from monzonite.
 Vegetation: Snakeweed, Mormon tea, *Yucca elata*, fluffgrass, and a few mesquite.
 Collected by: J. S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 12, 1959.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Surface 1/2 inch dominantly angular and subangular monzonite gravel, about 1/4 inch in diameter (not sampled).

A11 11250 0 to 4 cm. Dark grayish-brown (10YR 4.5/2 dry) or very dark brown (10YR 2.5/2 moist), ranging to brown (10YR 4.5/3 dry) or dark brown (10YR 3/3 moist); coarse sandy loam; massive and weak coarse platy; slightly hard; few roots; noncalcareous; abrupt smooth boundary.

A12 11251 4 to 15 cm. Dark grayish-brown (10YR 4.5/2 dry) or very dark brown (10YR 2/2 moist) fine gravelly loamy coarse sand; massive and single grain; soft and loose; roots few to common; mica flakes common; noncalcareous; clear smooth boundary.

A13 11252 15 to 30 cm. Ranges in color from yellowish-brown (10YR 5/4 dry) or dark yellowish-brown (10YR 3/4 moist) to dark grayish-brown (10YR 4.5/2 dry) or very dark brown (10YR 2.5/2 moist); fine gravelly loamy coarse sand; massive and single grain; soft and loose; roots common; noncalcareous; clear wavy boundary.

Clca 11253 30 to 61 cm. Thirty percent brown (10YR 5/3 dry) or dark brown (10YR 3.5/3 moist) sandy loam; massive; soft; few roots; 70 percent brown (7.5YR 5.5/2 dry) or dark brown (7.5YR 4/2 moist) fine gravelly loamy coarse sand; single grain; loose; roots common; effervesces weakly to strongly; gradual wavy boundary.

C2ca 11254 61 to 102 cm. Grayish-brown (10YR 5/2 dry) or very dark grayish-brown (10YR 3/2 moist) fine gravelly loamy coarse sand; massive and single grain; soft and loose; fine roots are few to common; carbonate filaments occur in the massive portions; larger pebbles have discontinuous carbonate coatings; occurring more commonly at contacts between pebbles; mica flakes common; effervesces strongly.

IIB2cab 11255 81 to 109 cm. Reddish-brown (5YR to 7.5YR 4.5/3 dry) or dark reddish-brown (5YR to 7.5YR 3.5/3 moist) loam; very weak medium subangular blocky; slightly hard; few roots; thin reflective surfaces along channels and on sand grains; carbonate filaments common; carbonate coatings along channels, on root traces, and in many pores; effervesces weakly to strongly; clear wavy boundary.

IIIB3cab 11256 109 to 132 cm. Brown (7.5YR 5/4 dry) or reddish-brown (5YR 4/4 moist) gravelly sandy loam; massive; slightly hard; few roots; carbonate filaments common; very weak evidence of clay movement (some reflective surfaces along a few channels and vesicles); effervesces strongly; gradual wavy boundary.

IVCcab 11257 132 to 193 cm. Brown (7.5YR 5/4 dry) or dark brown (5YR to 7.5YR 4/4 moist) loamy sand; massive; slightly hard to soft; very few roots; weak carbonate coatings on surfaces of larger voids; effervesces weakly to strongly.

Remarks: Upper 5 horizons from interfluvial, level transversely; lower 3 horizons from north bank of nearby arroyo, just south of interfluvial.

SOIL CLASSIFICATION: Typic Torrifuvent; sandy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Vinton SOIL Nos. S59Mex-7-4 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 11258-11268, 72L575

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B, a/

Depth (cm.)	Horizon	Size class and particle diameter (mm)											2A2 Coarse fragments h/			
		Total			Sand					Silt			Clay (2-0.1)	Vol.		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.02-0.002)	250-2		76-2	19-2	
Pct. of < 2 mm											% < 250	% < 76	% < 19			
Carbonate Removed																
0-5	A2	78.0	16.3	5.7	15.2	15.8	8.4	19.1	19.5	12.3	4.0	43.0	58.5	5	10	10
5-23	B2t	76.4	15.6	8.0	19.1	16.5	7.9	15.7	17.2	11.9	3.7	38.1	59.2	10	16	16
23-38	C1ca	78.9	14.2	6.9	22.2	17.5	7.8	14.6	16.8	10.6	3.6	35.8	62.1	10	15	15
38-58	IIC2ca	87.4	8.0	4.6	28.8	21.9	11.0	15.8	9.9	5.8	2.2	23.5	77.5	15	24	24
58-66	IIIB1b	75.1	16.6	8.3	15.5	14.7	7.8	16.7	20.4	12.7	3.9	42.8	54.7	10	20	20
66-74	IVB2cab	77.9	12.9	9.2	24.8	16.3	7.6	14.7	14.5	9.3	3.6	32.0	63.4	10	22	22
74-97	IVC1cab	79.9	13.3	6.8	25.6	19.2	8.0	13.6	13.5	9.8	3.5	30.5	66.4	15	28	28
97-135	VC2cab	71.6	18.5	9.9	15.4	13.0	7.7	16.8	18.7	13.8	4.7	41.9	52.9	10	22	22
135-160	VB1cab2	74.2	14.4	11.4	16.6	15.0	8.0	16.9	17.7	10.1	4.3	37.4	56.5	10	15	15
160-198	VB2cab2	60.6	20.4	19.0	14.7	11.0	6.2	13.2	15.5	14.0	6.4	37.3	45.1	15	23	23
198-213	VB2cab2	69.4	15.8	14.8	19.1	14.4	7.3	14.9	13.7	10.5	5.3	32.7	55.7	10	22	22

Depth (cm.)	6A1a	6B1a	C/N	6C1a Ext. Iron as Fe Pct.	Carbonate as CaCO ₃		Bulk density		CEC NH ₄ OAc me./100g.	Water content			Composition Whole Material c/					
	Organic carbon b/, g/ Pct.	Nitrogen b/ Pct.			<2mm. d/ Pct.	<2mm. e/ Pct.	f/ g/cc	g/cc		NONCARBONATE	>2mm. Pct.	Sand Pct.	Silt Pct.	Clay Pct.	Carbonate as CaCO ₃ Pct.	Pct.	Pct.	Pct.
0-5	0.19	0.026	7	1.1	0.3		1.4	6.0										
5-23	0.22	0.022	10	0.9	-		1.4	6.5				16	64	13	7	-		
23-38	0.25	0.029	9	0.9	2	4.4	1.4	6.7				15	65	12	6	2		
38-58	0.18	0.015		1.0	1	5.2	1.4	4.8				24	65	6	4	1		
58-66	0.19	0.018		0.9	1	1.5	1.4	7.1				20	60	13	6	1		
66-74	0.19	0.020		0.8	1	3.0	1.4	7.2				22	60	10	7	1		
74-97	0.13	0.016		0.8	3	4.4	1.4	6.4				27	57	9	5	2		
97-135	0.14	0.015		0.9	1	1.3	1.4	8.6				22	54	15	8	1		
135-160	0.13	0.015		1.0	1	2.8	1.4	8.5				15	63	12	9	1		
160-198	0.15	0.019		1.1	1		1.4	12.2				23	47	15	14	1		
198-213	0.11	0.013		0.8	13		1.4	11.0				20	48	11	10	11		

- a/ The < 2 mm. was removed from the > 2 mm. by gentle agitation in water. This < 2 mm. was added to the < 2 mm. obtained by dry sieving. Carbonate was removed from the composited sample by Method 1B3. Determinations were made on and reported for the composite sample so treated unless otherwise indicated.
- b/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- c/ Inclusive of coarse fragments, carbonate, and gypsum.
- d/ Determination on whole material by Methods 6E1a and 6E1c and calculated as a percentage of the < 2 mm.
- e/ < 2 mm. obtained by washing the > 2 mm. gently in water; Method 6E1c.
- f/ Bulk density assumed for moist fine-earth fabric for calculations.
- g/ 2.3 kg/m² to 97 cm (Method 6A).
- h/ Volume on carbonate-containing basis; weight on carbonate-free basis.

59-4

Soil Classification: Typic Torrifluent; sandy, mixed, thermic
 Soil: Vinton
 Soil Nos.: S59NMex-7-4
 Location: North bank of arroyo, SW 1/4 NW 1/4, Sec. 34, T21S, R3E, Dona Ana County, New Mexico.
 Geomorphic Surface: Organ.
 Land Form: Ridge sloping 3 percent to the west. Elevation: 4,735 feet.
 Parent Material: Organ alluvium derived from monzonite. Sediments from 0 to 58 cm are Organ; from 58 to 135 cm probably early Organ; from 135 to 213 cm, Jornada II.
 Vegetation: Dominantly snakeweed, few clumps black grama, fluffgrass, few Mormon tea, Yucca elata, very few creosotebush.
 Collected by: J. S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 12, 1959.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Discontinuous layer of fine monzonite gravel, mainly less than 1/4 inch in diameter.

A2 11258 0 to 5 cm. Brown (10YR 5/3 dry) or dark brown (10YR 3/3 moist) coarse loamy sand; weak thin and medium platy; soft; few roots; noncalcareous; abrupt smooth boundary.

B2t 5 to 23 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/4 moist) coarse sandy loam; massive to single grain; soft; roots few to common; noncalcareous; abrupt wavy boundary.

Clca 11260 23 to 38 cm. Brown (10YR 5/3 dry) or dark yellowish-brown (10YR 3/4 moist) coarse sandy loam; massive; soft to slightly hard; roots few to common; effervesces weakly and strongly; abrupt wavy boundary.

IIC2ca 11261 38 to 58 cm. Brown (10YR to 7.5YR 5/3 dry) or dark brown (10YR to 7.5YR 3.5/3 moist) fine gravelly sand; single grain to massive; loose to soft; few roots; thin discontinuous carbonate coatings on pebbles; effervesces strongly; abrupt wavy boundary.

IIB1b 11262 58 to 66 cm. Brown (10YR 5/3 dry) or dark yellowish-brown (10YR 3.5/4 moist) coarse sandy loam; massive; slightly hard; few roots; effervesces weakly; clear wavy boundary.

IVB2cab 11263 66 to 74 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/4 moist) fine gravelly coarse sandy loam; massive; slightly hard; few roots; thin discontinuous carbonate coatings on some pebbles; generally effervesces weakly and strongly with a few parts noncalcareous; clear wavy boundary.

IVC1cab 11264 74 to 97 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/4 moist) fine very gravelly loamy coarse sand; 80 percent single grain, 20 percent massive; loose and soft; few roots; undersides of larger pebbles coated with carbonate; effervesces weakly and strongly; clear wavy boundary.

VC2cab 11265 97 to 135 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/4 moist) coarse sandy loam; massive; friable; very few roots; few carbonate filaments; thin, discontinuous carbonate coatings on pebbles and on walls of larger voids; few weak dull films on larger void surfaces; insect holes up to 1/2 inch in diameter are common and have thin coatings of fine material, the same color as rest of horizon; effervesces weakly and strongly; clear wavy boundary.

VIB1cab2 11266 135 to 160 cm. Brown (7.5YR to 5YR 5/4 dry) or dark brown (7.5YR 3.5/3 moist) coarse sandy loam; massive; friable; very few roots; reflective surfaces on sand grains common; few carbonate filaments; effervesces weakly; clear to gradual boundary.

VIB21cab2 11267 160 to 198 cm. Reddish-brown (5YR 5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) sandy clay loam; weak medium subangular blocky; firm; few roots; few reflective surfaces on weak ped faces and on walls of non-capillary size voids; few carbonate filaments; effervesces weakly and strongly; clear smooth boundary.

VIB22cab2 11268 198 to 213 cm. Fifty percent reddish-brown (5YR 5/4 dry, 4/4 moist) and 50 percent pinkish-white (5YR 8/2 dry) or light reddish-brown (5YR 6/3 moist), the latter relatively rich in carbonate, sandy clay loam; massive; firm; very few roots; carbonate occurs fairly continuously throughout; effervesces strongly.

Remarks: The VC2cab horizon (97 to 135 cm.) may be a buried B, related to the IIB2cab horizon of S59NMex-7-3.

Mineralogy (Methods 7A2, 7A3): The Beltsville laboratory determined the clay mineralogy of the Clca horizon (23-38 cm). A poorly organized montmorillonite-vermiculite intergrade is abundant; a small amount of mica and 15 percent kaolinite are present.

59-5

Soil Classification: Typic Haplargid; sandy, mixed, thermic

Soil: Onite, sandy subsoil variant

Soil Nos.: S59NMEX-7-5

Location: South bank of arroyo, NE 1/4 SE 1/4, Sec. 32, T21S, R3E, Dona Ana County, New Mexico.

Geomorphic Surface: Organ. Land Form: Slight ridge sloping 2 percent to the west. Elevation: 4,600 feet.

Parent Material: Organ alluvium derived from monzonite.

Vegetation: Dominantly snakeweed, black grama and fluffgrass, with few Mormon tea and Yucca elata.

Collected by: J. S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 13, 1959.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. 30 to 40 percent of surface covered by angular to subangular monzonite fragments mainly less than 1/2 inch in diameter.

Al 11269 0 to 4 cm. Brown (10YR to 7.5YR 5/4 dry) or dark brown (10YR to 7.5YR 3/4 moist) coarse sandy loam; upper 1/8 inch moderate medium platy and lower part single grain to weak medium platy; soft and slightly hard; few roots; effervesces weakly; abrupt smooth boundary.

B2t 11270 4 to 20 cm. Reddish-brown (6YR 5/4 dry) or dark reddish-brown (6YR 3.5/4 moist) coarse sandy loam; massive; slightly hard; few roots; faint reddish stains on sand grains; few parts noncalcareous and most parts effervesce weakly; clear smooth boundary.

Clca 11271 20 to 53 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/4 moist) fine gravelly sandy loam; very weak medium subangular blocky; slightly hard; roots few to common; scattered carbonate filaments on ped faces and on pebbles; effervesces strongly; abrupt wavy boundary.

IIC2 11272 53 to 64 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 4/4 moist) loamy sand; massive; soft; few roots; effervesces strongly; abrupt wavy boundary.

IIIC3ca 11273 64 to 84 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 4/4 moist) fine gravelly sand; single grain to massive; loose to soft; few roots; few thin discontinuous carbonate coatings on pebbles; effervesces strongly; abrupt wavy boundary.

IVC4 84 to 137 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 4/4 moist) fine loam with pockets of gravelly sand totalling 40 percent; massive and single grain; loose and slightly hard; few roots; effervesces strongly; abrupt boundary.

VC5 137 to 160 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 4/4 moist) fine loam; massive; firm; few roots; effervesces weakly to strongly; abrupt boundary.

VIBcab 160 to 216 cm. Reddish-yellow (5YR 5.5/6 dry) or yellowish-red (5YR 4/6 moist) fine gravelly sandy clay loam; weak fine to medium subangular blocky; firm; few roots; carbonate coatings common on surfaces of structural units and on pebbles; effervesces weakly to strongly.

Material below was removed with a bucket auger and descriptions made at four-inch intervals. The horizon is probably a buried B horizon with secondary carbonate accumulations.

Bcab 216 to 226 cm. Reddish-brown (5YR 5/4 dry) or yellowish-red (5YR 4/6 moist) clay loam.

Bcab 226 to 236 cm. Pink (5YR 7/3 dry) or light reddish-brown (5YR 6/4 moist) clay loam; few reddish parts effervesce weakly, remainder effervesces strongly; few extremely hard carbonate cylindroids.

Bcab 236 to 246 cm. Same as above.

Bcab 246 to 257 cm. Red to yellowish-red (2.5YR to 5YR 4/6 dry) or reddish-brown (2.5YR to 5YR 5/4 moist); carbonate is reddish-brown (5YR 5/4 moist) or pink (5YR 7/3 dry) clay loam; higher in carbonate than above and slightly higher in clay.

Bcab 257 to 267 cm. Reddish-brown (5YR 5/4 dry; 4/4 moist); carbonate colored as above; heavy sandy clay loam (more sand than above); few pebbles up to 1/2 inch in diameter.

Bcab 267 to 277 cm. Light reddish-brown to light brown (5YR to 7.5YR 6/4 dry) or reddish-brown to dark brown (5YR to 7.5YR 4/4 moist); sandy clay loam; much less carbonate than above; effervesces strongly; few pebbles up to 1/2 inch in diameter.

277 cm. plus. K2m horizon.

Remarks: This soil occurs along a gully, and is considered to be truncated, with a weak argillic horizon.

SOIL CLASSIFICATION: Ustollic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Berino, Ustollic variant

SOIL Nos. S59NMex-7-6

LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska

LAB. Nos. 11274-11283

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Radiocarbon Samples: 20846-20847, 67L039

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1													31a Fine clay <0.0002	2A2 coarse fragments f/		
		Total														Vol. 250-2	Wt. 76-2	3B1 19-2
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02 (0.02-0.002)	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	250-2				
Pct. of < 2 mm																		
Carbonate Removed a/																		
0-13	A1	62.2	20.9	16.9	5.1	8.9	7.7	22.5	18.0	7.5	13.4	37.6	44.2		tr	tr	tr	
13-30	B21tca	55.4	16.4	28.2	2.7	7.0	7.0	21.8	16.9	8.1	8.3	37.2	38.5	10.6	tr	tr	tr	
30-51	B22tca	53.2	20.4	26.4	3.6	5.3	4.6	19.4	20.3	11.7	8.7	43.8	32.9	8.1	tr	tr	tr	
51-71	B1b	63.8	18.1	18.1	6.7	9.1	6.4	21.9	19.7	10.6	7.5	42.8	44.1	8.7	tr	tr	tr	
71-91	B2tb	50.5	11.5	38.0	4.5	5.9	5.1	19.7	15.3	7.0	4.5	33.6	35.2	19.7	tr	tr	tr	
91-117	K1b	65.0	14.3	20.7	3.4	4.6	5.3	30.9	20.8	8.7	5.6	49.1	44.2	9.1	tr	tr	tr	
117-168	K2b	71.3	13.7	15.0	6.1	7.0	6.5	29.0	22.7	9.0	4.7	48.5	48.6	8.7	tr	tr	tr	
168-201	B2tb2	35.7	39.0	25.3	5.4	4.1	1.8	6.5	17.9	23.5	15.5	45.9	17.8	10.3	5	12	12	
201-231	K21b2	69.8	9.4	20.8	5.4	6.5	5.8	30.7	21.4	6.0	3.4	47.1	48.4	9.9	tr	tr	tr	
231-262	K22b2	66.8	14.2	19.0	7.0	9.3	5.8	23.7	21.0	8.1	6.1	44.3	45.8		tr	tr	tr	
Carbonate Not Removed																		
0-13	A1	57.4	24.7	17.9	5.1	8.8	7.8	19.6	16.1	8.0	16.7	35.2	41.3					
13-30	B21tca	49.8	20.2	30.0	2.5	6.8	6.6	19.1	14.8	8.1	12.1	33.7	35.0					
30-51	B22tca	44.4	26.4	29.2	1.6	3.5	3.7	16.7	18.9	11.9	14.5	41.3	25.5					
51-71	B1b	59.9	20.5	19.6	6.1	8.1	6.5	20.6	18.6	11.1	9.4	41.9	41.3					
71-91	B2tb	50.3	12.1	37.6	5.3	6.5	5.4	18.8	14.3	6.3	5.8	31.6	36.0					
91-117	K1b	59.0	16.8	24.2	4.8	5.2	5.2	25.5	18.3	8.4	8.4	41.7	40.7					
117-168	K2b	56.6	20.2	23.2	4.7	5.3	5.4	22.8	18.4	8.6	11.6	40.8	38.2					
168-201	B2tb2	59.2	14.0	26.8	12.8	8.0	6.3	19.6	12.5	5.7	8.3	29.3	46.7					
201-231	K21b2	45.6	19.6	34.8	3.5	4.1	4.0	20.1	13.9	5.5	14.1	32.1	31.7					
231-262	K22b2	44.0	24.3	31.7	4.7	4.9	3.5	15.7	15.2	6.4	17.9	32.0	28.8					
Depth (cm.)	6A1a Organic carbon %	6B1a Nitrogen %	C/N	6C1a Ext. Iron as Fe %	Carbonate as CaCO ₃		6B1a Total Phos.		6C1a CEC NH ₄ OAc 5A1a		Water Content		Composition Whole Material b/					
					6E1a, 3A1a <2mm. <0.002 mm. Pct.		a		a		e/		NONCARBONATE			Carbonate as CaCO ₃		
					Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	me./100g.	g/cc	Pct.	>2mm. Pct.	Sand Pct.		Silt Pct.	Clay Pct.
0-13	0.73	0.064	11	0.8	tr	tr	0.032	0.040	15.8	15.9	1.4		tr	62	21	17	tr	
13-30	0.55	0.070	8	0.8	8	6	0.040	0.034	18.0	15.6	1.4		tr	52	15	25	8	
30-51	0.39	0.048	8	0.8	15	11	0.042	0.042	16.2	13.3	1.4		tr	46	17	22	15	
51-71	0.13	0.021	6	0.8	5	3	0.025	0.015	10.4	9.4	1.5		tr	61	17	17	5	
71-91	0.22	0.032	7	0.9	5	1	0.026	0.022	21.3	20.5	1.5		tr	48	11	36	5	
91-117	0.05			0.7	12	8	0.025	0.018	12.8	10.9	1.6		tr	57	12	19	12	
117-168	0.06			0.6	18	10	0.036	0.015	10.8	9.6	1.6		tr	58	12	12	18	
168-201	0.11			1.0	15	12	0.029		16.3	10.9	1.6	10.2	10	28	30	19	13	
201-231	0.08			0.7	32	21	0.021		13.7	8.9	1.8		tr	48	6	14	32	
231-262	0.06			0.7	34	19	0.046		12.7	7.2	1.8		tr	44	9	13	34	
0-38	0.43d/																	

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ Inclusive of coarse fragments, carbonate, and gypsum.
- c/ 4.8 kg/m² to 91 cm (Method 6A).
- d/ Composite of 4 auger samples spaced 2 m apart in a line 2 m north and parallel to gully, and 5 m from 59-6. All samples taken between dunes.
- e/ Assumed bulk densities of the moist fine-earth for calculations.
- f/ Volume on carbonate-containing basis; weight on carbonate-free basis.

Radiocarbon Dates

Sample Description a/	Carbon Isotope Data	
	C-13	C-14 Age b/ Yrs B.P.
Across boundary between B2tb and K1b horizons; whole material; I-2125, LSL 20846	δ - 0.4	11,700 ± 170
Lower half of K2b horizon Whole material; I-2126, LSL 20847	δ + 1.1	25,500 + 800
2 to 0.5 mm. c/; I-2734, LSL 67L039		- 700
		29,000 + 2,700
		- 2,100
K22b2 horizon; whole material; I-4410, LSL 67L135	δ - 1.2	26,950 ± 1,050

- a/ Samples 27-30 in Soil Monograph.
- b/ Not adjusted for δ C-13 value.
- c/ Dispersed by Method 3A1, except that treatment with hydrogen peroxide was omitted and a solution of sodium phosphate glass adjusted to pH 8.5 with NaOH was used as the dispersing agent. The < 2 mm. contains 23 percent total carbonate, 2 percent 2-0.5 mm. carbonate, and 17 percent < 0.02 mm. carbonate (Method 6E1b). As viewed under the petrographic microscope, all of the carbonate in the 2-0.5 mm. consists of aggregates of much smaller crystals of carbonate, consistent with a pedogenic origin.

Total Analysis, Method 7C2. The B21tca and the B2tb horizons, respectively, contain 0.06 and 0.05 percent Mn, expressed as MnO.

Soil Classification: Ustollic Haplargid; fine-loamy, mixed, thermic
 Soil: Berino, Ustollic variant
 Soil Nos.: S59Mex-7-6
 Location: 400 feet south of Highway 70, SW 1/4 NW 1/4, Sec. 18, T22S, R3E, Dona Ana County, New Mexico.
 Geomorphic Surface: Isaacks' Ranch.
 Land Form: Surface of broad drainage way; on coalescent fan piedmont sloping 1 percent to west-northwest.
 Elevation: 4,490 feet.
 Parent Material: Drainage way sediments composed mainly of monzonite and rhyolite with a small amount of limestone (see Remarks).
 Vegetation: Vegetation between dunes is mostly tarbush, with a few matrimony vine; vegetation on dunes is dominantly mesquite, with a few four-wing salt bush.
 Collected by: J. S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 14, 1959.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface, 20 to 0 cm. Dune sand, not sampled.

A1 11274 0 to 13 cm. Reddish-brown (5YR 4.5/3 dry) or dark reddish-brown (5YR 3/3 moist) with some aggregates and weak coatings on ped surfaces colored 5YR to 10YR 3/2 (moist); fine sandy loam; very weak subangular blocky, with small parts massive, especially in the upper part; slightly hard; roots common; effervesces weakly; clear wavy boundary.

B21tca 11275 13 to 30 cm. Reddish-brown (5YR 5/4 dry) or dark reddish-brown (5YR 3/4 moist) sandy clay loam; weak coarse prismatic, breaking to weak to moderate medium subangular blocky; slightly hard to hard; common fine roots; few fine and very fine tubular pores; discontinuous reflective surfaces on peds and on walls of larger pores; sand grains thinly stained with clay; carbonate occurs along root traces and as few fine nodules; effervesces strongly; clear wavy boundary.

B22tca 11276 30 to 51 cm. Reddish-brown (5YR 5/4 dry) or (5YR 4/4 moist) clay loam; weak coarse prismatic, breaking to weak to moderate medium subangular blocky; hard; few roots; sand grains thinly stained with clay; faint discontinuous reflective surfaces on ped and macro-pore surfaces; few fine carbonate nodules; carbonate accumulations on walls of pores and on root traces; effervesces strongly to violently; clear wavy boundary.

B1b 11277 51 to 71 cm. Reddish-brown (5YR 5/4 dry) or yellowish-red (5YR 4/6 moist) sandy clay loam with a few pebbles up to 1/4 inch in diameter; weak coarse subangular blocky; hard; few roots; few slightly hard carbonate nodules; lowermost 5 cm coarser; effervesces strongly; clear smooth boundary.

B2tb 11278 71 to 91 cm. Red (2.5YR 4/6 dry) or dark red (2.5YR 3/6 moist) sandy clay; moderate to strong medium prismatic, breaking to strong medium angular blocky; very hard; no roots; sand grains stained with reddish clay; prisms stained in places with black filamentous material; continuous smooth, reflective surfaces on peds; few fine indurated nodules, some of which are cylindrical, occur mostly in cleavage planes between prisms; noncemented concentrations of carbonate plentiful on pore walls; interiors of peds effervesce weakly with some noncalcareous portions; clear wavy boundary.

K1b (B3cab) 11279 91 to 117 cm. Pink (5YR 7/3 dry) or light reddish-brown (5YR 6/4 moist) sandy clay loam; weak medium subangular blocky; hard; very few roots; many very fine pores; when dry shows a complex color pattern of reddish-brown coatings on planes of weakness with pink carbonate-rich material away from the structural surfaces; many peds are carbonate aggregates; 30 to 40 percent carbonate nodules and cylindrical; effervesces strongly; clear wavy boundary.

K2b (Ccab) 11280 117 to 168 cm. Mainly light reddish-brown (5YR 6.5/4 dry, 5YR 5.5/4 moist) with small amount reddish-brown (5YR 4/4 moist) loam; weak coarse subangular blocky to massive; hard; few roots; carbonate nodules common; carbonate more abundant in lower part; carbonate lines probable old root channels; effervesces strongly; clear wavy boundary.

B2tb2 11281 168 to 201 cm. Yellowish-red (5YR 5/5 dry, 5YR 3/6 to 4/6 moist) sandy clay loam; moderate medium subangular blocky to massive; very hard; few roots; many sand grains stained with reddish clay; discontinuous reflective surfaces on peds; few carbonate nodules; effervesces strongly; abrupt smooth boundary.

K21b2 (C1cab2) 11282 201 to 231 cm. Pink (5YR 8/3 dry) or light reddish-brown (5YR 6/4 moist) loam; moderate very coarse platy; very hard; few roots; discontinuous reddish coatings on surfaces of plates; effervesces strongly; clear wavy boundary.

K22b2 (C2cab2) 11283 231 to 262 cm. Pink (7.5YR 7.5/4 dry) or light brown (7.5YR 6/4 moist) sandy loam to loam; massive; very hard; few roots; effervesces strongly.

Remarks: Alluvial parent materials in upper 51 cm are Isaacks' Ranch; underlying deposits are associated with buried Jornada I and II surfaces.

Micromorphology, Method 4E1b. The fabric of the B2tb horizon is plasmic and strongly asepic. Large voids are mostly planar. Weak cracks crudely delineate polyhedrons 1/2 mm. across. Parts up to one millimeter across and a few millimeters long that show moderate preferred orientation of the clay are fairly common. In some instances, these parts are associated with macroscopic planar voids, but in other instances, they are not. Glebbules of oriented clay are fairly common; none definitely appear to be formed by in-place weathering, although the possibility exists. Many of the sand grains are quite angular. Quartz and feldspar predominate; grains of ferromagnesian minerals are scarce, mostly pyroxene and amphibole with very little biotite. The feldspar are diverse, both plagioclase and K-feldspar. Composite grains are quite common; they consist mostly of feldspar optical domains that range widely in size down to very small units. The pyroxene and amphibole are fractured and have ragged, altered edges. Some composite grains that consist entirely of feldspar optical domains show appreciable peripheral alteration. Occasional composite grains contain biotite in a feldspar matrix. At the periphery of the composite grain the biotite is more altered. Some composite grains show alteration or staining along planes of weakness between optical domains. Black, opaque cutans are well expressed. They range from a few microns across to 20 microns and are continuous over distances up to a millimeter, but mostly less. Some are cutans and would appear to have formed in place, but they may have been the cause of the crack and not a feature formed on the crack surface. In addition to these elongate features, there are numerous small dark bodies that appear roughly equidimensional, but may be elongated normal to the plane of observation.

Sand Mineralogy, Method 7B1. Counts of 300 grains were made on the carbonate-free very fine sand from the B21tca, K2b, and K22b2 horizons. The three horizons have similar mineralogy. They contain about 40 percent quartz, 40 percent discrete feldspar, 15 percent microcrystalline aggregates, 3 percent ferromagnesian grains, and 1 percent opaques. The discrete feldspar are mostly orthoclase and albite with some microcline. About one-fourth of the discrete feldspar grains are plagioclase of intermediate calcium content. The microcrystalline aggregates are mostly composites of small optical domains of feldspar having an index of refraction consistent with orthoclase. These composites range widely in the extent of alteration. The ferromagnesian minerals are epidote-zoisite, hornblende, pyroxene, garnet, and biotite. Much of the epidote-zoisite consists of composites of small crystals; the mineralogical identification is questionable. The few grains of biotite present show weak yellow interference color. Some of the grains have thick patchy coatings of reddish-brown silicate clay with little difference in the proportion among the three horizons. Many grains have numerous opaque inclusions.

The fine sand from the K2b horizon was also examined. It contains 45 percent quartz, 35 percent discrete feldspar, 25 percent microcrystalline aggregates, one percent ferromagnesian minerals, and one percent opaques. The higher proportion of microcrystalline aggregates than in the very fine sand may be related partly to the grains being thicker. The same volume proportion of opaque material in a thicker grain would reduce the amount of light transmitted more. The patchy coatings of reddish-brown silicate clay may be better expressed and more common than in the very fine sand.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Bucklebar SOIL Nos. S59(61)RMex-7-7 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 11284-11288, 15023

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B Radiocarbon samples: 20848, 67L038, 67L042

Depth (cm.)	Horizon	Size class and particle diameter (mm)												3Alb Fine clay < 0.0002	2A2 coarse fragments e/		
		Total		Sand						Silt					Vol. 250-2	Wt. 76-2	3B1 19-2
		Sand (2-0.05)	Silt (0.05- 0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02- 0.002)	Int. II (0.2-0.02)	(2-0.1)				
Pct. of < 2 mm															250	76	19
Carbonate Removed a/																	
0-15	A	63.0	23.4	13.6	7.8	10.2	7.1	18.8	19.1	11.0	12.4	41.7	43.9	5.2	tr	tr	tr
15-38	B21t	61.5	16.5	22.0	15.4	11.3	6.2	15.1	13.5	9.2	7.3	31.7	48.0	10.5	5	13	13
38-58	B22tca	48.7	28.1	23.2	16.7	8.4	3.6	7.7	12.3	17.0	11.1	34.0	36.4	10.8	10	16	16
58-97	C1ca	70.8	10.0	19.2	19.0	9.6	6.7	22.4	13.1	6.0	4.0	31.7	57.7	7.3	5	10	10
97-127	C2ca	35.2	37.7	27.1	6.6	4.7	2.4	6.8	14.7	20.7	17.0	39.8	20.5	9.3	3	5	5
127-147	Bc sb	56.8	20.6	22.6	9.8	8.9	5.5	16.2	16.4	12.2	8.4	38.6	40.4	6.1	15	23	23
Carbonate Not Removed																	
0-15	A	60.2	26.9	12.9	6.8	9.2	6.8	17.9	19.5	12.0	14.9	42.7	40.7				
15-38	B21t	54.0	20.3	25.7	8.5	10.4	6.0	14.5	14.6	9.7	10.6	33.2	39.4				
38-58	B22tca	44.2	31.9	23.9	14.0	7.0	3.2	7.1	12.9	17.4	14.5	34.8	31.3				
58-97	C1ca	33.0	42.4	24.6	5.1	3.6	1.7	6.2	16.4	22.6	19.8	43.4	16.6				
97-127	C2ca	33.5	42.8	23.7	6.1	4.1	2.2	6.5	14.6	21.0	21.8	40.0	18.9				
127-147	Bc sb																

Depth (cm.)	6A1a	6B1a	C/N	6C1a Ext. Iron as Fe a	Carbonate as CaCO ₃		d/ g/cc	4Alb Air- Dry g/cc	CEC NH ₄ OAc 5A1a		Water content			Composition Whole Material b				
	Organic carbon c/ Pct.	Nitrogen Pct.			6E1a Iron as Fe a Pct.	3A1a <0.002 mm Pct.			a	me./100g.	Pct.	Pct.	Pct.	NONCARBONATE				Carbonate as CaCO ₃ Pct.
														>2mm.	Sand	Silt	Clay	
0-15	0.43	0.038	11	0.8	1	1.4	12.3	12.7					tr	63	22	14	1	
15-38	0.40	0.042	10	0.8	tr	1.4	13.9	15.9					13	54	14	19	tr	
38-58	0.25	0.032	8	0.8	3	1.5	14.3	14.5					16	39	23	19	3	
58-97	0.19			0.7	8	1.5	12.7	14.8					9	60	8	16	7	
97-127	0.12			1.0	6	1.6	16.7	15.8					5	31	34	24	6	
127-147				1.1	8	1.6	17.4	14.1					22	41	14	17	6	

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ Inclusive of coarse fragments, carbonate and gypsum.
- c/ 3.9 kg/m² to 97 cm (Method 6A).
- d/ Assumed bulk densities for the moist fine-earth fabric for calculations.
- e/ Volume on carbonate-containing basis; weight on carbonate-free basis.

Radiocarbon Dates

Sample ^{a/}	C-14 Age Yrs. B.P.
Lower three-fourths of C1ca horizon	
Whole material; I-2127, LSL 20848	8,010 ± 130
Whole material; water treated ^{b/} ; I-2727, LSL 20848	8,430 ± 140
2-0.05 mm ^{c/} ; I-2733, LSL 67L038	7,880 ± 150

- a/ Samples 9-11 in Soil Monograph.
- b/ 800-gram sample was allowed to stand 24 hours in distilled water, then shaken overnight in a sealed container with 4 l. of distilled water. The sample was flocculated with ethanol. Water was withdrawn with filter candles and the sample then was air-dried.
- c/ Material noticeably whitened by carbonate was segregated from the field sample (67L042). The sample was dispersed as described in Method 3A1, except that treatment with hydrogen peroxide was omitted and sodium phosphate glass adjusted to pH 8.5 with NaOH was used as the dispersing agent. The < 2 mm. contains 2.1 percent carbonate 2-0.05 mm., 1.5 percent 0.05-0.02 mm., 10.3 percent 0.02-0.002 mm., and 5.8 percent < 0.002 mm. As viewed under the petrographic microscope, the carbonate in 20848 has a morphology consistent with pedogenic origin.

Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic
 Soil: Bucklebar
 Soil Nos.: S59NMex-7-7
 Location: West bank of arroyo, NE 1/4 NE 1/4, Sec. 18, T22S, R3E, Dona Ana County, New Mexico.
 Geomorphic Surface: Isaacks' Ranch.
 Land Form: Surface of broad drainageway; coalescent fan piedmont sloping 1 percent to west-northwest.
 Elevation: 4,525 feet.
 Parent Material: Monzonitic Isaacks' Ranch drainageway sediments from 0-127 cm; Jornada II sediments from 127 to 147 cm.
 Vegetation: Tarbush, creosotebush, snakeweed, tumbleweed, few clumps of tobosa, and few mesquite.
 Collected by: J. S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 14, 1959.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Weakly cracked into plates 1 to 2 inches wide and several mm. thick. A few coarse sand grains and monzonite pebbles less than about 1/2 inch in diameter are scattered over the surface, which has a generally smooth, bare appearance.

A 11284 0 to 15 cm. Brown (10YR 5/3 dry) or dark brown (7.5YR 3.5/2 moist) sandy loam; weak medium platy; soft; few roots; few monzonite pebbles 1/2 inch in diameter scattered on the surface; upper one-third effervesces weakly and lower two-thirds noncalcareous; abrupt wavy boundary.

B2lt 11285 15 to 38 cm. Reddish-brown (5YR 4/3 dry) or dark reddish-brown (5YR 3/3 moist) sandy clay loam; weak medium subangular blocky; very hard; few roots; peds have thin continuous to discontinuous reflective surfaces; noncalcareous; clear wavy boundary.

B2tca 11286 38 to 58 cm. Reddish-brown (5YR 5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) loam; massive to weak coarse subangular blocky; very hard; no roots; few smooth reflective surfaces on ped faces; very few carbonate coatings; effervesces weakly to strongly; clear wavy boundary.

Clca 11287 58 to 97 cm. Reddish-brown (5YR 5/3.5 dry, 4/4 moist) fine loam; few pinkish-white (5YR 8/2 dry) and pink (5YR 7/3 moist) fine carbonate nodules; weak coarse and medium subangular blocky; very hard; very few roots; common fine tubular pores; some pores have carbonate coatings on walls; effervesces strongly; clear wavy boundary.

C2ca 11288 97 to 127 cm. Reddish-brown (5YR 5/4 dry; 4/4 moist) light silty clay loam; moderate medium subangular blocky; very hard; few roots; carbonate on ped surfaces and on walls of pores; effervesces strongly; clear wavy boundary.

Bcab 15023 127 to 147 cm. Yellowish-red (5YR 5/6 dry, 4/6 moist) sandy clay loam; weak to moderate medium subangular blocky; hard and very hard; very few roots; sand grains stained with clay; few fine carbonate nodules and carbonate filaments; some ped surfaces weakly reflective; effervesces weakly to strongly.

Remarks: Later observations showed that an A2 horizon extends from 0-5 cm and a B1t horizon from 5-15 cm.

Clay Mineralogy, Methods 7A2, 7A3. The Beltsville Laboratory determined that the B2tca horizon contains a moderate amount of montmorillonite, a small amount of illite, and 15 percent kaolinite. Carbonate removed prior to analysis by Method 1B3.

Strength (Hodgson, 1974). The median strength at air dryness for 9 pieces of the B2lt horizon (15-38 cm) is 600 N with a range of 400 to > 800 N (one piece > 800).

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Bucklebar, overburden variant SOIL Nos. S59(65)NMex-7-8 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 11289-11295, 20807

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1			2A2 Coarse fragments <u>e/</u>			
		Total			Sand							Silt	Clay	Vol.	Wt.	3B1			
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)				250-2	76-2	19-2
Pct. of < 2 mm																			
Carbonate Removed <u>a/</u>																			
0-5	C	77.5	13.0	9.5	1.6	9.7	8.8	30.3	27.1	7.8	5.2	54.0	50.4				tr	tr	tr
5-13	A2	69.5	18.6	11.9	3.7	10.1	8.4	25.2	22.1	7.9	10.7	44.2	47.4				tr	tr	tr
13-28	B21t	61.7	12.4	25.9	11.5	11.8	6.9	18.3	13.2	5.0	7.4	28.3	48.5				tr	tr	tr
28-46	B22t	50.1	16.4	33.5	5.2	6.9	5.2	16.7	16.1	8.4	8.0	34.1	34.0				tr	tr	tr
46-71	B2b	56.2	16.8	27.0	4.5	7.2	5.6	18.2	20.7	9.9	6.9	41.4	35.5				tr	tr	tr
71-112	IIK21b	69.5	11.0	19.5	17.5	11.4	6.9	19.6	14.1	6.2	4.8	31.2	55.4				15	24	24
112-155	IIK22b	73.0	10.5	16.5	5.2	7.2	8.5	30.6	21.5	5.9	4.6	43.8	51.5				tr	tr	tr
155-178	IIK3b	77.0	10.3	12.7	6.0	6.0	8.5	35.7	20.8	6.7	3.6	48.8	56.2				2	3	3
Carbonate Not Removed																			
0-5	C	78.2	12.3	9.5	1.8	8.6	8.7	29.0	30.1	7.2	5.1	55.4	48.1						
5-13	A2	69.8	18.5	11.7	4.1	10.0	9.2	24.9	21.6	8.2	10.3	44.5	48.2						
13-28	B21t	58.8	13.6	27.6	10.8	11.0	6.2	16.8	14.0	5.4	8.2	29.3	44.8						
28-46	B22t	48.3	17.1	34.6	5.1	7.0	5.4	15.6	15.2	8.6	8.5	33.0	33.1						
46-71	B2b	56.6	15.9	27.5	6.1	7.6	5.8	17.5	19.6	9.7	6.2	40.0	37.0						
71-112	IIK21b	59.2	16.8	24.0	16.6	9.8	5.9	15.1	11.8	6.4	10.4	26.7	47.4						
112-155	IIK22b	56.2	19.2	24.6	3.0	5.3	6.8	24.6	16.5	5.7	13.5	36.3	39.7						
Depth (cm.)	6A1a	6E1a	C/N	Carbonate as CaCO ₃		Bulk density		CEC		Water content			Composition Whole Material <u>b/</u>						
	Organic carbon	Nitrogen		6C1a Ext. Iron as Fe <u>a/</u>	6F1a < 2mm. Pct.	3A1a < 0.002 mm. Pct.	4A1b Air Dry <u>c/</u>	NH ₄ <u>a/</u>	OAc <u>a/</u>	Pct.	Pct.	Pct.	NONCARBONATE				Carbonate as CaCO ₃		
													> 2mm. Pct.	Sand Pct.	Silt Pct.	Clay Pct.			
	d/ Pct.	Pct.		Pct.	Pct.	g/cc	g/cc	me./100g.				Pct.	Pct.	Pct.	Pct.	Pct.			
0-5	0.14			0.7	0.2	1.4	1.5	6.8	7.3				tr	77	13	10	tr		
5-13	0.21			0.8	0.1	1.5	1.56	8.1	8.5				tr	69	19	12	tr		
13-28	0.31	0.035	9	1.0	1	1.6	1.69	14.1	14.7				tr	62	12	25	1		
28-46	0.28	0.037	8	1.1	1	1.6	1.72	17.0	18.8				tr	49	16	34	1		
46-71	0.16			1.0	1	1.6	1.68	14.6	14.6				tr	55	17	27	1		
71-112	0.10			0.8	11	1.7	1.75	12.3	10.4				20	45	7	13	15		
112-155	0.05			0.7	22	1.7		11.5	8.6				tr	57	8	13	22		
155-178					13	1.6							3	65	8	11	13		

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ Inclusive of coarse fragments, carbonate, and gypsum.
- c/ Assumed moist bulk densities of the fine-earth fabric for calculations.
- d/ 3.1 kg/m² to 112 cm (Method 6A).
- e/ Volume on carbonate-containing basis; weight on carbonate-free basis.

Total Analysis (Method 7C2): The B21t (11291) and the B2b (11293), respectively, contain 0.08 and 0.07 percent Mn expressed as MnO.

Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic
 Soil: Bucklebar, overburden variant
 Soil Nos.: S59(65)NMex-7-8
 Location: North bank of arroyo, SW 1/4 Sec. 7, T22S, R3E. Geomorphic Surface: Organ. Elevation: 4,470 feet.
 Land Form: Broad drainage way; coalescent fan piedmont sloping 1 percent to west-northwest.
 Parent Material: Veneer of drainage way sediments on coalescent fan piedmont deposits, composed mainly of monzonite and rhyolite (see Remarks).
 Vegetation: Dominantly snakeweed with scattered clumps of tobosa and burro grass, few *Yucca elata* and Mormon tea. Vegetation on dunes is dominantly mesquite.
 Collected by: 1959 - James S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 15, 1959;
 1965 - L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, September 29, 1965.
 Described by: 1959 and 1965 - L. H. Gile and R. B. Grossman.

Soil Surface. Scattered fine pebbles, coarse sand grains, and a discontinuous layer of finer, reddish sand occur on the surface.

C 11289 0 to 5 cm. Reddish-brown (5YR 5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) loamy fine sand; massive, soft; few roots; noncalcareous; abrupt wavy boundary.

A2 11290 5 to 13 cm. Brown (7.5YR 5/3 dry) or dark reddish-brown (5YR 3/3 moist) fine sandy loam with very thin layers of reddish fine sand; massive; slightly hard; prismatic cleavage planes from the E21 extend through this horizon; noncalcareous; abrupt smooth boundary. (See remarks)

B21t 11291 13 to 28 cm. Dark reddish-brown (5YR 3.5/3 dry, 3/4 moist) sandy clay loam; moderate coarse prismatic; prisms are massive; very hard; few roots; thin, discontinuous smooth, reflective surfaces on incomplete fracture planes; noncalcareous; clear boundary. (See remarks)

B22t 11292 28 to 46 cm. Reddish-brown (5YR 3.5/4 dry) or dark reddish-brown (5YR 3/4 moist) clay loam; moderate coarse prismatic breaking to moderate medium angular blocky; very hard; few roots; reflective surfaces continuous on ped faces and less than 1/2 color chip lower value than ped interiors when dry; noncalcareous; clear boundary.

B2b 11293 46 to 71 cm. Yellowish-red (5YR 4.5/6 dry, 3.5/6 moist) sandy clay loam with 5 percent gravel; moderate to strong coarse prismatic breaking to moderate coarse subangular blocky; faint to distinct, reflective surfaces, which when dry are less than 1/2 color chip lower in value than ped interior, and which disappear on moistening; very hard; few roots concentrated in vertical cleavage planes; effervesces weakly; abrupt smooth to wavy boundary.

IIIK21b (IIB3cab) 11294 71 to 112 cm. Light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 5/4 moist) sandy clay loam with 5 percent gravel; reddish-brown (5YR 4/4 moist) and pink (5YR 7/3 moist) carbonate nodules are common; a few channels in ped interiors have yellowish-red surfaces; weak medium subangular blocky with many of the cleavage planes controlled by carbonate aggregates, many of which are cylindroids with no preferred orientation; very hard; no roots; few very fine pores; effervesces strongly; clear wavy boundary.

IIIK22b (IIIC1cab) 11295 112 to 155 cm. Light reddish-brown (5YR 6/3 dry) or reddish-brown (5YR 5.5/4 moist) sandy clay loam; pink (7.5YR 8/3 moist) carbonate nodules are common; walls of the larger voids are more reddish in color; cleavage planes commonly controlled by variations in carbonate content; majority of structural units are sub-rounded, weak to moderately expressed, and of medium blocky size; very hard; effervesces strongly; clear wavy boundary.

IIIK3b (IIIC2cab) 20807 155 to 178 cm. Dominantly light brown (7.5YR 6.5/4 dry, 7.5YR 5.5/4 moist); a few carbonate nodules white (higher value than 7.5YR 8/2 dry) or pinkish-white (7.5YR 8/2 moist); about 5 to 10 percent 5YR 4.5/4 moist; sandy clay loam; weak and moderate medium subangular blocky; hard and very hard; very few fine roots; few fine tubular pores; effervesces strongly.

Remarks: Material in upper 5 cm is probably the result of sedimentation in historic time. Material from 5 to 46 cm is Organ alluvium; material from 46 to 178 cm is Jornada II alluvium.

Thin sections show that in the A2 horizon many of the large sand grains are free or nearly free of clay; whereas in the B21t horizon all sand grains are thickly coated with clay.

Clay Mineralogy (Methods 7A2, 7A3): The Beltsville laboratory analyzed the B22t horizon (28-46 cm). A poorly ordered vermiculite-montmorillonite intergrade is abundant; a small amount of mica and 15 percent kaolinite is present.

SOIL CLASSIFICATION: Typic Haplargid: fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SND-2 SOIL Nos. S59Mex-7-9 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 11296-11302

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											2A2 Coarse fragments b/						
		3A1											Vol. 250-2	Wt. 3B1					
		Total		Sand					Silt						Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)
Pct. of < 2 mm											250-2	76-2	19-2						
Carbonate Removed a/																			
0-36	K2	78.7	10.4	10.9	20.3	6.7	10.4	29.2	12.1	6.5	3.9	31.5	66.6		51	31			
36-51	IIB11cab	82.3	8.1	9.6	1.4	5.6	14.0	50.7	10.6	5.5	2.6	39.1	71.7		tr	tr			
51-64	IIB12cab	85.7	6.3	8.0	0.6	4.7	13.4	56.0	11.0	3.8	2.5	39.8	74.7		tr	tr			
64-71	IIB21cab	76.6	8.3	15.1	0.6	2.5	7.6	47.2	18.7	5.6	2.7	51.7	57.9		tr	tr			
71-135	IIB22cab	68.8	9.5	21.7	0.7	1.8	4.8	40.6	20.9	6.0	3.5	53.2	47.9		tr	tr			
135-165	IIB3cab	68.6	13.6	17.8	0.9	1.9	4.1	37.6	24.1	8.3	5.3	58.0	44.5		tr	tr			
165-226	IIC1cab	74.3	13.8	11.9	1.4	2.5	4.7	40.2	25.5	8.0	5.8	61.2	48.8		tr	tr			
Carbonate Not Removed																			
0-36	K2	71.0	16.2	12.8	19.5	8.0	9.8	24.3	9.4	7.3	8.9	27.8	61.6						
36-51	IIB11cab	80.4	9.1	10.5	2.9	6.5	15.6	46.3	9.1	4.7	4.4	34.0	71.3						
51-64	IIB12cab	83.6	6.8	9.6	1.0	4.7	14.7	52.3	10.9	5.0	1.8	39.3	72.7						
64-71	IIB21cab	74.9	9.2	15.9	0.6	3.0	8.1	45.4	17.8	5.7	3.5	50.1	57.1						
71-135	IIB22cab	63.5	13.8	22.7	1.0	1.8	5.1	36.1	19.5	6.4	7.4	49.5	44.0						
135-165	IIB3cab	65.5	17.1	17.4	1.8	2.2	4.3	34.4	22.8	7.9	9.2	54.2	42.7						
165-226	IIC1cab	61.1	21.0	17.9	0.5	1.9	3.6	32.7	22.4	8.2	12.8	53.4	38.7						

Depth (cm.)	6A1a Organic carbon	6E1a Nitrogen	C/N	6C1a Ext. Iron as Fe %	Carbonate as CaCO ₃		Bulk density		CEC		Water content			Composition Whole Material c/					
					6E1a <2mm. Pct.	3A1a <0.002 mm. Pct.	g/cc	g/cc	NH ₄ OAc		4B2 15-Bar			NONCARBONATE				Carbonate as CaCO ₃	
					a/		me./100g.		Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.			
0-36	0.74	0.078	8	0.6	14	6			9.5	8.0									
36-51	0.26	0.028	9	0.4	4	2			8.3	7.9				tr	78	8	10	4	
51-64	0.11			0.4	2	1			7.7	7.0				tr	84	6	8	2	
64-71	0.11			0.5	1	-			11.7	11.4				tr	76	8	15	1	
71-135	0.05			0.6	4	1			16.9	15.9				tr	65	10	21	4	
135-165	0.05			0.6	7	3			13.0	11.8				tr	63	13	17	7	
165-226	0.04			0.6	14	9			10.1	8.0				tr	64	12	10	14	

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ > 2 mm. contains pebbles of limestone. Pebbles partially dissolved in treatment (Method 1B3) to remove carbonate.
- c/ Inclusive of coarse fragments, carbonate, and gypsum. Carbonate by Method 6E1a.

Radiocarbon^{a/}

The radiocarbon ages on two samples of carbonate are reported by Rubin, M. and Alexander, C., 1960. U. S. Geological Survey Radiocarbon Dates, V, Am. Jour. Sci., Radiocarbon supplement, v. 2, pp 129-185:

IIB21cab, IIB22cab, 64-135 cm

nodular carbonate, including 20,300 ± 800 vertical stringers; W-796

IIC1cab

carbonate nodules; > 30,000 W-797

a/ Samples 26 and 33 in Soil Monograph.

Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic

Soil: SND-2

Soil Nos.: S59NMex-7-9

Location: East bank of cut exposed in pipeline, NW 1/4 NW 1/4, Sec. 36, T22S, R2E, Dona Ana County, New Mexico.

Geomorphic Surface: Complex. (See remarks) Land Form: Ridge-side erosion surface, approximately 10 percent slope

Elevation: 4,450 feet. Vegetation: Mainly creosotebush and ratany.

Parent Material: Parent material of K2 horizon is alluvial terrace fill derived from rhyolite, monzonite, andesite and limestone; parent material of paleosol is undifferentiated sand.

Collected by: J. S. Allen, R. B. Grossman, and R. V. Ruhe, May 16, 1959.

Described by: R. B. Grossman and R. V. Ruhe.

Soil Surface. Desert pavement of angular to subangular rhyolite pebbles; some of the pebbles are partially coated with red and black desert varnish, a few have discontinuous carbonate coatings; a discontinuous layer of loose reddish sand occurs between pebbles.

K2 11296 0 to 36 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) very gravelly loamy sand; single grain; loose; roots common; carbonate coatings on pebbles and sand grains; effervesces strongly; abrupt wavy boundary.

IIB11cab 11297 36 to 51 cm. Light reddish-brown (5YR 6/3 dry) or brown (7.5YR 5/4 moist) loamy sand; single grain; loose; few roots; few carbonate nodules; effervesces strongly; clear wavy boundary.

IIB12cab 11298 51 to 64 cm. Brown to light brown (7.5YR 5.5/4 dry) or brown (7.5YR 4.5/4 moist) coarse loamy sand; massive and single grain; loose and soft; very few roots; few very fine carbonate accumulations associated with root channels; effervesces weakly to strongly; abrupt wavy boundary.

IIB21cab 11299 64 to 71 cm. Reddish-brown (5YR 5/4 dry; 4/4 moist) fine sandy loam; strong fine subangular blocky; slightly hard; very few roots; loamy sand fillings between peds similar in composition to superjacent horizon; larger voids in ped interiors have carbonate coatings; dark coatings around larger voids (manganese oxides?); ped interiors noncalcareous; ped surfaces effervesce weakly; clear irregular boundary.

IIB22cab 11300 71 to 135 cm. Brown (7.5YR 5/4 dry; 4/4 moist) fine sandy loam; pink (7.5YR 8/4 moist) carbonate nodules common; moderate to strong coarse to medium angular blocky to subangular blocky; very hard; very few roots; large nodules and veins of carbonate 3 to 4 inches in diameter; larger voids in ped interiors coated with carbonate; more prominent vertical faces have associated carbonate veins which effervesce strongly; upper part contains numerous large carbonate concentrations that were excluded from the sample; ped interiors mainly noncalcareous; ped surfaces commonly effervesce weakly; clear wavy boundary.

IIB3cab 11301 135 to 165 cm. Brown (7.5YR 5/4 dry; 4/4 moist) light fine sandy loam; mixture of moderate to strong medium subangular blocky and subrounded structural units; very hard; very few roots; few carbonate nodules and veins; carbonate coatings on surfaces of larger voids in ped interiors; ped interiors effervesce weakly; ped surfaces effervesce weakly to strongly; clear wavy boundary.

IIC1cab 11302 165 to 226 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) fine sandy loam; mixture of moderate medium subangular blocky and medium subrounded structural units; slightly hard to very hard; very few roots; fine pinkish-white (7.5YR 8/2 moist) carbonate nodules are common; effervesces strongly; gradual boundary.

IIC2cab 226 cm. plus. Light brown (7.5YR 6/4 dry) and brown (7.5YR 5/4 moist) loamy fine sand; massive; slightly hard; very few roots; few fine carbonate nodules; effervesces strongly.

Remarks: Erosion surface, in upper valley sideslope position, cut into gravelly alluvium associated with the Tortugas surface and underlying sandy to loamy basin-fill of the Upper Camp Rice.

Clay Mineralogy (Methods 7A2, 7A3): The Beltsville laboratory determined the clay mineralogy of the IIB22cab (71-135 cm) after carbonate removal by Method 1B3. Montmorillonite is abundant; 10 percent kaolinite is present.

Soil: Bluepoint Soil Classification: Typic Torripsamment; mixed, thermic
 Soil Nos.: S59NMex-7-10
 Location: 150 feet west of power line, SW 1/4 NW 1/4, Sec. 23, T23S, R2E, Dona Ana County, New Mexico.
 Geomorphic Surface: Fort Selden Group - undifferentiated. Land Form: Ridge side sloping 6 percent to the north.
 Elevation: 4,150 feet. Vegetation: Creosotebush, mesquite, Yucca elata.
 Parent Material: Fort Selden colluvial-alluvial sediments, mainly noncalcareous sand with a few scattered pebbles of
 Collected by: J. S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 18, 1959. rhyolite and chert.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. A few fine mixed rounded and angular pebbles. The surface has a fragile crust about 1 mm. thick, in places covered by a discontinuous layer of loose sand.

A 11303 0 to 13 cm. Grayish-brown (10YR 5/2.5 dry) or dark grayish-brown (10YR 4/2 moist) loamy sand; upper 2 inches dry, single grain and loose; lower part moist, massive, and very friable; few roots; upper one cm. effervesces very weakly and below noncalcareous; abrupt wavy boundary.

B 11304 13 to 43 cm. Grayish-brown (10YR 5/2 dry) or dark grayish-brown (10YR 4/2 moist) sand; massive in place; very friable; few roots; few pebbles with thin patchy carbonate coatings; generally noncalcareous, with some zones that effervesce weakly; clear wavy boundary.

Clca 11305 43 to 64 cm. Light brownish-gray (10YR 6.5/2 dry) or grayish-brown (10YR 5/2.5 moist) sand, with about 5 percent gravel; massive; soft; very few roots; thin, discontinuous to thick, continuous carbonate coatings on pebbles; effervesces strongly; clear wavy boundary.

C2ca 11306 64 to 114 cm. Light brownish-gray (10YR 6.5/2 dry) or grayish-brown (10YR 5/2 moist) sand; massive; soft to loose; very few roots; several carbonate-cemented fragments < 2 mm. in diameter; the few pebbles that occur have thin carbonate coatings; effervesces strongly.

C3 114 to 140 cm. Light gray (10YR 7/2 dry) or grayish-brown (10YR 5/2 moist) sand; massive; soft; effervesces weakly in upper part, becoming noncalcareous with depth. (Not sampled.)

Mineralogy (Methods 7A2, 7B). Fine sand, Clca horizon.

Quartz	35
Weatherable (mostly feldspar)	65
Weatherable breakdown	
Albite	35
Oligoclase, andesine	20
Orthoclase, microcline	10
Microcrystalline aggregates	35

The microcrystalline aggregates mostly have an index of refraction below 1.530. Feldspars of the albite-anorthite series and potassium feldspars were identified by X-ray analysis. The ratio of peak heights for the albite-anorthite doublet suggests that the mineral is towards the albite end. The potassium feldspar is largely removed on grinding, whereas the albite remains. Estimates of quartz and feldspar by X-ray diffraction (peak height) did not correlate well with grain counts. The apparent quartz content estimated from the X-ray patterns is high, and is further enhanced by grinding.

Micromorphology (Method 4E1b). A thin section of the B horizon was examined. The fabric consists of an open pack of sand grains with large voids in most of the interstices. The sand grains are interconnected by fines along only one-fourth of their periphery. A thin coating (< 5 μ) of oriented clay is found on half of the periphery of the sand grains. This thin coating could be illuvial clay. Many grains have moderately thick patchy coatings of weakly oriented clay; these are probably inherited. Grains of discrete quartz and feldspar predominate, with rock fragments common; ferromagnesian minerals are scarce, mostly amphiboles. The rock fragments come from a wide array of volcanic rocks; many of the fragments appear quite altered. Dark grains are common in many of the rock fragments and discrete grains apparently rich in iron oxides, ranging from brown and translucent to black and opaque, are very common in the interstices between the larger sand grains. Many discrete grains show peripheral weathering and alteration, much of which is probably related to geological processes. In a geological sense, this would appear to be a very immature sediment.

SOIL CLASSIFICATION: Typic Paleorthid; loamy, mixed, thermic, shallow

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Simona SOIL Nos. S59NMex-7-11 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 11307-11314

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (in.)	Horizon	Size class and particle diameter (mm)											2A2 Coarse fragments ^{1/}					
		Total				Sand				Silt			Vol. 250-2	Wt. 3B1				
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.02-0.002)	(2-0.1)		76-2	19-2			
Pct. of < 2 mm											92.50	92.76	92.19					
Carbonate Removed a / b /																		
1-5	A12	66.6	20.2	13.2	6.8	14.3	11.8	18.2	15.5	13.4	6.8	38.4	51.1	20	33	23		
5-13	Bca	62.3	20.0	17.7	6.4	14.6	10.2	16.3	14.8	13.2	6.8	36.6	47.5	5	15	15		
13-17	K21m	68.3	13.9	17.8	14.6	20.0	12.7	12.7	8.3	7.2	6.7	20.9	60.0	5	16	11		
17-28	K22m f/	75.5	11.6	12.9	17.7	20.7	14.2	13.5	9.4	7.6	4.0	22.9	66.1	25	56	27		
28-48	C3ca	78.9	10.8	10.3	20.2	18.0	14.6	16.2	9.9	6.9	3.9	24.5	69.0	35	59	38		
48-71	C4ca	80.5	11.6	7.9	26.7	22.3	14.1	11.0	6.4	6.3	5.3	17.0	74.1	35	53	30		
71-89	C5ca	80.3	13.1	6.6	22.1	21.9	16.4	13.1	6.8	6.2	6.9	18.1	73.5	35	51	26		
89-122	C6ca	94.8	2.5	2.7	42.4	33.3	11.4	6.3	1.4	1.0	1.5	4.6	93.4	55	68	54		
Carbonate Not Removed																		
1-5	A12	64.6	25.2	10.2	6.4	12.8	10.8	17.2	17.4	13.8	11.4	40.3	47.2					
5-13	Bca	57.9	27.5	14.6	5.3	11.6	8.8	15.1	17.1	13.1	14.4	38.5	40.8					
Depth (in.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C1a Ext. Iron as Fe a	Carbonate as CaCO ₃		Bulk density		5A1a CEC NH ₄ OAc		Water content			Composition Whole Material d/				
					3A1a		g/ cc	g/ cc	a/ me./100g.	Pct.	Pct.	Pct.	NONCARBONATE				Carbonate as CaCO ₃	
					<2mm. e	<0.002 mm.							>2mm. Pct.	Sand Pct.	Silt Pct.	Clay Pct.		Pct.
1-5	0.27	0.025	10	0.6	12	1.4	1.4	12.0	10.6				30	42	12	8	8	
5-13	0.50	0.044	8	0.6	22	1.4	1.4	14.9	12.5				12	43	14	12	19	
13-17	0.15			0.4	50	1.8	1.8	11.1					9	31	6	8	46	
17-28	0.06			0.6	55	1.8	1.8	9.5					36	22	3	4	35	
28-48	0.09			0.6	36	1.7	1.7	10.8					48	26	4	3	19	
48-71				0.4	24	1.6	1.6	6.5					46	33	5	3	13	
71-89				0.6	15	1.5	1.5	7.8					47	36	6	3	8	
89-122				0.5	3	1.5	1.5	4.4					67	30	1	1	1	

a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.

c/ Determined directly for 11307 and 11308. For others, determinations on sample treated by Method 1B3 to remove carbonate and values expressed on a carbonate-containing basis.

d/ Inclusive of coarse fragments, carbonate and gypsum.

e/ Determination on whole material by Method 6E1a and calculated as a percentage of the < 2 mm., see Method 1B4.

f/ The water-soluble ions and related data were determined on the water extract (Method 8A1) of the whole material ground to pass 2 mm. from the K22m horizon:

Electrical Conductivity (Method 8A1a)	3.90 mmhos/cm
Water at Saturation (Method 8A)	21.6 Pct.
Water Soluble Ions	
Na (Method 6F1a)	30.8 meq/l
K (Method 6Q1a)	0.2 meq/l
HCO ₃ (Method 6J1a)	3.0 meq/l
Cl (Method 6K1a)	21.1 meq/l
SO ₄ (Method 6L1a)	8.4 meq/l

g/ Assumed bulk densities for the moist fine-earth fabric for calculations.

h/ 0.7 kg/m² 1 to 13 cm (Method 6A).

i/ Volume on carbonate-containing basis; weights on carbonate-free basis.

Soil: Simona Soil Classification: Typic Paleorthid; loamy, mixed, thermic, shallow
Soil Nos.: S59NMex-7-11

Location: Ridge crest, NE 1/4 NE 1/4, Sec. 36, T23S, R2E, Dona Ana County, New Mexico.

Geomorphic Surface: Tortugas(?) Land Form: Ridge crest sloping 2 percent to the west. Elevation: 4,235 feet.

Parent Material: Mixed rounded gravel (Upper Camp Rice)--rhyolite, granite, chert, quartz, sandstone.

Vegetation: Creosotebush, ratany, few Mormon tea.

Collected by: J. S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 18, 1959.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Desert pavement of loosely packed rounded pebbles of mixed lithology. Pebbles are prominently coated with black desert varnish.

A11 0 to 1 cm. Pinkish-gray (7.5YR 6/2 dry) or dark brown (7.5YR 4/2 moist) gravelly sandy loam; moderate medium platy; strongly vesicular; soft to slightly hard; no roots; effervesces strongly; abrupt smooth boundary. (Not sampled.)

A12 11307 1 to 5 cm. Brown (7.5YR 5.5/2 dry) or dark brown (7.5YR 4/3 moist) gravelly light sandy loam; very weak thin platy, breaking out as fine crumb; soft; no roots; effervesces strongly; abrupt smooth boundary.

Bca 11308 5 to 13 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/5 moist) gravelly sandy loam; massive and very weak subangular blocky; hard to soft; few roots; few carbonate nodules, increasing with depth; effervesces strongly; abrupt smooth boundary.

K21m (C1cam) 11309 13 to 17 cm. Pink (5YR 7/4 dry) or light reddish-brown (5YR 6/5 moist) fine gravelly loamy sand; a few parts yellowish-red (5YR 5.5/6 dry, 4/6 moist); weak to moderate coarse platy; very and extremely hard; very few roots; plates have weakly troweled surfaces; a few white (5YR 8/1 dry) carbonate filaments and coatings; effervesces strongly; abrupt smooth boundary.

K22m (C2cam) 11310 17 to 28 cm. White (7.5YR 8/0 dry) or light brown (7.5YR 6/4 moist) very gravelly loamy sand; massive; very hard; very few roots; most of the pebbles break out with adhering carbonate coatings; effervesces strongly; clear wavy boundary.

C3ca 11311 28 to 48 cm. Pink (5YR 8/3 dry) or light brown (7.5YR 6/4 moist) very gravelly sandy loam; massive; slightly hard; very few roots; moderately thick, cemented, carbonate coatings on many pebbles; effervesces strongly; clear boundary.

C4ca 11312 48 to 71 cm. Pinkish-gray (5YR 7/2 dry) or reddish-brown (5YR 5.5/3 moist) very gravelly sandy loam; single grain and massive; generally loose, with 15 to 20 percent weakly to moderately indurated; very few roots; pebbles thinly coated with carbonate; effervesces strongly; clear wavy boundary.

C5ca 11313 71 to 89 cm. Pinkish-white (7.5YR 8/2 dry) or brown (7.5YR 5.5/4 moist) moderately indurated material (not continuous around perimeter of pit); no roots; effervesces strongly; clear wavy boundary.

C6ca 11314 89 to 122 cm. Sharply contrasting zones of single grain; loose, very gravelly sand and pinkish-white (5YR 8/2 dry) indurated material; very few roots; larger pebbles in loose pockets have a few patchy carbonate coatings; massive and indurated material is similar to the C5ca horizon; effervesces strongly; loose sand was sampled.

Sand Mineralogy, Method 7B1. Counts of 300 grains of the carbonate-free very fine sand were made. The Bca contains 45 percent quartz, 30 percent discrete feldspar, 25 percent microcrystalline aggregates, 2 percent ferromagnesian minerals and 1 percent opaques. The C4ca contains 35 percent quartz, 30 percent feldspar, 25 percent microcrystalline aggregates, 3 percent ferromagnesian minerals, and 3 percent opaques. The feldspars are mostly albite and orthoclase with 15 percent relative plagioclase of intermediate to high calcium content and some microcline. The microcrystalline aggregates are mostly composite grains that are largely small optical domains of feldspar with a refractive index consistent with K-feldspar, within which may be found a wide range of small, primary minerals, but mostly opaques. Some of the composite grains have altered to earthy-looking material. The alteration may be stronger in the Bca than in the C4ca and for the Bca is probably relatively strong compared to younger soils. A portion of the microcrystalline aggregates may be chert. The ferromagnesian minerals are mostly amphibole and epidote. Some grains in the Bca have thick, patchy reddish-brown coatings of silicate clay.

Clay Mineralogy, Methods 7A2, 7A3. The Beltsville Laboratory determined that carbonate-free clay (Method 1B3) of the C3ca horizon contains an abundance of montmorillonite, a trace of mica, and 10 percent kaolinite.

SOIL CLASSIFICATION: Typic Haplargid; coarse-loamy, mixed, thermic.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SND-1 SOIL Nos. S59(62)NMex-7-12 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 11315-11320, 17265-17266

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1											2A2 Coarse fragments g/							
		Total			Sand					Silt			Vol. 250-2	Wt. 76-2	3B1 19-2					
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)				(2-0.1)				
Pct. of < 2 mm											250-2	76-2	19-2							
Carbonate Removed a/																				
0-36	K2	77.4	10.8	11.8	15.3	4.4	10.0	34.1	13.6	7.9	2.9	40.2	63.8	40	59	20				
36-69	IIB1cab	71.9	15.1	13.0	2.3	4.1	11.4	38.2	15.9	11.3	3.8	47.7	56.0	tr	tr	tr				
69-91	IIB21cab	76.1	10.6	13.3	0.5	3.4	11.9	43.8	16.5	7.8	2.8	47.7	59.6	tr	tr	tr				
91-122	IIB22cab	79.3	8.8	11.9	0.8	3.3	10.9	45.7	18.6	6.8	2.0	51.5	60.7	tr	tr	tr				
122-152	IIB3cab	80.2	8.8	11.0	0.5	3.0	9.7	45.2	21.8	6.7	8.1	55.0	58.4	tr	tr	tr				
152-178	IICcab	83.8	5.9	10.3	1.0	4.2	11.9	47.5	19.2	0.2	5.7	56.0	64.6	tr	tr	tr				
36-69	c/	72.8	15.4	11.8	2.7	5.4	12.4	39.5	12.8	13.0	2.4	44.0	60.0		tr	tr				
36-69	d/	72.6	16.6	10.8	2.7	5.8	12.9	39.2	12.0	13.5	3.1	49.9	60.6		tr	tr				
Carbonate Not Removed																				
0-36	K2	70.4	19.3	10.3	10.3	4.7	8.7	32.5	14.2	9.8	9.5	40.9	56.2							
36-69	IIB1b	69.3	22.9	7.8	2.2	3.5	9.0	38.0	16.6	11.8	11.1	48.7	52.7							
69-91	IIB21cab	74.7	11.9	13.4	0.9	3.2	9.9	43.8	16.9	7.1	4.8	47.4	57.8							
91-122	IIB22cab	78.6	8.8	12.6	1.0	3.4	10.3	46.7	17.2	5.6	3.2	47.4	61.4							
122-152	IIB3cab	76.4	9.5	14.1	0.6	3.6	9.6	45.3	17.3	4.6	4.9	47.0	59.1							
152-178	IICcab	76.8	7.8	15.4	0.5	3.8	9.2	45.9	17.4	3.5	4.3	47.3	59.4							
Depth (cm.)	6A1a	6B1a	C/N	6C1a	Carbonate as CaCO ₃		Bulk density			CEC NH ₄ OAc 5A1g			Water content			Composition Whole Material b/				
	Organic carbon f/ Pct.	Nitrogen Pct.		Ext. Iron as Fe ²⁺ Pct.	6E1a	<0.002	g/cc	g/cc	me./100g.	a/	Pct.	Pct.	Pct.	NONCARBONATE				Carbonate as CaCO ₃ Pct.		
					<2mm. Pct.	<0.002 mm. Pct.								>2mm. Pct.	Sand Pct.	Silt Pct.	Clay Pct.			
0-36	0.52	0.046	11	0.5	10	1.4	11.6						55	30	4	5	6			
36-69	0.15			0.4	4	1.4	13.3						tr	69	14	13	4			
69-91	0.08			0.4	2	1.6	12.1	11.2					tr	75	11	12	2			
91-122	0.06			0.4	2		10.8	9.9					tr	77	9	12	2			
122-152	0.05			0.4	5		9.5	8.9					tr	76	9	10	5			
152-178	0.05			0.4	6		8.6	7.7					tr	79	6	9	6			
36-69	c/				5			12.0					tr	70	14	11	5			
36-69	d/				1			12.6					tr	72	16	11	1			

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ Inclusive of coarse fragments, carbonate, and gypsum.
- c/ Fillings between structural units.
- d/ Structural units.
- e/ Assumed bulk density of moist fine-earth for calculations.
- f/ 2.7 kg/m² to 91 cm (Method 6A).
- g/ Volume on carbonate-containing basis; weights on carbonate-free basis.

Soil: Nickel Soil Classification: Typic Calciorthid; loamy-skeletal, mixed, thermic
 Soil Nos.: S59(62)NMex-7-13
 Location: South bank of a branch of Fillmore Arroyo, NE 1/4 NW 1/4, Sec. 31, T23S, R3E, Dona Ana County, New Mexico.
 Geomorphic Surface: Picacho. Land Form: Alluvial terrace sloping 2 percent to west. Elevation: 4,250 feet.
 Parent Material: Picacho terrace alluvium derived from rhyolite from 0-157 cm; Upper Camp Rice Formation below.
 Vegetation: Creosotebush and ratany.
 Collected by: J. S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 19, 1959; L. H. Gile, R. B. Grossman, and
 F. F. Peterson, July 24, 1962.
 Described by: L. H. Gile and R. B. Grossman, 1959; L. H. Gile, R. B. Grossman, and F. F. Peterson, 1962.

Soil Surface. Desert pavement of rhyolite pebbles.

A2 11321 0 to 5 cm. Light brown (7.5YR 6/3 dry) or dark brown (7.5YR 4/3 moist) gravelly sandy loam; single grain and weak fine crumb; loose; very few roots; upper 1/4 inch is moderately vesicular, moderate coarse platy and slightly hard; effervesces strongly; abrupt smooth boundary. (Upper 1/4 inch excluded from sample.)

B 11322 5 to 13 cm. Light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 4/4 moist) gravelly sandy loam; moderate very fine crumb; loose; very few roots; effervesces strongly; abrupt wavy boundary.

K2 (C1ca) 11323 13 to 18 cm. Pink (7.5YR 7/4 dry) gravelly, discontinuously carbonate-cemented plates that are very or extremely hard, readily removed with knife; pebbles protrude from upper and lower surfaces of plates; plates are discontinuous in upper inch; the lower inch is fairly continuous and has interstice fillings of yellowish-brown (10YR 5/4 dry); upper 0.02 to 0.1 inch is laminated; the top lamina is readily scored with a knife and is two color chips higher in value than the subjacent lamina; laminae below are difficultly scored with a knife; no roots; brown (7.5YR 5/4 dry) dense, hard carbonate coatings occur on many pebbles; effervesces strongly; clear smooth boundary.

K31 (C2ca) 11324 18 to 48 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) very gravelly sandy loam; massive; hard; very few roots; the uppermost inch is similar to the lower inch of the K1 horizon, except for a weaker laminated zone; powdery, whitish carbonate coatings on pebbles; hard flakes of carbonate on undersides of pebbles; effervesces strongly; gradual wavy boundary.

K32 (C3ca) 11325 48 to 69 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) and pinkish-gray (7.5YR 7/2 dry) or light brown (7.5YR 6/4 moist) very gravelly sandy loam; massive; slightly hard; very few roots; hard carbonate flakes on undersides of some pebbles; few whitish, powdery coatings on pebbles; effervesces strongly; abrupt wavy boundary.

K33 (C4ca) 11326 69 to 94 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) very gravelly loamy sand; massive; soft; no roots; carbonate coatings are mainly on undersides of pebbles and are smooth, flaky, and light olive brown; a few pebbles have whitish, powdery carbonate coatings; effervesces strongly; abrupt wavy boundary.

C1ca (C5ca) 17234 94 to 132 cm. Angular rhyolite gravel with most pebble interstices open or only partially filled with light brown (7.5YR 6/4 dry, 5/4 moist) sandy loam; pebbles with thin discontinuous, but distinct white (10YR 8/2 dry, 6/3 moist) coatings of carbonate on pebble bottoms; some pebbles with 1 to 2 mm. thick gypsum deposits on tops; effervesces strongly; clear and abrupt smooth and wavy boundary. (Resampled.)

C2ca (C6ca) 17235 132 to 157 cm. Fine angular rhyolite gravel and coarse sand prominently coated with reddish brown (5YR 5/4 dry, 4/4 moist) clay; most interstices open, clay bridging between pebbles and sand grains common; some larger pebbles with mostly clear surfaces or distinctly clay-coated only on bottoms, finer pebbles and sand all clay-coated; a few pebbles with thin patches of carbonate on bottoms, some with crystalline gypsum on bottoms and some with gypsum on tops; effervesces weakly or noncalcareous; abrupt smooth to wavy boundary.

2C3ca (IIC7ca) 17236, 17237 157 to 178 cm. Yellowish red (5YR 4/6 dry) or reddish brown (5YR 4/4 moist) sandy loam; moderate coarse prismatic; hard; no roots; dark red coatings on vertical and horizontal ped faces; very dusky red coatings (manganese oxide?) on vertical ped surfaces and around pores; a few soft carbonate nodules 1- to 2-inch diameter, otherwise matrix noncalcareous or effervesces weakly; clear wavy boundary. (Resampled.) (Sampled 157 to 168 cm and 168 to 178 cm.)

2C4ca (IIC8ca) 17238, 17239 178 to 229 cm. Tongues of noncalcareous reddish-yellow (7.5YR 6/6 dry) or brown (7.5YR 5/4 moist) loamy sand to sand extending into calcareous light brown (7.5YR 6/4 dry) loamy sand to sand; massive; slightly hard; no roots; few medium nonindurated carbonate nodules concentrated near bottom of horizon. (Resampled.) (Sampled 178 to 203 cm. and 203 to 229 cm.)

Mineralogy (Methods 7A2, 7A3, 7B1). The Beltsville laboratory found montmorillonite dominant in the K2 (13-18 cm) with detectable illite and 15 percent kaolinite. The light fraction of the 0.02-0.05 mm of the K2 consists of 75 percent feldspar, 15 percent quartz, and 7 percent mica. The feldspar is predominantly altered, as is also the mica. The heavy fraction is predominantly ore minerals with hornblende and epidote next in abundance. Garnet, zircon, and sphene are present.

SOIL CLASSIFICATION: Ustollic Haplargid; loamy-skeletal, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Caralampi SOIL Nos. S59NMex-7-14 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 11328-11334

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B, d/

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1			2A2 Coarse fragments b/			
		Total			Sand							Silt	Clay		Vol. 250-2	Wt. 76-2	3B1 19-2		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)						
Pct. of < 2 mm																			
		Carbonate Removed a/																	
0-5	A	59.2	27.7	13.1	10.1	7.7	4.2	14.7	22.5	17.0	10.7	49.4	36.7				50	61	42
5-20	A1	51.1	30.2	18.7	10.2	6.3	3.3	11.6	19.7	17.4	12.8	45.0	31.4				60	69	14
20-46	B1t	37.6	29.4	33.0	6.7	4.5	2.3	8.3	15.8	17.4	12.0	38.9	21.8				80	86	17
46-76	B21t	47.8	21.7	30.5	17.6	7.2	3.0	7.5	12.5	12.6	9.1	30.0	35.3				60	68	36
76-97	B22tca	45.8	29.0	25.2	10.0	6.0	3.0	9.8	17.0	18.0	11.0	41.5	28.8				60	68	23
97-147	B3tca	52.4	27.5	20.1	12.4	9.1	4.3	11.1	15.5	16.0	11.5	38.4	36.9				70	75	22
147-173	Cca	62.1	23.2	14.7	24.2	11.2	4.2	10.3	12.2	13.0	10.2	31.6	49.9				75	82	33

Depth (cm.)	6A1a Organic carbon e/ Pct.	6B1a Nitrogen Pct.	C/N	6C1a Ext. Iron as Fe a/ Pct.	Carbonate as CaCO ₃		Bulk density		CEC NH ₄ OAc		Water content			Composition Whole Material c/					Carbonate as CaCO ₃ Pct.
					6E1b <2mm. Pct.	6E2a <0.002 mm. Pct.	f/ g/cc	g/cc	5A1a a/ me./100g.	4B2 15-Bar			NONCARBONATE						
										Pct.	Pct.	Pct.	> 2mm. Pct.	Sand Pct.	Silt Pct.	Clay Pct.			
0-5	0.76	0.066	12	0.9	tr(s)		1.3		10.2				5.6	61	23	11	5	-	
5-20	0.83	0.062	13	1.0	-(s)		1.3		12.4				7.5	69	16	9	6	-	
20-46	0.88	0.092	10	1.1	tr		1.4		18.3				12.7	86	5	4	5	tr	
46-76	0.36	0.044	8	1.0	tr		1.5		16.6				12.8	68	15	7	10	tr	
76-97	0.31	0.027	11	1.1	tr		1.5		14.7					68	15	9	8	tr	
97-147	0.11	0.017		0.8	1		1.5		13.6					86	7	4	3	tr	
147-173	0.10	0.012		0.8	1		1.5		11.2					91	4	2	2	1	

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ Did not sample > 2 mm. larger than about 125 mm. diameter. Included in the < 76 mm. are some pebbles 125-76 mm. diameter, but the proportion is not high. 76-250 mm 10 percent by volume to 1 m and 15 percent below; no > 250 mm.
- c/ Inclusive of coarse fragments, carbonate, and gypsum. Carbonate measured directly by Method 6E1a.
- d/ The < 2 mm. removed from the > 2 mm. by gentle agitation in water was added to the < 2 mm. originally separated by dry sieving. All analyses were made on this composite sample.
- e/ 2.6 kg/m² to 97 cm (Method 6A).
- f/ Assumed bulk density of the moist fine-earth fabric for calculations.

Soil: Caralampi
 Soil Classification: Ustollic Haplargid; loamy-skeletal, mixed, thermic
 Soil Nos.: S59NMex-7-14
 Location: North wall of fan-head trench, Soledad Canyon in NW 1/4 SW 1/4, Sec. 13, T23S, R3E, Dona Ana County, New Mexico. Geomorphic Surface: Jornada I. Land Form: Alluvial fan sloping 8 percent to the west.
 Elevation: 5,600 feet. Parent Material: Jornada I fan alluvium derived from rhyolite.
 Vegetation: Snakeweed, fluffgrass, whitethorn, prickly pear, Mormon tea, Yucca baccata, and black grama.
 Collected by: J. S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 20, 1959.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Desert pavement of rhyolite fragments averaging 1 inch in diameter but ranging to 6 inches in diameter. A thin (1 to 2 mm.) layer of loose reddish sand occurs between fragments.

A 11328 0 to 5 cm. Brown (7.5YR 4.5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) very gravelly sandy loam; moderate fine to medium granular; uppermost 1/8 inch weak fine platy; soft; few roots; noncalcareous; clear smooth boundary.

A1 11329 5 to 20 cm. Dark reddish-brown (5YR 3/3 dry, 3/4 moist) very gravelly sandy clay loam; strong very fine granular; soft; roots common; noncalcareous; clear wavy boundary.

B1t 11330 20 to 46 cm. Reddish-brown (5YR 5/3 dry, 4.5/4 moist) very gravelly sandy clay loam; strong fine granular with strong fine angular blocks common; interstice fillings loose; roots common; thin, discontinuous clay coatings on pebbles; noncalcareous; clear wavy boundary.

B2lt 11331 46 to 76 cm. Red (2.5YR to 5YR 4/6 dry) or dark red (2.5YR 3/6 moist) very gravelly sandy clay; interstice fillings are strong fine angular blocky with the boundaries of many of the structural units controlled by fine pebbles; slightly hard; few roots; weakly reflective pebble casts; thick, discontinuous reddish clay coatings on pebbles; noncalcareous except for thin patchy carbonate coatings on larger pebbles; abrupt wavy boundary.

B2tca 11332 76 to 97 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) very gravelly sandy clay loam; massive; interstice fillings vesicular and slightly hard to very hard; very few roots; walls of the larger noncapillary voids in the interstice fillings are dark red (2.5YR 3/6 dry); carbonate filaments and thin, discontinuous carbonate coatings on surfaces of larger pebbles; interstice fillings noncalcareous; carbonate coatings effervesce strongly; clear wavy boundary.

B3tca 11333 97 to 147 cm. Reddish-brown (5YR 5/3.5 dry, 4/5 moist) very gravelly loam; massive; interstice fillings are massive; slightly hard to hard; vesicular; very few roots; weak filamentous carbonate coatings on some pebbles; numerous dark concentrations (manganese oxides?); generally noncalcareous; carbonate coatings effervesce strongly; gradual boundary.

About 15 percent of horizon by volume is composed of fragments, greater than 3 inches in diameter, which were not sampled.

Cca 11334 147 to 173 cm. Reddish-brown (5YR 5/3 dry, 4/3 moist) very gravelly loamy sand; massive and single grain; very friable and loose; very few roots; thin, noncemented carbonate flakes, mainly on pebble undersides; effervesces weakly.

Fraction greater than 3 inches in diameter estimated as 15 percent of horizon by volume and was not sampled.

Remarks: The lower boundary of the B2t horizon ranges from 24 to 48 inches in depth around the periphery of the sampling pit. Where described and sampled, the depth is 30 inches, which was considered "average" for the exposure.

Mineralogy. The B2lt (46-76 cm., ISL 11331) contains a moderate amount of mica, a small amount of kaolinite, a small to moderate amount of very poorly ordered 2:1 layer silicates (montmorillonite-like). The Cca horizon (147-173 cm., ISL 11334) contains abundant montmorillonite that is somewhat poorly ordered, a moderate amount of mica, and a small amount of kaolinite. Method 7A2 employed.

Soil: Caralampi Soil Classification: Ustollic Haplargid; loamy-skeletal, mixed, thermic
 Soil Nos.: S59NMex-7-15
 Location: North bank of arroyo, NE 1/4 NE 1/4, Sec. 21, T23S, R3E, Dona Ana County, New Mexico.
 Geomorphic Surface: Jornada II. Land Form: Alluvial fan sloping 4 percent to the west. Elevation: 4,720 feet.
 Parent Material: Jornada II fan sediments derived from rhyolite.
 Vegetation: Dominantly snakeweed with mesquite, Mormon tea, barrel cactus, fluffgrass, and a few creosotebush.
 Collected by: J. S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 20, 1959.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Cobbles up to a foot in diameter cover 20 to 30 percent of surface, remainder covered with pebbles mainly about 1 inch in diameter; most surface fragments stained red or black.

A2 11335 0 to 6 cm. Brown (7.5YR 5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) with some parts slightly gray; very gravelly light sandy loam; weak fine platy; soft; few roots; noncalcareous; abrupt smooth boundary.

B21t 11336 6 to 23 cm. Reddish-brown (2.5YR to 5YR 4/4 dry) or dark reddish-brown (2.5YR to 5YR 3.5/4 moist) very gravelly sandy clay loam; pebbles largely discrete; strong very fine granular in interstices between pebbles; loose to slightly hard; roots common; pebbles are coated with clay and there are common clay bridges; noncalcareous; clear boundary. Fifteen percent by volume estimate greater than 3 inches in diameter and not sampled.

B22t 11337 23 to 43 cm. Red (2.5YR 4/6 dry) or dark red (2.5YR 3/6 moist) very gravelly sandy clay loam; massive in place; breaks out largely as discrete, clay-coated pebbles with a few aggregates of the finer pebbles; loose to slightly hard; roots common; pebbles are coated with clay and there are common clay bridges; noncalcareous; clear wavy boundary. Twenty percent by volume estimate greater than 3 inches in diameter and not sampled.

B3ca 11338 43 to 71 cm. Partly pinkish-white (7.5YR 8/2 dry) or pink (7.5YR 7/4 dry) carbonate coatings on pebbles, with some interstice fillings of reddish-brown (5YR 5/4 dry, 4/4 moist); with a subordinate part yellowish-red (5YR 5/6 dry); very gravelly sandy clay loam breaks out as weak aggregates of fine pebbles to single grain; soft to loose; few roots; carbonate occurs as filaments in some interstice fillings and as filaments and soft coatings on most pebbles; there are several disconnected, moderately indurated lenses; effervesces strongly; clear irregular boundary. Twenty-five percent by volume estimate greater than 3 inches in diameter and not sampled.

K&C (Clca) 11339 71 to 109 cm. Dominantly very pale brown (10YR 8/3 dry) or (10YR 7/4 moist) with some brown (7.5YR 5.5/4 dry) or reddish-brown (5YR 4.5/4 moist) between pebbles; very gravelly fine loamy sand; weak very fine granular interstice fillings; 10 percent weakly cemented lenses; loose; no roots; coatings thicker and more resistant to removal on undersides of pebbles; effervesces strongly; abrupt boundary.

Cca (C2ca) 11340 109 to 145 cm. Brown (7.5YR 5.5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) very gravelly loamy sand; single grain; loose with discontinuous moderately indurated lenses; loose material effervesces strongly and lenses effervesce strongly; patchy carbonate coatings on undersides of pebbles; 15 percent of horizon by volume greater than 3 inches in diameter and not sampled.

Clay Mineralogy (Method 7A2). The clay of the B22t contains small to moderate amount of very poorly ordered montmorillonite, and small amounts of well-ordered mica and kaolinite. The clay of the K&C contains a moderate amount of mica and a small amount of kaolinite, a moderate amount of interstratified mica (-chlorite?) mineral and a trace of discrete chlorite. The interstratified mineral does not expand to any extent upon solvation. Clay mineralogy is mixed.

Micromorphology, Method 4Elb. The B22t horizon was examined in thin section. The fabric consists largely of rock fragments. Sand and silt-size particles are relatively scarce. The plasma between the rock fragments shows moderate to strong orientation. The plasma does not usually connect between the rock fragments. Commonly there is a desiccation crack that separates the rock fragments and an associated coating of plasma from adjacent rock fragments. Adjacent to the rock fragments the plasma shows stronger preferred orientation. The larger infillings of plasma are laced with fine cracks. The rock fragments are mostly composites of small feldspar optical domains with inclusions of quartz grains, opaques, and occasional grains of ferromagnesian minerals. The small feldspar optical domains are probably potassium feldspar. The discrete sand and silt grains are mostly quartz with much feldspar and a very occasional grain of a ferromagnesian mineral (pyroxene, amphibole, or biotite). The discrete ferromagnesian grains are somewhat weathered, but still have readily identified optical properties. The biotite grains show no increase in birefringence. Some of the discrete feldspar grains show alteration along edges and twinning planes. Ferromagnesian minerals in rock fragments if at the edge of the rock fragment show partial alteration. There are strongly oriented clay coatings on pebbles and sand grains.

SOIL CLASSIFICATION: Petrocalcic Paleargid; loamy-skeletal, mixed, thermic, shallow

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Cruces, loamy-skeletal variant SOIL Nos. S59(61)NMex-7-16 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 11341-11347, 15029-15031

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											2A2 Coarse fragments g				
		Total											Vol.	Wt. 3B1			
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	0.02-0.002	0.2-0.02		(2-0.1)			
Pct. of < 2 mm															25.2	76.2	19.2
Carbonate removed a															25.2	76.2	19.2
0-1	A21	57.1	30.1	12.8	4.0	2.8	2.4	17.1	30.8	19.7	10.4	62.7	26.3	15	25	25	
1-5	A22	60.0	26.7	13.3	5.9	3.6	2.6	18.4	29.5	16.1	10.6	58.4	30.5	25	39	26	
5-15	B21t	63.8	19.6	16.6	12.2	4.2	3.0	18.6	25.8	12.7	6.9	51.3	38.1	40	53	39	
15-28	B22tca	53.8	23.8	22.4	16.7	3.9	2.4	13.5	17.3	13.4	10.4	39.9	36.5	45	63	46	
28-30	K21m	58.0	18.5	23.5	25.3	8.7	3.3	9.9	10.8	14.9	3.6	31.6	47.2	40	80	57	
30-64	K22m	62.3	15.7	20.0	27.8	7.3	3.4	11.8	14.0	10.4	5.3	31.9	48.3	65	87	26	
64-127	K3	73.8	12.9	13.3	27.2	9.5	4.6	17.1	15.4	9.3	3.6	35.5	58.4	55	71	30	
i	K21m	20.1	26.6	53.3	9.2	2.7	0.8	1.2	6.2	13.1	13.5	19.6	13.9				
i	K21m	46.9	22.0	31.1	16.7	6.4	2.9	9.0	11.9	11.4	10.6	29.0	35.0	22	22		
i	K21m	66.3	13.8	20.4	11.6	5.8	10.1	20.8	18.0	8.9	4.9	38.5	48.3	45	36		

Depth (cm.)	6A1a Organic carbon	6A1a Org. Carbon	6B1a Nitrogen	C/N	Carbonate as CaCO ₃	5A1a CEC as NH ₄ OAc	6C1a Ext. Iron as Fe	i	Water content			Composition Whole Material c					
									b, h Pct.	a Pct.	a Pct.	4B2 15-Bar	NONCARBONATE				Carbonate as CaCO ₃
													Pct.	Pct.	Pct.	> 2mm	
0-1	0.44	0.44	0.053	8	-	13.0	1.4					25	42	22	10	-	
1-5	0.29	0.29	0.034	8	-	12.6	1.4					6.6	39	34	18	9	
5-15	0.37	0.37	0.047	8	tr	13.6	0.8	1.4				6.8	53	28	11	8	
15-28	0.74	0.82	0.086	10	10	17.1	0.8	1.4				10.7	60	19	9	8	
28-30	0.15	0.73	0.075	10	80	16.3	0.9	2.0					45	6	2	3	
30-64	0.14	0.34	0.040	8	58	16.4	0.8	1.8					74	7	2	2	
64-127	0.11	0.14	0.019		23	10.1	0.9	1.7					65	20	3	4	
28-30	0.49	1.89	0.425	14	74	35.9	1.4						-	5	7	13	
28-30	0.15	0.91	0.089	10	83	21.8	0.9						4	7	4	5	
28-30	0.25	0.46	0.054	8	46	16.8	0.7						10	38	8	12	

LSL No.	TOTAL ANALYSIS e								
	S ₁ O ₂	Al ₂ O ₃	Fe ₂ O ₃	TiO ₂	CaO	K ₂ O	MgO	Ign. Loss	Total
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
	< 2 mm. a								
11341									
11342									
11343	72.3	11.3	3.64	0.63	0.79	3.26	0.93	2.70	95.6
11344	70.1	11.4	3.38	0.55	0.77	3.38	0.84	3.02	93.4
11345	58.8	16.5	4.72	0.68	1.06	3.08	1.81	9.44	96.1
11346	66.3	12.9	3.36	0.54	0.89	3.72	1.92	6.04	95.7
15029	74.2	10.2	3.34	0.55	0.76	2.66	1.30	3.64	96.7
15030	69.5	11.9	3.15	0.50	0.59	3.86	0.93	3.00	93.4
15031	70.6	10.7	2.37	0.41	0.45	4.05	0.80	1.90	91.3
	> 2 mm. a								
15030	73.8	13.2	1.36	0.23	0.13	5.32	0.20	0.91	95.2
15031	73.9	12.2	1.50	0.27	0.09	5.34	0.16	0.77	94.2
	Whole Material a								
15029	58.8	16.5	4.72	0.68	1.06	3.08	1.81	9.44	96.1
15029f	59.0	17.2	3.76	0.67	1.07	3.17	1.82	9.42	96.1
15030f	66.4	14.8	2.13	0.35	0.71	4.76	1.52	4.89	95.5
15031f	72.2	13.8	1.16	0.26	0.46	5.11	0.66	1.97	95.6

- Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- Inclusive of coarse fragments, carbonate, gypsum; carbonate directly on whole material by Method 6E1a.
- Determination on whole material by Method 6E1a and calculated as a percentage of the < 2 mm.
- Beltsville Soil Survey Laboratory, Method 7C2. Borate glass disks used for all elements except magnesium, which was determined on a soil powder.
- Computed from total analyses on separate samples of the whole material before and after removal of the carbonate by Method 1B3. The computations for 15030, 15031 require summing the analyses on the > 2 mm. and the < 2 mm. after treatment by Method 1B3.
- Volume on carbonate-containing basis; weight on carbonate-free basis.
- 1.2 kg/m² to 28 cm (Method 6A).
- Assumed bulk densities of moist fine-earth fabric for calculations.
- Upper part, soft laminar zone; middle, the hard laminar zone; lower, the adhering non-laminar material.

59-16

Soil: Cruces, loamy-skeletal variant Soil Classification: Petrocalcic Paleargid; loamy-skeletal, mixed, thermic, shallow
 Soil Nos.: S59NMex-7-16
 Location: SE 1/4 SE 1/4, Sec. 19, T23S, R3E, north bank of arroyo, 1,500 feet east of pipeline, Dona Ana County, New Mexico. Parent Material: Picacho terrace alluvium derived from rhyolite.
 Geomorphic Surface: Picacho. Land Form: Alluvial terrace sloping 2 percent to the west. Elevation: 4,410 feet.
 Vegetation: Creosotebush, whitethorn and ratany.
 Collected by: J. S. Allen, L. H. Gile, R. B. Grossman, and R. V. Ruhe, May 21, 1959.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Desert pavement of pitted and varnished fine rhyolite pebbles; discontinuous layer of loose reddish sand occurs between pebbles.

A21 11341 0 to 1 cm. Brown (7.5YR 4.5/2 dry) or dark brown (7.5YR 3/2 moist) gravelly loam; moderate medium platy; soft; no roots; strongly vesicular; noncalcareous; abrupt wavy boundary.

A22 11342 1 to 5 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/3 moist) gravelly fine sandy loam; weak fine and very fine platy; soft; few roots; noncalcareous; abrupt smooth boundary.

B21t 11343 5 to 15 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) very gravelly heavy fine sandy loam; weak very fine crumb; slightly hard; roots common; thin, discontinuous coatings of silicate clay on pebbles and sand grains and there are some clay bridges; dominantly noncalcareous; abrupt to clear wavy boundary.

B22tca 11344 15 to 28 cm. Reddish-brown (5YR 5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) very gravelly sandy clay loam; slightly hard; roots common; interstice fillings are weak fine crumb and adhere weakly to pebble surfaces; powdery carbonate coatings intermingled with reddish-brown clay coatings on pebbles; effervesces strongly; abrupt smooth boundary.

K21m (C1cam) 11345 28 to 30 cm. The laminar subhorizon occurs in the upper 1/4 to 1/2 inch, uppermost laminae (Lab. No. 15029) are pink (7.5YR 7/4 dry) or light brown (7.5YR 6/4 moist), and score readily with a knife; remaining laminae (Lab. No. 15030) score difficultly with a knife and range from white (10YR 9/2 dry) or very pale brown (10YR 8/3 moist) to very pale brown (10YR 7/4 dry) or light yellowish-brown (9YR 6/4 moist); underlying the laminar subhorizon (Lab. No. 15031) is pink (7.5YR 7/4 dry) and light brown (7.5YR 6/4 moist) massively cemented material; very and extremely hard; powdery, white carbonate coatings on most pebbles with flaky, brittle, olive-colored coatings occurring on some pebbles; no roots; effervesces strongly; clear wavy boundary.

K22m (C2cam) 11346 30 to 64 cm. Pink (5YR 8/3 dry 7/4 moist) and white (10YR 9/1 dry) or very pale brown (10YR 8/3 moist) massively cemented material; some interstice fillings are pinkish-gray (5YR 7/2 dry) and light brown (7.5YR 6/4 moist); dominantly very hard with some parts only weakly cemented; the upper 10 inches contains cracks filled with reddish-brown loam in which roots are concentrated; effervesces strongly; clear wavy boundary.

K3 (C3ca) 11347 64 to 127 cm. Mostly lenses of loose fine gravel and weakly cemented fine gravel with pockets of light brown (7.5YR 6/4 dry) or dark brown (7.5YR 4/4 moist); massive; very hard but nonindurated loamy material; few roots; pebbles in loose gravel bands have hard, flaky carbonate coatings on undersides; many fine carbonate nodules in loamy material; effervesces strongly.

Radiocarbon Dates

Sample Description	Radiocarbon Age yrs. B.P.
<u>B22tca</u>	
Carbonate in whole material (LSL 15027; I-374)	5,725 ± 200
Carbonate associated with > 2 mm. <u>a/</u> (LSL 15027; I-1039)	10,226 ± 400
Carbonate in < 2 mm. (LSL 15027)	1,300 (computed <u>c/</u>)
Organic carbon in < 2 mm. (LSL 11344; I-2222)	565 ± 95
Organic carbon in water-dispersed < 0.002 mm. See method 3Alc (LSL 11344; I-2223)	910 ± 100
<u>K21m</u>	
Carbonate in soft laminar part (LSL 15029; I-375)	4,575 ± 170
Carbonate in hard laminar part (LSL 15030; I-392)	13,850 ± 600 <u>d/</u>
Organic carbon in hard laminar part (LSL 15030; I-616)	9,550 ± 300
Carbonate in non-laminar part (LSL 15031; I-391)	18,300 ± 600
<u>K22m</u>	
Carbonate in whole material (LSL 15032; I-376)	15,300 ± 400
Carbonate associated with > 19 mm. <u>b/</u> (LSL 20849; I-2128)	27,900 ± 1,100 - 1,000

a/ > 2 mm. washed, dried, and ground to form the sample.

b/ > 19 mm. washed in water, dried, and loosely adhering carbonate removed with an electric buffing wheel. Pebbles were then ground to form the sample.

c/ From dates on whole material and > 2 mm. plus carbonate percentages.

d/ The δ_c (C¹³)% is + 2.0.

Mineralogy. The 0.05 to 0.02 mm. of the K21m (28-30 cm.) was examined by Method 7B1 by the Beltsville Laboratory. The light fraction contains 75 percent feldspar, the majority microcrystalline aggregates, 15 percent quartz, and 10 percent mica, mostly altered. The heavy fraction consists mostly of ore minerals with 10 percent each hornblende and epidote, 5 percent zircon and 2 percent tourmaline.

The B22tca horizon (15-28 cm., 11344) contains small amounts of montmorillonite, mica and kaolinite (Method 7A2). The montmorillonite is very poorly ordered. Removal of the carbonate with pH 5 NaOAc buffer from the sample of the B22tca did not lead to a change in the X-ray traces of the clay minerals. Only a trace of calcite is present in the untreated sample. The K3 horizon (64-127 cm., 11347) contains moderate to abundant montmorillonite with small amounts of mica and kaolinite. The montmorillonite is fairly well ordered.

SOIL CLASSIFICATION: Typic Torripsamment; mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Blueprint SOIL Nos. S59Mex-7-17 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 11978-11984

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1											2A2 Coarse fragments g			
		Total			Sand					Silt			Vol. 250-2	Wt. 3B1		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.02-0.002)	(2-0.1)		% < 250	% < 76	% < 19
Pct. of < 2 mm																
		Carbonate Removed - 3A3														
0-13	C	84.9	10.1	5.0	4.9	19.2	20.4	29.0	11.4	8.6	1.5	32.2	73.5	1	2	2
13-25	B	84.1	10.7	5.2	8.0	22.1	20.2	25.3	8.5	7.5	3.2	25.9	75.6	5	10	10
25-48	C1ca	85.0	9.9	5.1	4.8	20.1	20.9	29.8	9.4	7.1	2.8	28.7	75.6	5	9	9
48-71	C1ca	85.0	9.7	5.3	4.6	17.9	21.3	31.8	9.4	6.7	3.0	29.2	75.6	5	8	8
71-117	C2ca	83.3	10.2	6.5	7.0	22.3	19.4	25.8	8.8	7.6	2.6	27.0	74.5	5	11	11
117-127	IIC3ca	83.4	10.9	5.7	14.8	23.5	16.1	21.2	7.8	6.8	4.1	23.5	75.6	35	54	43
127-140	IIIC4ca	93.1	3.1	3.8	20.6	25.9	17.0	24.2	5.4	1.2	1.9	16.4	87.7	65	82	54

Depth (cm.)	6A1a Organic carbon e Pct.	6B1a Nitrogen Pct.	C/N	6C1a Ext. Iron as Fe Pct.	Carbonate as CaCO ₃			Bulk density f g/cc	CEC NH ₄ OAc a me./100g.	Water cont.		8C1a pH 1:1	8C1a Composition Whole Material b				Carbotate as CaCO ₃ Pct.		
					c		d			e	f		g	h	i	NONCARBONATE			
					< 2mm. Pct.	2-0.05 mm. Pct.										> 2mm. Pct.		Sand Pct.	Silt Pct.
0-13	0.16			0.4	0.4	0.2	1.3	5.7			8.4	2	83	10	5	tr			
13-25	0.14			0.4	0.1	tr	1.5	6.5			8.5	10	75	10	5	tr			
25-48	0.11			0.4	0.6	0.1	1.5	6.2			8.4	9	76	9	5	1			
48-71	0.09			0.4	1.0	0.2	1.5	6.5			8.4	8	77	9	5	1			
71-117	0.15			0.4	1.8	0.2	1.5	6.6			8.3	11	73	9	5	2			
117-127	0.16			0.4	4		1.4	7.4			8.2	53	37	5	3	2			
127-140	0.05			0.4	2		1.2	4.0			8.4	81	17	1	1	tr			

- a. Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b. Inclusive of coarse fragments, carbonate and gypsum. Carbonate computed from < 2 mm. values. For the IIC3ca and IIIC4ca horizons, the carbonate is underestimated (see footnote "c").
- c. Methods 6Elc and 6Elb. Some carbonate occurs as coatings on pebbles in the IIC3ca and IIIC4ca horizons. Carbonate measured on the whole material and computed to a basis free of > 2 mm. would exceed values measured directly on the < 2 mm.
- d. The sands contain allogenic carbonate of pedogenic origin. A minimum estimate was obtained by treating the 2-0.05 mm. for 2 hours with pH 5 NaOAc and then determining the carbonate by Method 6Elc.
- e. 2.1 kg/m² to 117 cm (Method 6A).
- f. Assumed bulk densities for the moist fine-earth fabric for calculations.
- g. Volume on carbonate-containing basis; weight on carbonate-free.

Soil: Bluepoint Soil Classification: Typic Torripsamment; mixed, thermic
 Soil Nos.: S59NMex-7-17
 Location: West of the east boundary of Dona Ana Bend Colony in unsectioned land; 1,500 feet west of the pole line, along the north bank of Fillmore Arroyo, Dona Ana County, New Mexico.
 Geomorphic Surface: Fillmore. Land Form: Alluvial terrace sloping 2 percent to the west. Elevation: 4,085 feet.
 Parent Material: Fillmore terrace alluvium. Sand of mixed composition, and gravel which is mainly rhyolite, with a few rounded pebbles of quartz, chert, and andesite. Vegetation: Creosotebush.
 Collected by: R. B. Grossman, November 17, 1958.
 Described by: R. B. Grossman.

C 11978 0 to 13 cm. Bands of clean, medium to coarse, loose, noncalcareous sand, and brown (7.5YR 4/2 moist) coarse loamy sand that effervesces moderately; soft; few roots; thin powdery carbonate coatings on undersides of some pebbles; abrupt smooth boundary. Upper 1/4 inch loamy sand that effervesces weakly to moderately; not sampled.

B 11979 13 to 25 cm. Brown (7.5YR 5/2 dry) or dark brown (7.5YR 3.5/2 moist) coarse loamy sand; massive; soft; few roots; noncalcareous; clear wavy boundary.

Clca 11980 25 to 48 cm. Brown (7.5YR 5/3 dry, 4/2 moist) coarse loamy sand; massive; soft; few roots; scattered pebbles have very thin carbonate coatings; effervesces strongly; gradual boundary.

Clca 11981 48 to 71 cm. Same as 25- to 48-cm. zone. Subdivision for sampling purposes.

C2ca 11982 71 to 117 cm. Pinkish-gray (7.5YR 6/2 dry) or dark brown (7.5YR 4/3 moist) coarse loamy sand; massive; slightly hard; very few roots; thin carbonate coatings on pebbles; effervesces strongly; clear wavy boundary.

IIC3ca 11983 117 to 127 cm. Pinkish-gray (7.5YR 6/2 dry) or dark brown (7.5YR 4/3 moist) loose coarse loamy sand in the interstices formed by the pebbles; massive; slightly hard; few roots; pebbles have thin powdery carbonate coatings that can be rubbed off easily with the hand; effervesces strongly; clear wavy boundary.

IIIC4ca 11984 127 to 140 cm. Bands of loose fine gravel and brown (7.5YR 5/4 moist) slightly hard sand that adheres to pebbles; massive; very few roots; patches of flaky carbonate coating occur on undersides of pebbles; patches commonly have light yellowish-brown central parts and white, filamentous edges; effervesces strongly.

Remarks: The pedon was sampled by equal depth increments rather than by horizon. Characterization samples were obtained by mixing the increment samples in proportion to their contribution to the horizon thickness.

A hearthsite occurs in a position corresponding to directly above the IIIC4ca (referred to by Desert Project personnel as the Fillmore Arroyo hearthsite). The hearthsite is lenticular in cross section, 30 inches wide, 8 inches thick and at least 24 inches deep, composed of black (5YR 2/1 moist) sand to loamy sand in which are scattered pieces of charcoal 1/4 to 1 inch in diameter. Both the loamy sand and the charcoal are calcareous. Numerous hearthstones occur. The upper sides of the hearthstones are charred, and they rest on loamy sand that shows evidence of having been fired. Modern roots are present. The charcoal dates at 2,620 ± 200 B.P., W-786.

Slumping had considerably altered the bank at the hearthsite after the charcoal was gathered, and so the section description and sampling were done 15 feet to the west of the hearthsite. The horizons in the description appear to conform very closely both in depth limits and physical character to the horizons directly above the hearthsite.

Mineralogy (Methods 7A2, 7B). Fine sand, Clca (48-71 cm.) horizon.

Quartz	45
Weatherable (mostly feldspar)	55
Weatherable breakdown	
Albite	11
Oligoclase, andesine	23
Orthoclase, microcline	17
Microcrystalline aggregates	49

The microcrystalline aggregates mostly have an index of refraction below 1.530. Feldspars of the albite-anorthite series and potassium feldspars were identified by X-ray analysis. The ratio of peak heights for the albite-anorthite doublet suggests that the mineral is towards the albite end. The potassium feldspar is largely removed on grinding, whereas the albite remains. Estimates of quartz and feldspar by X-ray diffraction (peak height) did not correlate well with grain counts. The apparent quartz content estimated from the X-ray patterns is high, and is further enhanced by grinding.

60-1

Soil: Casito Soil Classification: Petrocalcic Ustollic Paleargid; loamy-skeletal, mixed, thermic, shallow
 Soil Nos.: S60NMex-7-1
 Location: SW 1/4 NE 1/4, Sec. 24, T23S, R2E, north bank of arroyo on south side of Dripping Springs Road, Dona Ana
 County, New Mexico. Land Form: Alluvial terrace sloping 2 percent to west. Elevation: 4,330 feet.
 Parent Material: Picacho terrace alluvium derived mainly from rhyolite, with minor amount of andesite.
 Vegetation: Creosotebush, 2 to 4 feet high and 3 to 6 feet apart. Geomorphic Surface: Picacho.
 Collected by: L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 11, 1960.
 Described by: L. H. Gile and F. F. Peterson.

Soil Surface. Desert pavement of fine rhyolite pebbles, with a layer of loose reddish sand, about 1 mm. thick, between the pebbles.

Aca 13119 0 to 6 cm. Brown (7.5YR 5/4 dry) gravelly fine sandy loam, dark brown (7.5YR 4/4 moist) with some parts slightly grayer; generally massive, with some weak medium platy in upper part; soft; few roots; thin, discontinuous carbonate coatings on pebble bottoms; effervesces strongly; abrupt smooth boundary.

B2tca 13120 6 to 28 cm. Light reddish-brown (5YR 6/3 dry) very gravelly light sandy clay loam, reddish-brown (5YR 4/4 moist); weak very fine and fine crumb structure; loose mass of soft crumbs; roots common; carbonate coatings on pebbles are thin and discontinuous, with a tendency to occur mainly on pebble bottoms; some pebble tops and interpebble sand grains are coated with silicate clay; scattered volumes with 5 or 6 chroma, occur discontinuously in lower part; effervesces strongly; abrupt wavy boundary.

Note. High-chroma material sampled separately from a continuous zone that extends 1 1/2 feet horizontally and occurs several feet away from the vertical sequence sampled. Its description follows:

B2tca 13125 18 to 30 cm. Red (2.5YR 4/6 moist) gravelly clay loam; massive; firm; roots common; pebbles firmly embedded in clayey matrix; carbonate filaments common; some segregation of the red, clayey material in 1/4 to 1-inch diameter units with fine subangular blocky structure; effervesces strongly; abrupt upper and lower boundaries.

K2m (Clcam) 13121 28 to 43 cm. Pink (5YR 7/3 dry) carbonate-cemented material, light reddish-brown (5YR 6/4 moist); massive; a few pebbles, and pieces of carbonate with cast-impressions of pebble surfaces can be broken out; very and extremely hard; few carbonate coatings on pebbles are laminar; lenses about 1/4 inch thick and 6 to 12 inches long, of light brown (7.5YR 6/4 dry) soft loamy material are spaced from 1/4 to 1 1/2 inches apart and contain the few roots in the horizon; effervesces strongly; clear wavy boundary.

K3 (C2ca) 13122 43 to 64 cm. Pinkish-white (5YR 8/2 dry) carbonate-cemented material, light reddish-brown (5YR 6/3 moist); massive; slightly hard to hard; pockets and small veins, about 1/4 to 1 inch in diameter, of brown (7.5YR 5/4 moist) loamy material in which occur the few roots in the horizon; very few fine (less than 1/4 inch), discontinuous small veins of reddish-brown (5YR 5/4 dry) loamy material; effervesces strongly; abrupt smooth boundary.

C3ca 13123 64 to 79 cm. Reddish-brown (5YR 5/3 dry) very gravelly sandy loam, reddish-brown (5YR 4/3 moist); massive and single grain; soft and loose; very few roots; thin coatings of carbonate on pebble bottoms and filaments on pebble tops; effervesces strongly; abrupt smooth boundary.

IIC4ca 13124 79 to 104 cm. Light brown (7.5YR 6/4 dry) heavy sandy loam, brown (7.5YR 5/4 moist); weak medium subangular blocky structure; hard; very few roots; a band of white (dry) or pinkish-white (moist) carbonate aggregates, 1 to 2 inches in diameter, occurs near the middle of the horizon; effervesces strongly; clear wavy boundary.

IIIC5ca 104 to 137 cm. Light brown (7.5YR 6/4 dry) or dark brown (7.5YR 4/4 moist) very gravelly sandy loam; single grain; loose except for a very few soft aggregates of small pebbles; few roots; very few yellowish brown, clayey bodies, about 1/2 inch in diameter; patchy carbonate coatings on pebbles, mainly on pebble undersides; effervesces strongly; gradual, irregular boundary. (Not sampled.)

IIIC6 137 to 152 cm. Light brown (7.5YR 6/4 dry) or dark brown (7.5YR 4/4 moist) very gravelly loamy sand; single grain; loose; no roots; patchy carbonate coatings on pebble undersides; effervesces strongly.

Remarks: Soil surface may have been contaminated by dust from road located about 20 feet to north, and by sand from arroyo. Soil sampled on very windy day; some winnowing of fine fractions occurred.

Soil: Algerita Soil Classification: Typic Calciorthid; coarse-loamy, mixed, thermic
 Soil Nos.: S60(68)NMex-7-2
 Location: No legal description; Dona Ana Bend Colony, 1/2 mile east of New Mexico State University along Tortugas Mountain road; about 40 yards south of road; Dona Ana County, New Mexico.
 Geomorphic Surface: Picacho. Elevation: 4,130 feet.
 Land Form: Alluvial fan sloping 2 percent to west; level area on undulating, relatively broad ridge top with subdued drainage ways, about a foot deep, either side of pit.
 Parent Material: Picacho fan alluvium derived from rhyolite, andesite, and sand and rounded gravel of mixed composition.
 Vegetation: Creosotebush, about 1.5 to 2 feet high and 2 to 10 feet apart.
 Collected by: L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 12, 1960.
 Described by: L. H. Gile and F. F. Peterson.

Soil Surface. Desert pavement, covering 70 to 80 percent of the surface, composed of angular, rhyolite gravel, less than about 2 inches in diameter, with some angular andesite and a few rounded pebbles of mixed lithology. Most pebbles have thin, discontinuous desert varnish. A thin layer of loose, pale brown sand occurs between the pebbles.

A 13126 0 to 5 cm. Pinkish-gray (7.5YR 6/2 dry) or brown (7.5YR 4/2 moist) gravelly fine sandy loam; weak coarse platy; soft; no roots; moderately vesicular; scattered, 0.5 mm. thick, reddish-brown (5YR) sand lenses throughout; effervesces strongly; abrupt smooth boundary. Sample includes desert pavement of gravel.

Bca 13127 5 to 10 cm. Light reddish-brown (6YR 6/4 dry) or reddish-brown (6YR 4/4 moist) sandy clay loam; moderate fine and very fine crumb with few, weak, very fine subangular blocks; soft and loose; very few roots; few carbonate filaments on ped surfaces; few small pebbles with discontinuous, less than 1 mm. thick carbonate coatings on undersides; effervesces strongly; abrupt wavy boundary.

K1 (C1ca) 13128 & 13129 10 to 36 cm. Dominantly pinkish-white (7.5YR 8/2 dry) or pink (7.5YR 7/4 moist) sandy clay loam, with lesser amounts light brown (7.5YR 6.5/4 dry, 5.5/4 moist); weak and very weak medium and fine subangular blocky; material digs out as a mixture of peds and loose soil; loose parts soft and peds hard; few roots; few reddish-brown (5YR 4/4 dry, 3.5/4 moist) bodies, 1 to 3 mm. in diameter; common carbonate nodules; few carbonate cylindrical; carbonate filaments on stronger peds; pebbles have thin, discontinuous carbonate coatings; effervesces strongly; clear wavy boundary. Sampled 4 to 9 and 9 to 14 inches.

K2 (C2ca) 13130 36 to 58 cm. Dominantly light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5.5/4 moist) sandy clay loam; weak and moderate coarse and medium subangular blocky; most parts very hard but nonindurated; few roots; some brown (7.5YR 4.5/4 dry) or dark brown (7.5YR 4/4 moist) parts; many weakly to moderately defined, light brown and some reddish-brown, cylindrical aggregates, 1/2 to 1 inch in diameter; effervesces strongly; clear wavy boundary.

K3 (C3ca) 13131 58 to 89 cm. Light brown (7.5YR 5.5/4 dry) or brown (7.5YR 4/4 moist) sandy loam; massive and weak coarse subangular blocky; soft and slightly hard; few roots; few light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist) cylindrical which are not physically well differentiated from matrix; thin, discontinuous carbonate coatings on pebbles; effervesces strongly; clear wavy boundary.

IIK32 68L234 89 to 122 cm. White (10YR 9/3, dry) or very pale brown (10YR 7/3, moist) very gravelly sandy loam; massive; dominantly hard and very hard, with a few zones soft; very few roots; most pebbles and sand grains continuously coated with carbonate; carbonate-cemented clusters of pebbles common; the very gravelly material is discontinuous, and laterally grades into low-gravel material in which carbonate occurs as scattered nodules; effervesces strongly; abrupt smooth boundary.

IIICca 68L235 122 to 137 cm. Light brown (7.5YR 6.5/4, dry) or brown (7.5YR 5/4, moist) sandy loam; massive; slightly hard; no roots; thin, discontinuous carbonate coatings on sand grains and pebbles; effervesces strongly.

Radiocarbon Dates

A radiocarbon date of 29,990 ± 1,400, - 1,200 B.P. was obtained on the carbonate adhering to the > 19 mm. pebbles from the 89- to 122-cm. zone (I-2731; 67L036). The pebbles were soaked in water for two days, dried, then scraped with a knife to remove the less strongly adhering material, followed by buffing with a stiff brush. The carbonate coating that remained was removed with a mechanical vibrating tool.

Clay Mineralogy, Methods 7A2, 7A3. The Beltsville Laboratory determined the clay mineralogy for the K1 (23-36 cm., ISL 13129). A poorly organized montmorillonite-vermiculite intergrade occurs abundantly, with a trace of mica and 10 percent kaolinite. The analyses were performed both with and without removal of the carbonate by Method 1B3.

Sand Mineralogy, Method 7B1. Counts of 300 grains were made on the very fine sand after carbonate removal for the Bca and the K3 horizons. The Bca horizon contains 50 percent quartz, 25 percent discrete feldspar, 25 percent microcrystalline aggregates, 3 percent opaques and 2 percent ferromagnesian minerals. The K3 horizon contains 35 percent quartz, 40 percent feldspar, 25 percent microcrystalline aggregates, 2 percent opaques and a trace of ferromagnesian minerals. The feldspar are mostly orthoclase (some microcline) and albite, with 10 to 15 percent relative plagioclase of intermediate to high calcium content. The microcrystalline aggregates appear to consist mostly of mosaics of small feldspar optical domains; the aggregate overall has a refractive index consistent with orthoclase and is presumably fragments of rhyolite groundmass. Some of the aggregates have the appearance of chert. Most aggregates have not altered to earthy material. They commonly contain very small inclusions of higher refractive index that appear pale brown in color. In addition, there are larger opaque bodies, probably magnetite or its relatives. The ferromagnesian minerals are mostly amphibole, pyroxene, and epidote with very little mica. Some grains have rather thick coatings of reddish-brown silicate clay. Overall the grains appear somewhat weathered, probably more related to geological processes than to pedogenic alteration.

Micromorphology, Method 4E1b. Thin sections of the upper half of the Bca horizon were examined. There are two subplasmas: fine-grain carbonate and silicate clay. The silicate clay occurs as coatings around sand grains and as small volumes, a millimeter or less, rich in silicate clay and low in carbonate (clayey blebs). Overall the fabric is plasmic but with a strong clumpiness. A substantial part lacks this clumpiness; fine grain carbonate fills the interstices and makes a decidedly plasmic fabric. Many sand grains and their associated coatings of silicate clay, and also many of the clayey blebs, appear discrete in the plane of observation. The subplasma of fine grain carbonate is continuous but over much of the area forms a very open porous fabric with the interstices only partly filled by sand grains and clayey blebs. In a few places fine-grain carbonate appears to mark the edge of small cylindrical bodies, which may be the trace of roots or of fungal filaments. The blebs are very diverse. Some show moderate internal preferred orientation of the clay. In others, the interference color is very weak or nonexistent over small optical domains, lending a chert-like appearance. These parts with extremely low interference color may in some instances be so rich in hydrous iron oxides as to mask the birefringence of the silicate clay. In some instances, perhaps they represent holes or parts low in silicate clay within which there had been small calcite crystals. The peripheries of some of the better expressed clayey blebs appear denser or higher in hydrous iron oxides than the interiors. The sand grains are mostly discrete quartz and feldspar. A subordinate portion of rock fragments is present. These rock fragments consist of small optical domains, probably mostly feldspar. Discrete grains of ferromagnesian minerals (mostly amphibole and pyroxene) are very scarce. Opaque bodies are very common and range widely in size. Magnetite(?) is present as inclusions in the rock fragments. Peripheral alteration of the rock fragments is quite pronounced. The discrete ferromagnesian minerals range from moderately to weakly altered, but the alteration is peripheral. Some discrete feldspar grains show moderate peripheral alteration.

SOIL CLASSIFICATION: Typic Torriorthent; sandy-skeletal, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Arizo SOIL Nos. S60-NMex-7-3 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13132-13135

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1			
		Total			Sand					Silt			Coarse fragments f/			
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.02-0.002)	(2-0.1)	Vol. 250-2	Wt. 3B1 76-2	19-2	
Pct. of < 2 mm											<250	<76	<19			
Carbonate Removed a/, b/																
0-10	A	69.8	22.1	8.1	7.1	9.0	5.8	21.1	26.8	16.9	5.2	57.7	43.0	75	85	52
10-33	B2	78.9	12.8	8.3	27.4	19.1	6.8	13.3	12.3	9.0	3.8	28.8	66.6	65	79	69
33-61	Clca	79.7	12.2	8.1	30.7	7.4	5.6	19.7	16.3	10.1	2.1	37.1	63.4	65	79	73
61-102	C2ca	76.4	17.2	6.4	23.6	19.9	4.6	11.2	17.1	14.0	3.2	38.4	59.3	70	82	28
102-118	C															

Depth (cm.)	6A1a	6B1a	C/N	6C2a	Carbonate as CaCO ₃		Bulk density			5A1a	Water content			Composition Whole Material d				
	Organic carbon	Nitrogen		Ext. Iron as Fe	<2mm. e/	<0.002 mm. Pct.	g/cc	g/cc	g/cc	CEC NH ₄ OAc	Pct.	Pct.	Pct.	NONCARBONATE			Carbonate as CaCO ₃	
	g/100g	g/100g		Pct.	Pct.	g/cc	g/cc	g/cc	me./100g.	>2mm. Pct.				Sand Pct.	Silt Pct.	Clay Pct.		
0-10	0.41	0.023	17	tr	tr	1.3			7.5				86	10	3	1	tr	
10-33	0.31	0.019	16	0.4	-	1.3			7.1				79	17	3	1	-	
33-61	0.06				-	1.3			6.1				78	17	3	2	-	
61-102	0.11				1	1.3			7.0				82	14	3	1	tr	

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
- c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- d/ Inclusive of coarse fragments, carbonate, and gypsum.
- e/ Determination on whole material by Method 6Elc and calculated as a percentage of the < 2 mm.
- f/ > 76 mm. < 5 percent by volume throughout.
- g/ Assumed bulk density of moist fine-earth fabric for calculations.
- h/ 0.8 kg/m² to 102 cm (Method 6A).

Soil: Arizo Soil Classification: Typic Torriorthent; sandy-skeletal, mixed, thermic
 Soil Nos.: S60NMex-7-3
 Location: SE 1/4 NE 1/4, Sec. 21, T23S, R3E, about 100 yards south of Soledad Canyon road, north bank of arroyo,
 Dona Ana County, New Mexico. Geomorphic Surface: Organ. Elevation: 4,750 feet.
 Land Form: Alluvial fan sloping 4 percent to west.
 Parent Material: Organ fan alluvium derived from rhyolite.
 Vegetation: Scattered snakeweed, Mormon tea, prickly pear, mesquite, creosotebush, fluffgrass, and black grama.
 Collected by: L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 12, 1960.
 Described by: L. H. Gile and F. F. Peterson.

A 13132 0 to 10 cm. Reddish-brown (5YR to 7.5YR 5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) very gravelly light sandy loam; weak fine crumb; soft; many fine roots; noncalcareous; clear smooth boundary.

B2 13133 10 to 33 cm. Reddish-brown (5YR 4/4 dry) or dark reddish-brown (5YR 3/4 moist) very gravelly light sandy loam with slightly redder moist color than horizon above; weak very fine granular; soft and loose; fine roots common; discontinuous thin carbonate coatings on bottoms of pebbles in lower part of horizon; fines in interstices; fines adhere to pebble surfaces discontinuously; noncalcareous except for pebble coatings; abrupt wavy boundary.

Clca 13134 33 to 61 cm. About 60 percent fine gravelly coarse sand; single grain; loose; few roots; thin, discontinuous carbonate coatings, mainly on bottoms of pebbles; about 40 percent reddish-brown (5YR 5/4 dry, 4/4 moist) lenses of very gravelly loamy coarse sand; matrix mainly noncalcareous but thin carbonate coatings on bottoms of pebbles; abrupt wavy boundary.

C2ca 13135 61 to 102 cm. Reddish-brown (5YR 5.5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) very gravelly sandy loam; massive; soft to slightly hard; many fine roots; few carbonate filaments; thin, discontinuous white carbonate coatings on pebbles (thicker on undersides); pebbles and cobbles in this horizon larger than in above horizon; effervesces strongly; clear wavy boundary.

C 102 to 118 cm. Light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 4/4 moist) very gravelly loamy sand; massive; soft; few roots; thin, mostly patchy coatings on pebbles, with most carbonate occurring on pebble bottoms; effervesces strongly (not sampled).

60-4

Soil: Vado Soil Classification: Typic Camborthid; loamy-skeletal, mixed, thermic
 Soil Nos.: S60NMex-7-4
 Location: SW 1/4 NW 1/4, Sec. 23, T23S, R3E, arroyo cut bank on south side of arroyo, just east of road crossing, arroyo, in front of first large foothill of Organ Mountain, Dona Ana County, New Mexico.
 Geomorphic Surface: Organ. Land Form: Alluvial fan sloping 7 percent to west. Elevation: 5,000 feet.
 Parent Material: Organ fan alluvium derived from rhyolite.
 Vegetation: Scattered bunches of black grama, numerous bunches of fluffgrass; snakeweed, mesquite, and Mormon tea.

Collected by: L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 12, 1960.
 Described by: L. H. Gile and F. F. Peterson.

Soil Surface. Angular, rhyolite gravel covers about 80 to 90 percent of the soil surface.

A 13136 0 to 8 cm. Brown (7.5YR 5.5/4 dry) or dark brown (7.5YR 3.5/2 moist) very gravelly sandy loam; weak medium platy; soft; many fine roots; noncalcareous; clear smooth boundary. Desert pavement included in sample.

B21 13137 8 to 25 cm. Reddish-brown (6YR 5/4 dry) or dark reddish-brown (5YR 3/3 moist) very gravelly sandy loam; massive and weak very fine granular, with some fine to very fine subangular blocky structure controlled by pebble surfaces; soft and slightly hard; roots common; pebbles have thin, discontinuous coatings of loamy material; noncalcareous; clear wavy boundary.

B22 13138 25 to 43 cm. Reddish-brown (6YR 5/4 dry) or dark reddish-brown (5YR 3/3 moist) very gravelly sandy loam; massive and weak very fine crumb; soft; roots common; loamy material adheres discontinuously to pebbles; noncalcareous; clear wavy boundary.

Clca 13139 & 13140 43 to 109 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/4 moist) very gravelly sandy loam with cobbles up to 6 inches diameter; massive and single grain; loose and slightly hard; roots common; thin, continuous carbonate coatings and carbonate filaments on pebbles; effervesces strongly; clear wavy boundary. Sampled 43 to 74 and 74 to 109 cm.

C2ca 13141 109 to 130 cm. Light brown (7.5YR 5.5/4 dry) or dark brown (7.5YR 3.5/4 moist) very gravelly loamy sand; single grain; loose; few roots; discontinuous, thin carbonate coatings on pebbles; few carbonate filaments on pebbles; effervesces strongly.

Mineralogy (Methods 7A2, 7A3, 7B1). The Beltsville laboratory found a moderate amount of a poorly organized montmorillonite-vermiculite in the B22 (25-43 cm) with small amounts of montmorillonite and mica, and 15 percent kaolinite. The coarse silt from the Clca (43-74 cm) contains 65 percent feldspar, 20 percent quartz, and 15 percent mica. Ore minerals, hornblende and epidote, in that order, dominate the heavy mineral fraction. About 80 percent of the feldspar and the mica is altered.

SOIL CLASSIFICATION: Petrocalcic Ustollic Paleargid; clayey-skeletal, mixed, thermic.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Terino, thick solum variant SOIL Nos. S60(61)NMex-7-5 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13142-13145; 15741-15749

GENERAL METHODS: 1A1, 1B1a, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)										3A1		1968 Samples			Coarse fragments 2A2		
		Total		Sand					Silt			Int. II (0.2-0.02)	(2-0.1)	3A1b	Vol. 250-2	Wt. 76-2	3B1 19-2		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.2-0.02)							Int. I (<0.002)	Int. II (0.002-0.0002)
Pct. of < 2 mm																			
Carbonate Removed g, b																			
0-8	A1	60.6	25.3	14.1	13.5	6.6	2.2	14.1	24.2	16.4	8.9	50.5	36.4	22.3	16	45	61	50	
8-20	B1t	48.7	28.1	23.2	12.2	3.6	1.5	10.4	21.0	18.7	9.4	47.2	27.7	31.7	24	60	73	55	
20-23	A2	51.4	33.9	14.7	14.2	4.8	1.6	9.0	21.8	22.8	11.1	51.0	29.6		50	68	62		
23-38	B21t	20.5	16.4	63.1	3.9	2.0	0.8	4.2	9.6	10.2	6.2	22.9	10.9	69.9	61	25	40	32	
38-58	B22tcs	18.2	7.6	74.2	7.5	2.9	1.0	2.8	4.0	3.9	3.7	9.7	14.2	71.7	61	35	49	24	
58-64	K1 c/	28.3	11.8	59.9	9.9	5.8	2.1	4.2	6.3	5.7	6.1	14.5	22.0	58.8	52	20	54	49	
58-64	K1 d/	33.5	9.2	57.3	10.5	9.0	3.3	5.1	5.6	2.5	6.7	10.9	27.9		5	42	42		
64-71	K21m e/	39.5	18.1	42.4	12.7	10.2	4.1	5.9	6.6	4.4	13.7	14.0	32.9	48.0	40	5	42	42	
64-71	K21m f/	52.3	11.0	36.7	18.6	15.3	5.7	7.1	5.6	3.2	7.8	12.3	46.7		5	54	54		
71-86	K22m -	61.0	12.2	26.8	24.6	17.3	5.4	8.2	5.5	2.7	9.5	12.4	55.5	28.5	19	45	76	64	
86-114	K31	63.4	13.4	23.2	31.5	17.2	3.3	5.1	6.3	3.7	9.7	12.6	57.1		45	68	54		
114-142	K32	45.4	31.4	23.2	17.8	8.6	3.5	7.3	8.2	6.7	24.7	19.2	37.2	24.2	8	55	75	66	
142-168+	K&Cca	73.5	15.0	11.5	33.3	20.4	5.9	7.3	6.6	4.2	10.8	14.4	66.9	13.9	4	55	69	59	
Depth (cm.)	6A1a	6B1a	C/N	6C2a	Carbonate as CaCO ₃	5A1a	Bulk density			Water content			Composition Whole Material 1/						
	Organic carbon	Nitrogen		Ext. CEC		NH ₄ OAc	n/	4B5	Water content		NONCARBONATE				Carbonate as CaCO ₃				
	E/ Pct.	E/ Pct.		Iron as b Fe Pct.	b/ Pct.	b/ 100g	g/cc	g/cc	g/cc	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	
0-8	0.88	0.092	10	0.8	-	10.2	1.4						61	24	10	5	-	-	
8-20	1.16	0.116	10	1.2	-	13.3	1.4						73	13	8	6	-	-	
20-23	0.70	0.070	10	1.1	-	6.9	1.4						68	16	11	5	-	-	
23-38	0.87	0.087	10	1.7	-	30.9	1.4		1.43				40	12	10	38	-	-	
38-58				2.1	1		1.5						49	9	4	38	tr		
58-64	0.40	0.030	13		60	34.8	1.6						32	8	3	16	41		
58-64	0.27	0.021	13		87	39.0	1.6						8	4	1	7	80		
64-71	0.21				88	29.6	1.8						8	4	2	5	81		
64-71	0.20				90	29.2	1.8						11	5	1	3	80		
71-86	0.05				62	20.7	1.8						55	10	2	5	28		
86-114					39	19.1	1.8						56	17	4	6	17		
114-142					39	26.5	1.7						65	10	6	5	14		
142-168+					17	16.4	1.6						65	21	4	4	6		
Depth (cm.)	Extractable bases				6B1a Ext. Acidity	Cat. Exch. Cap.	Water extract from saturated paste 8A1												
	6N2b	6O2b	6P2a	6Q2a			5A1a NH ₄ OAc	Ca	Mg	6F1a	6Q1a	6J1a	6K1a	6L1a	8A1a				
	Ca	Mg	Na	K			meq/100g	meq/liter	meq/liter	meq/liter	meq/liter	meq/liter	meq/liter	meq/liter					
0-8	9.3	2.2	tr	1.1			2.2	11.7											
8-20	10.5	2.8	0.1	1.7			2.5	14.6											
20-23	4.5	1.9	1.2	0.2			1.5	7.8											
23-38	13.2	15.3	4.1	0.3			1.8	31.2		6.2	0.2		3.0	0.2					
38-58		8.1	0.8	1.8				26.6		3.2				3.2					
58-64		5.1	2.1	0.8				13		25	1.0			3.8					
58-64		1.8	1.2	0.3				3.3		19	0.8			3.5					
64-71		1.7	1.2	0.2				4.8				4.1	0.2	32					
64-71		2.8	2.4	0.3				3.7		33	0.9		6.9	60					
71-86		6.9	3.3	1.1				15		58	1.8		6.7	3.3					
86-114		11	1.8	1.4				24		20	1.4			111					
114-142		3.9	1.4	1.4				26		17	1.1			2.5					
142-168+		10	1.1	1.1				26		23	0.9			1.6					
Depth (cm.)	8A Water at Sat. Pct.	6F1a Gypsum Pct.				a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.													
0-8						b/ In contact overnight with 0.1N NaOH in addition to regular treatment.													
8-20						c/ Non-indurated part.													
20-23						d/ Indurated plates.													
23-38	79					e/ Laminar subhorizon.													
38-58						f/ Upper part of carbonate-plugged horizon.													
See Footnote k/ concerning data below.																			
58-64	56					g/ Determination on sample treated by Method 1B3 to remove carbonate; expressed on a carbonate-containing basis.													
58-64	47					h/ Determination on whole soil and calculated as a percentage of the fine earth. Carbonate included with the fine earth. Explanation													
64-71	53					1/ Inclusive of coarse fragments, carbonate and gypsum.													
64-71	60					Carbonate measured directly by Methods 6E1c and 6E1b.													
86-114	52					k/ Determination on whole soil ground to pass 2 mm.; calculated to a basis free of noncarbonate coarse fragments.													
114-142	70					m/ The pedon was resampled in 1968. McKim determined the particle-size distribution and did mineralogical studies (McKim, H. L. 1969. The mineralogy of a Petrocalcic Paleargid from southern New Mexico. M.S. Thesis, University of Nebraska, Lincoln, Nebraska). The mineralogical data are on a subsequent sheet.													
142-168+	66					n/ Assumed bulk density of moist fine-earth fabric for calculations.													
o/ Volume on a carbonate-containing basis; weight on a carbonate-free basis.																			

Soil: Terino, thick solum variant Soil Classification: Petrocalcic Ustollic Paleargid; clayey-skeletal, mixed, thermic
 Soil Nos.: S60(61)NMex-7-5
 Location: Center Sec. 12, T23S, R3E, in Ice Canyon, Dona Ana County, New Mexico. Elevation: 5,880 feet.
 Geomorphic Surface: Dona Ana. Parent Material: Upper Camp Rice fan alluvium derived from rhyolite.
 Land Form: Remnant of an alluvial fan with about 9 percent slope to west; at sampling site, 1 to 3 percent convex transverse slope and weakly convex longitudinal slope.
 Vegetation: Snakeweed spaced 1 to 3 feet apart. scattered mesquite and cholla cactus; bunches of sideoats and black grama about a foot apart; few juniper on sideslopes; few squawbush; scattered prickly pear.

Collected by: L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 13, 1960 and F. F. Peterson, 1961.
 Described by: L. H. Gile and F. F. Peterson, 1960 and F. F. Peterson, 1961.

Soil Surface. Desert pavement covers about 80 to 90 percent of the soil surface and consists of angular rhyolite gravel, 1 to 3 inches in diameter, and some larger (3 to 7 inches) angular rhyolite cobbles; most of these surface fragments are stained reddish-brown; thin layer of loose reddish sand occurs between pebbles and is lighter colored than the underlying A.

A1 13142 0 to 8 cm. Reddish-brown (5YR 4/4 dry) or dark reddish-brown (5YR 3/3 moist) very gravelly loam; weak very fine granular; soft in place; slightly sticky; many roots; noncalcareous; abrupt smooth boundary. Desert pavement included in the sample.

B1t 13143 8 to 20 cm. Reddish-brown (5YR 4/4 dry) or dark reddish-brown (5YR 3/4 moist) very gravelly heavy loam; very weak fine subangular blocky breaking easily to weak very fine granular; slightly hard; many roots; pebbles with reddish-brown (5YR 4/4 dry) loamy coatings; majority of sand grains have a dull coating and a few appear clean; noncalcareous; abrupt wavy boundary.

A2 13144 20 to 23 cm. Reddish-brown (5YR 5/3 dry) or dark reddish-brown (5YR 3.5/4 moist) very gravelly sandy loam; moderate medium to fine subangular blocky; friable; slightly hard; roots common; vesicular; many clean (7.5YR to 10YR 6/2 to 7/2 dry) fine sand grains, especially on exteriors of peds, give a grayish cast to the soil; some parts similar to superjacent horizons; peds have rough-textured surface; bottoms of pebbles coated with reddish-brown loamy material; tops of pebbles at bottom of horizon are coated with grayish material; horizon is discontinuous; noncalcareous; abrupt smooth boundary.

B2lt 13145 23 to 38 cm. Ped surfaces dark reddish-brown (2.5YR 3/4 moist) with larger peds having somewhat darker surfaces; gravelly clay; firm; sticky; few roots; moderate to strong medium and fine subangular blocky; larger peds separate into fine and very fine subangular blocky peds; ped interiors dark red (2.5YR 3/6 moist); ped surfaces very smooth and reflective; pebbles and cobbles have apparent clay coatings; noncalcareous; clear wavy boundary.

B2tcs 15741 38 to 58 cm. Dark red (2.5YR to 10R 3/6 moist) gravelly clay; moderate medium to fine subangular blocky peds that do not break down to as small or as strong peds as in B2lt horizon; firm; hard; sticky; very few roots; pebbles and cobbles coated with clay; ped surfaces smooth and reflective; scattered lenses of sand-sized gypsum crystals, 1/8 to 1/4 inch wide, 1 to 4 inches long, and 2 to 3 mm. thick; lenses commonly in a weakly effervescent clayey matrix; gypsum grains have reflective faces, crush easily, are yellow to reddish-yellow and not visibly stained with clay; mainly noncalcareous, some parts effervesce weakly; abrupt smooth boundary.

K1 (C1ca) 15742 58 to 64 cm. Mainly white (7.5YR 9/0 dry) or pinkish-white (7.5YR 8/2 moist) platy, very hard, carbonate-cemented fragments with prominent coatings of reddish-yellow (5YR 7/6 dry, or 5YR 6/6 moist); reddish colors occur throughout some fragments and in parts of others; plates are weakly laminated in some parts, are discontinuous and dig out rather readily; few roots; loamy material occurs between some plates; effervesces strongly; abrupt smooth boundary. Plates analyzed under LSL 15743.

K2lm (C2cam) 15744, 15745 64 to 71 cm. Laminae horizon and upper plugged horizon reported and analyzed under LSL 15744 and 15745, respectively. Upper 1/2 to 1 inch consists of extremely hard laminae ranging mainly from white (10YR 9/1 dry, or 8/1 moist) to white (10YR 8/2 dry) or very pale brown (10YR 7/3 moist), with few thin laminae slightly darker; overlies 2 to 3 inches of white (10YR 9/2 dry) or very pale brown (10YR 8/3 moist) very hard, massively cemented material; no roots; few included pinkish lenses; effervesces strongly; clear smooth boundary.

K22m (C3cam) 15746 71 to 86 cm. Variegated white (10YR 9/1 dry) or very pale brown (10YR 8/3 moist) and pink (7.5YR 8/4 dry) or light brown (7.5YR 6/4 moist) gravelly material indistinctly banded with white (10YR 9/1 dry); hard to extremely hard; very few roots; most pebbles have 0.5 to 2 mm. thick coatings of laminar carbonate; light brown bands with about 50 percent gravel, white bands with 15 to 25 percent gravel where bands relatively thick; effervesces strongly; clear smooth boundary.

K3l (C4ca) 15745 86 to 114 cm. Pink (7.5YR 7/4 dry) or light brown (7.5YR 6/4 moist) finely variegated with reddish-brown (5YR 5/4 dry, 3.5/4 moist) and white (7.5YR 9/1 dry) or pinkish-white (7.5YR 8/2 moist) gravelly sandy loam; massive; slightly hard and hard; very few roots; indistinct banding 1 to 2 inches thick of reddish-brown, low-carbonate material with light gray carbonate-rich material; scattered blebs, small pockets and lenses of reddish-brown (2.5YR 4/4 dry) apparent clay-coated sand and pebbles; pebbles commonly have thin, discontinuous, flaky carbonate coatings, mainly on pebble bottoms; effervesces strongly; clear to gradual wavy boundary.

K32 (C5ca) 15748 114 to 142 cm. About 70 percent white and pink lenses, which are white and pink (7.5YR 8/1 dry, 8/3 moist; and 5YR 7/3 dry, 5.5/4 moist) very gravelly sandy loam; massive; slightly hard to very hard (where carbonate cemented); pebbles separated by carbonate; reddish-brown blebs in carbonate cement; lenses 1/2 to 2 inches thick, 12 to 30 inches long. About 30 percent reddish-brown lenses which are reddish-brown (5YR 5/4 dry, 4/4 moist) very gravelly sandy loam; massive; compact but looser than white lenses; common discontinuous clay coatings and bridging on and between pebbles; few discontinuous thin carbonate coatings on pebbles; very few roots; few black (MnO₂?) blebs; lenses 1/2 to 1 inch thick, 12 to 24 inches long; effervesces weakly and strongly; clear to gradual wavy boundary.

K&Cca (C6ca) 15749 142 to 168 cm. Reddish-brown (5YR 5/4 dry, 3.5/4 moist) very gravelly loamy sand; massive and loose; discontinuous (and in pockets, continuous) clay films and bridges (some 2.5YR 4/6 dry) on sand grains and pebbles; scattered black (MnO₂?) blebs; pebbles commonly with loamy sand adhering to tops, thin, discontinuous carbonate coatings to bottoms; about 20 to 40 percent of horizon of 1/2 to 2 inches thick, 6 to 18 inches long, light brown (7.5YR 7/2 to 6/4 dry, 6/4 to 5/4 moist) carbonate-cemented lenses which are massive, slightly hard to hard, and have sand grains separated by carbonate; some parts noncalcareous, most parts effervesce weakly or strongly.

Remarks: The A2 horizon has the grayness and bleached appearance of an eluvial horizon. The boundary between the A2 and B2 is exceedingly sharp, and there is no evidence of extension of the A2 down around B2 peds.

Micromorphology, Method 4Elb. Thin sections of the B2lt and B2tcs show no oriented clay on ped faces; all of the clay in ped interiors is strongly oriented, both as grain coatings and linear bodies.

(Continued)

Terino, thick solum variant 60-5, continued

60-5 (cont.)

Mineralogy (Methods 7B1, 7A2). McKim^{1/} studied the mineralogy of pedon S60NMex-7-5. Point counts were made of composite thin sections (see Method 4Elc for preparation) of the > 19 mm. from the Blt, K22m, and Cca horizons. The rock fabric was divided into > 0.05 mm. grains and groundmass. The average values were 72 percent groundmass, 17 percent quartz, 7 percent feldspar, 2 percent biotite, and 2 percent opaque and isotropic minerals. It should be emphasized that resolvable grains smaller than 0.05 mm. were included with the groundmass.

The table below lists the counts on several separates. Groundmass in this table is roughly equivalent to microcrystalline aggregate in other data for pedons of the study area. About 600 grains were counted.

Horizons above the Kl contain small to moderate amounts of kaolinite and mica plus traces of interlayer montmorillonite, chlorite, and quartz. Clays in the Kl horizon and beneath contain a moderate amount of a mica-montmorillonite complex, small amounts of mica and kaolinite, and traces of chlorite and quartz. The proportion of montmorillonite below the Kl increases somewhat with depth. In the fine clay (< 0.0002 mm.), mica predominates above the Kl horizon and a mica-montmorillonite complex predominates below.

1/ McKim, H. L. The mineralogy of a Petrocalcic Paleargid from southern New Mexico. 1969. M.S. Thesis, University of Nebraska, Lincoln, Nebraska.

Mineralogy of the Noncarbonate 2-0.05 mm. from Pedon S60NMex-7-5, Resampled in 1968.

Depth cm.	Horizon	Groundmass %	Quartz and Feldspar n ~ 1.550	Quartz	Feldspar n < 1.550	Feldspar n = 1.550 (Oligoclase)	Hornblende	Epidote	Biotite	Opakes	Isotropic ^{a/}
			%	%	%	%	%	%	%	%	%
<u>2-0.5 mm.^{b/}</u>											
0-8	A1	80	9		10		tr	tr	tr	tr	1
58-64	Kl	75	14		10		tr	tr	tr	tr	1
<u>0.25-0.1 mm.</u>											
0-8	A1	23	57		15		tr	-	-	4	1
23-38	B2lt	24	60		14		tr	-	-	1	1
71-86	K22m	52	28		6		tr	-	-	3	11
142-168	K&Cca	51	27		5		tr	-	3	8	7
<u>0.1-0.05 mm.</u>											
0-8	A1	18		46	14	11	2	5	tr	1	2
8-20	Blt										
23-38	B2lt	23		46	17	6	1	tr	tr	3	3
38-58	B22tes										
58-64	Kl	18		52	13	12	1	1	tr	2	tr
64-71	K21m	33		35	19	6	tr	tr	tr	2	4
71-86	K22m	29		35	13	5	tr	tr	tr	19	15
86-114	K31	34		32	17	9	tr	1	1	3	4
114-142	K32	36		27	15	9	1	tr	4	4	4
142-168	K&Cca	35		22	16	5	1	tr	14	3	4
<u>0.05-0.02 mm.</u>											
0-8	A1	17	51		17		2	2	tr	7	4
23-38	B2lt	20	53		17		2	2	1	5	1
71-86	K22m	24	48		12		1	1	1	5	8
114-142	K32	25	23		20		1	1	21	5	4
142-168	K&Cca	19	15		14		1	2	44	2	3

a/ Index of refraction substantially below 1.550.

b/ Thin sections were prepared.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Dona Ana SOIL Nos. S60(65)NMex-7-6 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13150-13157, 20808-20812

GENERAL METHODS: 1A1, 1B1a, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)													3A1			2A2 Course fragments		
		Total				Sand					Silt				3A1b Fine Clay < 0.0002	Vol. Wt. 3B1				
		Sand (2-0.05)	Silt (0.05- 0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02- 0.002)	Int. II (0.2-0.02)	(2-0.1)	<0.074		250-2	76-2	19-2		
Pct. of < 2 mm																				
Carbonate Removed a, b																				
0-13	C	NOT	SAMPLED																	
13-18	A	73.7	9.3	17.0	1.6	9.0	11.2	33.9	18.0	6.0	3.3	41.6	55.7	5.1	1	1	1			
18-28	A	69.3	10.9	19.8	3.4	11.2	10.3	28.2	16.2	5.6	5.3	35.8	53.1	6.9	1	2	2			
28-41	B21tca	63.9	11.9	24.2	5.7	9.3	9.0	25.5	14.4	6.9	5.0	34.1	49.5	10.3	3	6	6			
41-51	B22tca	51.0	16.9	32.1	4.6	7.6	6.1	19.5	13.2	9.7	7.2	32.8	37.8	19.0	1	2	2			
51-64	K1	58.8	12.2	29.0	3.9	6.1	7.9	26.1	14.8	7.3	4.7	35.3	44.0	18.1	1	2	2			
64-86	K21	72.1	11.8	16.1	4.4	6.2	9.5	35.5	16.5	7.1	4.7	40.6	55.6	12.8	2	3	3			
86-112	K21	74.3	8.3	17.4	3.5	6.1	9.7	37.6	17.4	5.5	2.8	41.4	56.9	13.2	1	2	2			
112-142	K22	73.5	6.7	19.8	2.6	5.8	8.8	36.2	18.1	4.4	2.3	42.7	55.4	14.5	1	2	2			
142-175	K3&Bb	78.9	7.2	13.9	2.9	4.1	9.6	44.3	18.0	4.4	2.8	48.0	60.9	28.9	8.8	tr	tr	tr		
175-208	K21b	78.0	7.4	14.6	1.8	4.6	11.8	42.2	17.6	4.8	2.6	45.5	60.4	30.2	10.4	tr	tr	tr		
208-244	K22b	77.9	8.9	13.2	3.7	4.2	7.9	42.3	19.8	5.3	3.6	51.1	58.1	31.1	6.9	tr	tr	tr		
244-274	C1cab	80.3	9.3	10.4	15.0	7.8	7.9	33.4	16.2	5.2	4.1	41.4	64.1	27.5	4.6	20	35	35		
274-310	C2cab	81.0	8.6	10.4	1.3	3.0	7.9	46.6	22.2	6.2	2.4	57.2	58.8	29.2	3.7	tr	tr	tr		
Carbonate Not Removed b																				
41-51	B22tca	55.6	9.9	34.5	3.7	5.8	6.3	28.3	11.5	1.6	8.3	32.6	44.1							
51-64	K1	53.6	8.8	37.6	3.0	4.6	6.0	29.1	10.9	1.0	7.8	31.2	42.7							
64-112	K21	53.1	18.5	28.4	4.0	4.6	7.4	24.9	12.2	5.0	13.5	30.3	30.9							
64-112	K21	50.8	21.8	27.4	2.1	4.2	6.9	25.2	12.4	4.9	16.9	29.9	38.4							
112-142	K22	51.3	27.1	21.6	1.7	3.5	6.3	26.0	13.8	6.4	20.7	33.9	37.5							
Depth (cm.)	6A1a Organic carbon c/, f/ Pct.	Nitrogen Pct.	C/N	Carbonate as CaCO ₃		Bulk density		4B5 Air- Dry g/cc	5A1a CEC NH ₄ OAc a/ me./ 100g.	Water content			Composition Whole Material d/							
				6E1a 6E1c <2mm. Pct.	3A1a <0.002 mm. Pct.	e/ g/cc	g/cc			g/cc	4B2 15-Bar NONCARBONATE			Carbonate as CaCO ₃ Pct.						
				Pct.	Pct.	Pct.	Pct.			Pct.	Pct.	Pct.	Pct.		Pct.					
C-13																				
13-18				1		1.4		11.4				1	73	10	15	1				
18-28	0.32			2		1.4		13.3				2	67	10	19	2				
28-41	0.45			5		1.4		1.51	15.6			6	57	11	21	5				
41-51	0.40			8	5	1.4		1.53	19.9			2	46	15	29	8				
51-64	0.43			23	17	1.4		1.43	19.1			2	44	9	22	23				
64-86	0.33			22	14	1.7		1.75	11.9			2	55	9	12	22				
86-112	0.10			28	16	1.7		1.83	10.8			2	52	6	12	28				
112-142				27	12	1.6		1.70	11.3			2	52	5	14	27				
142-175				25		1.5						7.0	tr	60	5	10	25			
175-208				15		1.5						7.5	tr	67	6	12	15			
208-244				19		1.5						7.5	tr	62	8	11	19			
244-274				14		1.4						4.9	32	47	5	6	10			
274-310				7		1.4						5.0	tr	75	8	10	7			

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
- c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- d/ Inclusive of < 76 mm., carbonate and gypsum.
- e/ Assumed bulk density of moist fine-earth fabric for calculations.
- f/ 3.2 kg/m² 13-86 cm (Method 6A).

Soil: Dona Ana Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic

Soil Nos.: S60(65)NMex-7-6

Location: SW 1/4 NE 1/4, Sec. 23, T22S, R2E; westernmost of gullies just south of U. S. Highway 70, Dona Ana County, New Mexico. Land Form: Coalescent fan piedmont sloping 1 percent to west-northwest.

Parent Material: Alluvial fan sediments, primarily monzonite but with some rhyolite and andesite (see Remarks).

Elevation: 4,400 feet.

Geomorphic Surface: Jornada II.

Vegetation: Mesquite and four-wing saltbush in coppice dunes; scattered creosotebush and tarbush in interdune areas.

Collected by: L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 14, 1960 and L. H. Gile, R. B.

Grossman, J. W. Hawley, and G. Holmgren, September 27, 1965.

Described by: L. H. Gile and R. B. Grossman, 1960 and 1965.

C 0 to 13 cm. Dune sand. Light reddish-brown (5YR 6/5 dry) or reddish-brown (5YR 5/4 moist) loamy sand; massive and single grain; soft and loose; roots few to common; effervesces weakly; abrupt boundary. Not sampled.

A 13150 13 to 18 cm. Reddish-brown (5YR 5/3 dry, 4/4 moist) fine sandy loam; massive breaking to weak fine subangular blocky; soft; few roots; few carbonate filaments; effervesces weakly; abrupt smooth boundary.

A 13151 18 to 28 cm. Reddish-brown (5YR to 7.5YR 4.5/4 dry) or dark reddish-brown (5YR to 7.5YR 3.5/4 moist) sandy loam; weak medium subangular blocky; slightly hard; roots common; few carbonate filaments; effervesces strongly; clear smooth boundary.

B21tca 13152 28 to 41 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) sandy clay loam; moderate medium subangular blocky; slightly hard; few roots; many sand grains are coated with reddish silicate clay; carbonate filaments common; effervesces strongly; clear to abrupt boundary.

B22tca 13153 41 to 51 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) sandy clay loam; some yellowish-red (5YR 4/6 dry) in mosaic pattern increasing in lower part; moderate fine prismatic breaking to weak medium and fine subangular blocky; hard; few roots; many sand grains are coated with reddish silicate clay; few carbonate filaments; effervesces strongly; clear wavy boundary.

K1 (B23tca) 13154 51 to 64 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) sandy clay loam with about 75 percent pink (5YR 7/3 dry) or light reddish-brown (5YR 6/4 moist) carbonate cylindroids and nodules; weak medium subangular blocky structure controlled by carbonate nodules; hard to soft; very few roots; effervesces strongly; clear wavy boundary.

K21 (C1ca) 13155, 13156 64 to 112 cm. Divided for sampling at 86 cm. About equal parts of coarsely variegated pinkish-white (7.5YR 8/2 to 8/3 dry) or light brown (7.5YR 6/3 to 7/3 moist) and light reddish-brown (5YR 6/4 dry, 5.5/4 moist), with some reddish-brown (5YR 5/4 dry) in upper part; light sandy clay loam; massive breaking to weak subangular blocky with upper part breaking into more discrete units; very hard; difficultly removed from horizon; many of weak structural units cylindrical; no roots; effervesces strongly; clear to gradual boundary.

K22 (C2ca) 13157 112 to 142 cm. Pinkish-white (5YR 8/2 dry) or pink (5YR 8/3 moist) carbonate nodules and cylindroids (60 percent of volume) set in a light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 5/4 moist) matrix; light sandy clay loam; massive, breaking to subangular blocky; hard; no roots; effervesces strongly; clear wavy boundary.

K3&Bb (Bcab) 20808 142 to 175 cm. About 50 percent light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5.5/4 moist) with lesser amounts light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 5/4 moist); with about 20 percent prominent white (higher value than 7.5YR 8/2 dry), or pink (7.5YR 8/4 moist) carbonate nodules and cylindroids; sandy loam; some parts massive, other parts weak subangular blocky and cylindrical; hard; no roots; effervesces strongly; clear wavy boundary.

K21b (C1cab) 20809 175 to 208 cm. Dominantly pinkish-white (7.5YR 8/2 dry) or pinkish-gray (5YR 7/2 moist), with 5 to 10 percent light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) and few white (higher value than 7.5YR 8/2 dry) or pinkish-white (7.5YR 8/2 moist) nodules; light sandy clay loam; generally weak subangular blocky, with some massive parts; very and extremely hard; few roots; effervesces strongly; clear wavy boundary.

K22b (C2cab) 20810 208 to 244 cm. Pinkish-gray (7.5YR 7/3 moist) or pinkish-white (7.5YR 8/3 dry) 10 to 15 percent colored 7.5YR 5/4 brown, moist; light sandy clay loam; weak subangular blocky, with few massive parts; hard and very hard; very few fine roots; few faint stained zones that are black or nearly black and that are 1 to 2-mm. diameter, occupy about 5 percent of volume; very few channels, 2 to 3-mm. diameter, that are lined with clayey, low-carbonate material; effervesces strongly; clear wavy boundary.

C1cab (C3cab) 20811 244 to 274 cm. Dominantly light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) with lesser amount pinkish-gray (7.5YR 7/2 dry or 7.5YR 6.5/2 moist); gravelly light sandy clay loam; gravel is mainly fine; massive; hard and slightly hard; very few roots; pebbles and sand grains of lighter-colored parts have thin, dominantly continuous carbonate coatings; effervesces strongly; clear wavy boundary.

C2cab (C4cab) 20812 274 to 310 cm. Brown (7.5YR 5/4 moist) or light brown (7.5YR 6.5/4 dry) with scattered slightly darker zones; fine sandy loam; massive; soft and slightly hard; very few roots; very few short (1 to 2 mm.) carbonate filaments; intermittent dark stainings scattered through fine earth (manganese?).

Remarks: The K3&Bb horizon illustrates apparent carbonate engulfment of a former buried B horizon. The apparent buried B horizon may be traced near the sample site by its discontinuous reddish fabric that, in places, is almost completely engulfed by carbonate accumulation.

Alluvial parent materials in the upper part are Jornada II (exact boundary not certain). Underlying basin-fill is now referred to as Jornada I.

Mineralogy (Methods 7A2, 7A3). The Beltsville laboratory determined that the clay from the B22tca (41-51 cm.) contains a poorly organized montmorillonite-vermiculite intergrade in abundance, 15 percent kaolinite, and a trace of mica.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Berino SOIL Nos. S60(65)NMex-7-7 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13159-13166; 20813-20821

GENERAL METHODS: 1A1, 1B1a, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1			3A1b			2A2		
		Total			Sand					Silt			Clay	3A1b Fine Clay	Coarse fragments j/						
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.02-0.002)	(2-0.1)			<0.074	<0.002	Vol.	Wt.	3B1		
Pct. of < 2 mm																					
Carbonate Removed a, b/																					
5-13	A	76.2	9.4	14.4	2.8	7.0	10.7	38.4	17.3	5.4	4.0	42.2	58.9		3.6	1	2	2			
13-33	B21t	60.4	11.6	28.0	5.1	7.2	7.8	26.5	13.8	7.3	4.3	34.4	46.6		12.4	2	3	3			
33-43	B22tca	52.3	14.3	33.4	3.8	5.9	6.6	22.6	13.4	9.3	5.0	34.9	38.9		18.4	1	2	2			
43-66	K11	67.1	8.5	24.4	2.9	6.1	9.7	32.4	16.0	5.6	2.9	39.1	51.1		13.9	1	2	2			
66-91	K12	70.7	9.8	19.5	3.2	7.0	8.3	33.6	18.6	7.3	2.5	45.0	52.1		11.4	2	3	3			
91-140	K2	69.5	13.0	17.5	6.4	8.7	6.5	27.0	20.9	9.2	3.8	46.4	48.6		11.8	10	14	14			
140-157	C1ca	76.7	10.8	12.5	5.2	6.6	9.0	35.5	20.4	7.7	3.1	49.0	56.3	33.6		10	15	15			
157-165	IIC2ca	81.8	6.2	12.0	8.4	7.3	11.8	40.1	14.2	3.7	2.5	39.3	67.6	24.5		20	30	30			
165-183	IIIB2ca	79.6	7.0	13.4	4.8	7.8	11.3	40.8	14.9	4.6	2.4	41.4	64.7	27.1		5	5	5			
183-193	IIIK1b	75.5	7.3	17.2	4.0	6.2	9.3	39.2	16.8	4.4	2.9	43.6	58.7	32.0		tr	tr	tr			
193-229	IIIK2b	73.7	8.1	18.2	2.9	5.6	9.3	39.3	16.6	4.6	3.5	43.9	57.1	33.6		tr	tr	tr			
229-246	IIIK31b	65.9	13.7	20.4	3.4	5.1	6.9	32.2	18.3	7.7	6.0	46.1	47.6	43.0		tr	tr	tr			
246-267	IIIK32b	68.0	14.7	17.3	4.1	5.1	7.3	32.4	19.1	7.4	7.3	46.9	48.9	41.2		tr	tr	tr			
267-279	IIIK33b	67.0	15.6	17.4	3.1	4.6	6.3	32.9	20.1	8.1	7.5	49.4	46.9	43.0		tr	tr	tr			
279-300	IIIBcab2	69.4	14.9	15.7	3.8	4.5	6.0	34.8	20.3	10.0	4.9	52.6	49.1	40.3		tr	tr	tr			
43-66	K11 f	69.6	7.3	22.2	4.9	6.6	9.9	33.6	15.5	5.1	2.2	38.2	54.1		12.8						
43-66	K11 g	64.8	9.8	25.4	5.6	3.6	9.0	30.4	16.2	6.0	3.8	38.4	48.6		16.2						
Carbonate Not Removed b/																					
43-66	K11	62.9	10.5	26.6	3.6	5.6	7.6	29.1	17.0	5.2	5.3	37.7	45.9								
66-91	K12	62.6	14.6	22.8	3.7	5.4	7.7	29.4	16.4	9.7	4.9	41.8	46.2								
91-140	K2	58.5	19.7	21.8	6.4	6.2	5.8	22.7	17.4	11.6	8.1	41.9	41.1								
Depth (cm.)	Organic carbon	Nitrogen	6A1a CEC NH ₄ OAc a/ as me./ 100g. Pct.	6C2a Ext. Iron e/ as Fe Pct.	Carbonate as CaCO ₃ 3A1a <0.002 mm. e/ as Pct.	Bulk density		4D1 COLE	Water content			Composition Whole Material d/				Carbonate at CaCO ₃ Pct.					
						4A1d 1/3- Bar	4B5 Air- Dry g/cc		4B1c 1/3- Bar Pct.	4B2 15- Bar Pct.	NONCARBONATE										
5-13	0.20		8.9	0.6	tr		1.5					2	75	9	14	tr					
13-33	0.28		14.5	0.8	tr		1.4					3	59	11	27	tr					
33-43	0.29		18.7	0.9	2		1.5					2	50	14	32	2					
43-66	0.11		15.9	0.6	9		1.5					2	61	7	22	9					
66-91			13.1	0.6	10		1.6					3	61	9	17	10					
91-140			11.5	0.6	15 h/		1.8					12	52	10	13	13					
140-157					8		1.6					5.6	14	9	10	7					
157-165					7		1.5					5.6	28	55	4	8					
165-183					8		1.6					6.5	5	69	6	12					
183-193					34		1.7					7.3	tr	50	5	11					
193-229					44		1.7	1.68	1.69	0.002		17.5	7.8	tr	41	5					
229-246					44		1.7					9.8	tr	37	8	11					
246-267					30		1.6					9.3	tr	48	10	12					
267-279					17		1.6					9.3	tr	56	13	14					
279-300					15		1.6					8.6	tr	59	13	13					
43-66	0.10		14.2		18																
43-66	0.20		16.0		7																

a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
 b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
 c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
 d/ Inclusive of coarse fragments, carbonate, and gypsum.
 e/ Determination on whole material by Method 6E1a and 6E1c and calculated as a percentage of the < 2 mm. by Method 1B4.
 f/ Carbonate cylindroids; LSL 13165.
 g/ Material from between cylindroids; LSL 13166.
 h/ The K2 was resampled less than one meter from the original face and split for analysis into two parts for carbonate determination:
 91-117 cm: 17% (71L787)
 117-140 cm: 22% (71L788)
 i/ Assumed bulk densities of the moist fine-earth fabric for calculations.
 j/ Volume on carbonate-containing basis and weight on carbonate-free basis.

Soil: Berino Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic
 Soil Nos.: S60(65)RMex-7-7
 Location: NE 1/4 NW 1/4, Sec. 24, T22S, R2E, along gully south of and parallel to U.S. Highway 70, about 1 mile east of pedon S60RMex-7-6, Dona Ana County, New Mexico.
 Geomorphic Surface: Jornada II. Elevation: 4,420 feet.
 Land Form: Coalescent fan piedmont sloping 1 percent to west-northwest.
 Parent Material: Monzonitic alluvial fan sediments (see Remarks)
 Vegetation: Mesquite and four-wing saltbush in coppice dunes, with scattered snakeweed between dunes.
 Collected by: 1960 - L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 11, 1960;
 1965 - L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, September 28, 1965.
 Described by: 1960 - L. H. Gile and F. F. Peterson; 1965 - L. H. Gile and R. B. Grossman

Dune sand, 0 to 5 cm, not sampled.

- A 13159 5 to 13 cm. Reddish-brown (5YR 5.5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) sandy loam; massive; slightly hard; few roots; noncalcareous; abrupt boundary.
- B2t 13160 13 to 33 cm. Reddish-brown (2.5YR-4YR 4/4 dry) or dark reddish-brown (3YR 3/4 moist) sandy clay loam; very weak coarse prismatic breaking to very weak subangular blocky; hard; few roots; ped surfaces weakly reflective; very few fine carbonate filaments; matrix noncalcareous; clear smooth boundary.
- B2tca 13161 33 to 43 cm. Reddish-brown (5YR 4/5 dry) or dark red (2.5YR-5YR 3/6 moist) sandy clay loam; moderate medium prismatic breaking to weak medium subangular blocky; hard; few roots; many ped surfaces appear smooth and reflective; pebbles covered with reddish clay films; few fine carbonate filaments; few carbonate nodules in the lower part; matrix of upper part noncalcareous and in lower part effervesces weakly; clear wavy boundary.
- B1 13162 43 to 66 cm. Reddish-brown (5YR 5/4 dry, 4YR 4/4 moist) sandy clay loam; massive breaking to medium subangular fragments; hard; few roots about 50 percent light reddish-brown (4YR 5.5/4 dry) or reddish-brown (4YR 4/4 moist), strongly indurated carbonate cylindroids 3/8 to 1/2 inch in diameter, and characteristically in 1/8- to 1/4-inch segments with rounded edges; interior of cylindroids reddish-yellow (5YR 6/5 dry) or reddish-brown (5YR 4.5/4 moist); effervesces strongly; clear wavy boundary. Carbonate cylindroids and material between analyzed separately under L&L 13165 and 13166, respectively.
- B12 (B32ca) 13163 66 to 91 cm. Reddish-brown (5YR 5.5/4 dry, 4.5/4 moist) and light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 5/4 moist) sandy clay matrix containing 20-30 percent white (7.5YR 8/0 dry) or pinkish-white (7.5YR 8/2 moist) nonindurated carbonate nodules and cylindroids, with a few cylindroids of darker reddish-brown; sandy clay loam; massive, breaking to fragments and nodules; hard; few roots; common fine pores; matrix effervesces weakly to strongly; clear boundary.
- B2 (C1ca) 13164 91 to 140 cm. Light brown (7.5YR 6.5/4 dry, 5.5/4 moist) sandy clay loam with some reddish-brown (5YR 5/4 dry, 4/4 moist); white (5YR 8/1 dry) or pink (7.5YR 7/4 moist) carbonate nodules and cylindroids; massive; hard; very few roots; few fine pores; effervesces strongly; clear wavy boundary.
- C1ca (C2ca) 20813 140 to 157 cm. Dominantly light brown (7.5YR 5.5/4 dry) or brown (7.5YR 4.5/4 moist) with smaller volumes light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist); heavy sandy loam with scattered pebbles to about 3 inches diameter; massive; hard; very few roots; few fine pores; pebbles have thin carbonate coatings, both discontinuous and continuous; effervesces strongly; clear wavy boundary.
- IC2ca (C3ca) 20814 157 to 165 cm. Reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) heavy sandy loam, with scattered coarse sand grains and fine pebbles; massive; soft; very few roots; pebbles and sand grains have discontinuous carbonate coatings; effervesces strongly; clear smooth boundary.
- IIIB2cab 20815 165 to 183 cm. Light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 5/4 moist) with scattered zones of 6 chroma; heavy fine sandy loam; compound very weak prismatic structure and weak medium subangular blocky; very hard and hard; very few roots; few fine tubular pores; macroscopic carbonate scattered throughout in the form of few to common filaments with discontinuous coatings on the fine pebbles and coarse sand grains; effervesces strongly, except for high-chroma zones that effervesce weakly or are noncalcareous; clear wavy boundary.
- IIIK1b (C1cab) 20816 183 to 193 cm. 60 to 70 percent white (higher value than 7.5YR 8/2 dry) or pinkish-gray (7.5YR 7/2 moist) sandy clay loam; nodular carbonate, weak medium subangular blocky; very and extremely hard; very few roots; remainder yellowish-red (5YR 5.5/5 dry, 4.5/4 moist) and light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist); is slightly hard, occurs between the carbonate nodules; effervesces strongly; clear wavy boundary.
- IIIK2b (C2cab) 20817 193 to 229 cm. Dominantly white (higher value than 7.5YR 8/2 dry) or pinkish-gray (7.5YR 7/2 moist) clay loam; with very few parts pinkish-white (7.5YR 8/2 dry) or light brown (7.5YR 6.5/4 moist); mainly massive, with some closely fitted medium blocks; extremely hard; very few roots, concentrated in channels 1/4- to 1/2-inch diameter, that also contain fine earth; the horizon is nearly indurated but softens markedly when water is applied; effervesces strongly; clear wavy boundary.
- IIIK3b (C3cab) 20818 229 to 246 cm. Dominantly white (higher value than 7.5YR 8/2 dry) or pinkish-gray (7.5YR 7/2 moist) with smaller volumes of pink (7.5YR 7/4 dry) or light brown (7.5YR 6/4 moist) clay loam; moderate medium subangular blocky; extremely hard; very few roots; few fine and very fine tubular pores, some of which are lined with black material; scattered root channels less than 1/8-inch diameter; a few channels about 1/4-inch diameter filled with loose fine earth that is somewhat darker than the rest of the horizon and appears to contain less carbonate; effervesces strongly; clear wavy boundary.
- IIIK32b (C4cab) 20819 246 to 267 cm. Dominantly white (higher value than 7.5YR 8/2 dry) or pinkish-gray (7.5YR 7/2 moist) with lesser amounts of pink (7.5YR 7/4 dry) or light brown (7.5YR 6/4 moist) clay loam; moderate medium subangular blocky, formed mainly of cylindrical and nodular units that are less than 1/2-inch diameter; with some loose internodular fine earth that is light brown (7.5YR 6/4 dry); nodules are very hard; very few roots; few fine tubular pores that are commonly lined with black material; peds are commonly stained in part with black material; effervesces strongly; clear wavy boundary.
- IIIK33b (C5cab) 20820 267 to 279 cm. Equal parts of white (higher value than 7.5YR 8/2 dry) or pinkish-gray (7.5YR 7/2 moist) and pink (7.5YR 7/4 dry) or light brown (7.5YR 6/4 moist) fine sandy clay loam; weak and moderate medium subangular blocky; very and extremely hard; few fine roots; black coatings on many peds; common subrounded, cylindrical units, 1/2 inch and less in diameter, most of which are cemented together, but some are loose and have loose internodular fine earth that is light brown (7.5YR 6/4 dry); many ped interiors have very fine pores lined with black material; effervesces strongly; clear wavy boundary.
- IIIRcab(?) 20821 279 to 300 cm. Brown (7.5YR 5.5/4 dry, 7.5YR 4.5/4 moist) heavy fine sandy loam; moderate medium subangular blocky; very and extremely hard; very few roots; some high-carbonate zones colored pinkish-gray (7.5YR 7/2 dry) or light brown (7.5YR 6/4 moist) many peds have discontinuous black coatings that cover up to about 75 percent of the surfaces of some peds; interiors of some peds have splotches and fine pore linings of darkened material; effervesces weakly and strongly.

Remarks: Parent materials in the upper 165 cm are designated Jornada II. Underlying materials are Jornada I.
 (Continued)

Berino 60-7, continued

60-7 (cont.)

Micromorphology, Method 4Elb. Thin sections of the B2lt, B2tca and K12 horizons were examined. The B2lt and B2tca are plasmic but with a strong clumpiness. Most sand grains have patchy to complete coatings of clay that show weak to moderate internal orientation. The plasma that partially fills between sand grains shows moderate to weak preferred orientation. There is an occasional body of strongly oriented clay. Small opaque bodies are common in the plasma. In the K12, interstices between sand grains are nearly completely filled by fine-grain carbonate and silicate clay. Coatings of oriented clay are found around a minority of the sand grains. A few small parts, low in carbonate, have plasma with moderate internal orientation of the clay. Quartz, feldspar, and rock fragments predominate. Ferromagnesian minerals are scarce; amphibole, pyroxene, biotite, and the epidote group are the principal species. Many feldspar grains show peripheral weathering that extends inward along zones of weakness. Ferromagnesian mineral inclusions in the rock fragments that occur near the edge of the fragments show alteration. Discrete ferromagnesian grains are pitted, frayed, and appreciably altered, although overall they retain their optical properties. The epidote appears susceptible to physical breakdown. There may be more biotite in the K12 horizon than in the B2t.

Sand Mineralogy, Method 7B1. A count of about 300 grains was made on the very fine sand (0.1-0.05 mm.) of the B2lt and the K2 horizons. The B2ltca contains 40 percent quartz, 35 percent feldspar, 20 percent microcrystalline aggregates, 5 percent ferromagnesian minerals, and a trace of opaques. The K2 contains 45 percent quartz, 35 percent feldspar, 10 percent microcrystalline aggregates, 5 percent ferromagnesian minerals, and a trace of opaques. The feldspar in both horizons is mostly orthoclase and albite with perhaps 10 percent relative plagioclase of intermediate calcium content. The microcrystalline aggregates are mostly feldspar groundmass, more or less altered to earthy material, and with a subordinate portion that may be chert. Epidote and amphibole are the principal ferromagnesian minerals; the epidote grains are quite altered, probably geologically related. Only a few grains of biotite are present; an occasional grain of chlorite was observed. The B2lt has a higher proportion of microcrystalline aggregates. More grains have patchy, rather thick coatings of reddish-brown clay in the B2lt than in the K2. Many of the feldspar grains are somewhat frayed and etched, suggestive of pedogenic weathering, but probably related to geological processes.

Clay Mineralogy, Method 7A2. Clays of the B2tca horizon (carbonate removed, Method 3A1) contain moderate amounts of montmorillonite, mica, and kaolinite. The montmorillonite is moderately well ordered and contains little interlayer material. Clay of the IIK32b horizon contains small to moderate amounts of montmorillonite and mica, small amounts of calcite and kaolinite.

Clay from carbonate cylindroids in the K1l horizon (carbonate removed, Method 3A1) contains an abundant amount of an interlayered montmorillonite mineral plus small amounts of mica and kaolinite. The montmorillonite mineral resists expansion with glycerol and collapse upon heat treatment.

SOIL CLASSIFICATION: Typic Haplargid; coarse-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Sonoita SOIL Nos. S60-NMex-7-8 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13167, 13168, 15013, 13170, 13171

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1											2A2 coarse fragments				
		Total			Sand					Silt			Vol. 250-2	Wt. 3B1			
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)		(2-0.1)	76-2	19-2	
Pct. of < 2 mm														250-2	76-2	19-2	
Carbonate Removed a/, b/																	
0-8	A	81.7	12.0	6.3	19.4	24.6	8.8	15.7	13.2	9.2	2.8	30.3	68.5	10	15	15	
8-23	B21t	74.5	13.3	12.2	15.6	21.0	9.2	16.1	12.6	9.2	4.1	29.8	61.9	15	24	18	
23-48	B22t	75.3	13.0	11.7	29.5	18.8	7.0	10.6	9.4	8.6	4.4	23.3	65.9	30	42	42	
48-81	B3	82.6	10.9	6.5	25.6	27.3	7.3	12.4	10.0	8.7	2.2	24.9	72.6	20	32	32	
81-102	IICca	81.2	12.5	6.3	27.0	24.5	7.9	12.8	9.0	8.4	4.1	23.3	72.2	25	35	33	
Depth (cm.)	6A1a	6B1a	C/N	6C2a	Carbonate as CaCO ₃			Bulk density			5A1a	8C1a pH (1:1)	Composition Whole Material d/				
	Organic carbon c/, Pct. g/	Nitrogen c/ Pct.		Ext. Iron a/As Fe Pct.	3A1a		4B5 Air-Dry NH ₄ OAc a/ me./ 100g	e/ g/cc	f/ g/cc	g/ g/cc	CEC		NONCARBONATE				Carbonate as CaCO ₃ Pct.
					<2mm e/ Pct.	<0.002 mm. Pct.							> 2mm. Pct.	Sand Pct.	Silt Pct.	Clay Pct.	
0-8	0.15	0.021	7	1.0	tr		1.5			4.3	7.6	15	70	10	5	tr	
8-23	0.21	0.023	9	1.3	-		1.5		1.61	8.2	7.6	24	57	10	9	-	
23-48	0.23						1.5			8.9	7.6	42	43	8	7	tr	
48-81	0.09				tr(s)		1.5			4.2	7.6	32	56	8	4	-	
81-102	0.06				l		1.5			4.4	8.3	35	52	8	4	1	

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
- c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- d/ Inclusive of coarse fragments, carbonate, and gypsum.
- e/ Determination on whole material by Method 6E1c and calculated as a percentage of the < 2 mm; 13171 by 6E2a.
- f/ Assumed bulk density of moist fine-earth fabric for calculations.
- g/ 1.7 kg/m² to 102 cm (Method 6A).

SOIL CLASSIFICATION: Typic Haplargid; loamy-skeletal, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Pinaleno, stony phase SOIL Nos. S60-NMex-7-9 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13172-13176

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1					
		Total				Sand				Silt			Clay (2-0.1)	2A2 Coarse fragments g/				
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.02-0.002)	Vol. 250-2		Wt. 3B1 76-2	19-2			
Pct. of < 2 mm											Carbonate Removed g, d/		75	80	37	34		
0-10	A1	71.6	15.2	13.2	3.9	22.0	9.0	20.4	16.3	10.2	5.0	37.5	55.3			65		42
10-28	B21t	57.8	12.5	29.7	15.3	11.9	6.7	14.5	9.4	6.7	5.8	23.2	48.4			60		25
28-84	B22t	61.9	12.1	26.0	23.8	12.5	6.4	11.5	7.7	6.5	5.6	19.9	54.2			75		41
84-152	B3t	76.8	9.0	14.2	27.2	23.9	7.9	11.5	6.3	5.0	4.0	16.8	70.5			75		37
152-244	Cca	77.7	17.0	5.3	20.3	25.0	7.4	13.2	11.8	10.6	6.4	29.2	65.9			80		34

Depth (cm.)	6A1a	6B1a	C/N	6C2a	Carbonate as CaCO ₃		Bulk density			5A1a	Water content			Composition Whole Material			
	Organic carbon c/ f/ Pct.	Nitrogen c/ Pct.		Ext. Iron e/ as Fe Pct.	Pct.	Pct.	e/ g/cc	g/cc	g/cc	NH ₄ OAc a/ me./ 100g.	Pct.	Pct.	Pct.	Noncarbonate			Carbonate as CaCO ₃ Pct.
														<2mm. d/ mm.	<0.002 mm.	> 2mm	
0-10	0.77	0.066	12	1.4	tr(s)	1.4			9.7				78	16	3	3	
10-28	0.31	0.037	8	1.3	-(s)	1.6			16.9				74	15	3	8	-(s)
28-84	0.24			1.3	-(s)	1.6			17.4				82	11	2	5	-(s)
84-152	0.06			0.8	-(s)	1.6			10.7				82	13	2	3	-(s)
152-244	0.02			0.6	4	1.4			8.8				89	12	2	1	tr

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
- c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- d/ Determination on whole material by Method 6E1a and 6E1c and calculated as a percentage of the < 2 mm.
- e/ Assumed bulk density of moist fine-earth fabric for calculations.
- f/ 1.3 kg/m² to 84 cm (Method 6A).
- g/ Volume on a carbonate-containing basis; weight on a carbonate-free basis.

60-9

Soil: Pinaleno, stony phase Soil Classification: Typic Haplargid; loamy-skeletal, mixed, thermic
 Soil Nos.: S60NMex-7-9
 Location: SW 1/4 NW 1/4, Sec. 1, T22S, R3E; a large mine pit about 1/4 mile east of the village of Organ and just south of U. S. Highway 70, Dona Ana County, New Mexico. Geomorphic Surface: Jornada.
 Land Form: Alluvial fan sloping about 15 percent to northwest. Elevation: About 5,200 feet.
 Parent Material: Jornada alluvial fan sediments derived from monzonite.
 Vegetation: Scattered oak about 3 to 4 feet high and 30 to 50 feet apart; scattered sumac, snakeweed, and beargrass; many indigo bush; many bunches of black grama and sideoats grama.
 Collected by: L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 15, 1960.
 Described by: R. B. Grossman and F. F. Peterson.

Soil Surface. About 90 percent covered with boulders and smaller monzonitic fragments of varying size. Loose reddish sand occurs between and under rock fragments.

A1 13172 0 to 10 cm. Brown (7.5YR 4/2 dry) or dark brown (7.5YR 2.5/2 moist) very stony coarse sandy loam; weak fine and medium granular; slightly hard; roots common; noncalcareous; abrupt boundary.

B21t 13173 10 to 28 cm. Dark red (2.5YR 3/6 moist and dry) very stony fine gravelly coarse sandy clay; weak medium to coarse angular and subangular blocky; hard; many roots; rock fragments have thick clay coatings; dark material on and between peds; noncalcareous; clear wavy boundary.

B22t 13174 28 to 84 cm. Dark red (2.5YR 3/6 moist and dry) very stony fine gravelly coarse sandy clay to coarse sandy clay loam; weak coarse subangular blocky; hard; few roots; clay coatings on rock fragments and peds; clayey material occurs as fillings between stones rather than continuously as in the B21; noncalcareous; gradual irregular boundary.

B3t 13175 84 to 152 cm. Reddish-brown (5YR 4/4 dry, 3.5/4 moist) and brown (7.5YR 5/4 dry, 4/4 moist) with a few parts dark red (2.5YR 3/6 dry and moist); very stony coarse sandy loam; massive with fines as fillings in coarse skeleton; hard; slightly sticky; very few roots; clay coatings on stones; noncalcareous; gradual irregular boundary.

Cca 13176 152 to 244 cm. Light reddish-brown (5YR 5.5/4 dry) or reddish-brown (5YR 4/4 moist) very stony coarse sandy loam; massive with fines as fillings in coarse skeleton; nonindurated; slightly hard to hard; no roots; few to common carbonate filaments and a few veins of carbonate disposed vertically; stones and pebbles thinly coated with carbonate; effervesces weakly.

Remarks: The A and B21t horizons contain 20 percent (by volume) 20-75 mm, 20 percent 75-250 mm, and 10 percent > 250 mm; the B22t and B3t horizons contain 10 percent 20-75 mm, 10 percent 75-250 mm, and 40 percent > 250 mm; the C horizon contains 5 percent 20-75 and 75-250 mm, and 60 percent > 250 mm.

Mineralogy (Methods 7A2, 7A3). The Beltsville laboratory determined the clay mineralogy of B22t (28-84 cm). Montmorillonite is abundant; a trace of mica and 15 percent kaolinite are present.

SOIL CLASSIFICATION: Typic Paleorthid; loamy, mixed, thermic, shallow

SOIL Simona SOIL Nos. S60RMex-7-10 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13177, 13179-13184, 711079 August, 1967

General Methods: 1A, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1											Coarse fragments 2A2 i/						
		Total			Sand					Silt			Int. II (2-0.1)	Coarse fragments 2A2 i/					
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)		Vol. <250	Wt. 3B1				
					Carbonate Removed a, b														
0-5	Aca	63.8	21.6	14.6	3.5	3.4	5.5	25.7	25.7	17.7	3.9	60.0	38.1				20	36	36
5-20	Bca	73.2	17.5	9.3	6.4	3.6	5.4	32.8	25.0	12.8	4.7	57.2	48.2				20	40	32
20-23	E21m	69.3	17.0	13.7	12.9	7.6	8.3	25.9	14.6	11.5	5.5	38.5	54.7				35	72	61
23-43	E22m	72.2	16.9	10.9	18.0	6.9	6.8	25.0	15.5	10.7	6.2	38.9	56.7				30	68	57
43-74	E22m	85.8	9.6	4.6	19.5	11.6	13.9	30.7	10.1	4.5	5.1	27.3	75.7				50	72	70
74-104	K3	85.7	9.3	5.0	21.8	10.1	11.0	32.0	10.8	4.1	5.2	29.2	74.9				50	72	59
104-127	Oca	83.6	9.9	6.5	20.4	15.4	8.9	24.5	14.4	7.9	2.0	34.6	69.2				40	58	56
0-38	f	56.3	19.2	24.5	11.9	5.7	3.8	18.4	16.5	12.6	6.6	41.1	39.8				60	70	56
Depth (cm.)	6A1a Organic carbon	Nitrogen	C/N	e Carbonate as CaCO ₃ Pct.	5A1a 6E1c Organic Carbon as CaCO ₃ Pct.	Bulk density			Water content			COMPOSITION WHOLE MATERIAL d							
						g/cc	g/cc	g/cc	Pct.	Pct.	Pct.	NONCARBONATE			Carbonate as CaCO ₃ Pct.				
												> 2 mm.	Sand	Silt		Clay			
0-5	0.50			8	12.4	1.3								34	39	13	9	5	
5-20	0.43			13	10.2	1.3								36	42	9	5	8	
20-23	0.16			67	10.7	1.8								46	12	3	3	36	
23-43	0.24			62	11.8	1.4		1.32						43	15	5	2	35	
43-74	0.14			35	7.0	1.5								63	21	2	1	13	
74-104	0.09			21	5.0	1.5								66	23	3	1	7	
104-127	0.02			7	3.5	1.4								55	39	1	2	3	
0-38f	0.69																		

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
- c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- d/ Inclusive of coarse fragments, carbonate, and gypsum.
- e/ Determination on whole material by Method 6E1a and 6E1c and calculated as a percentage of the < 2 mm. by Method 1B4.
- f/ Composite of six samples from a trench in a Terino soil, 225 m southwest of pedon S60RMex-7-10. 1.5 kg/m² to 38 cm (Method 6A).
- g/ Assumed bulk density of moist fine-earth fabric for calculations.
- h/ 0.9 kg/m² to 20 cm (Method 6A).
- i/ Volume on a carbonate-containing basis; weight on a carbonate-free basis.

Soil: Simona

Soil Classification: Typic Paleorthid; loamy, mixed, thermic, shallow

Soil Nos.: S60NMex-7-10

Location: In the SE 1/4 SW 1/4, Sec. 18, T23S, R3E, north bank of arroyo, 700 feet east of pipeline, 800 feet north of Dripping Springs Road, Dona Ana County, New Mexico.

Geomorphic Surface: Jornada I. Elevation: 4,450 feet.

Land Form: Ridge remnant of a coalescent alluvial fan surface, sloping 2 percent westward.

Parent Material: Jornada I alluvium derived mainly from rhyolite, with some andesite.

Vegetation: Creosotebush and ratany.

Collected by: R. B. Grossman and J. L. Millet, April 16, 1960.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Desert pavement of rhyolite pebbles, mainly less than 3 cm. in diameter, covers 80 to 100 percent of the soil surface. A few pebbles have discontinuous carbonate coatings. A discontinuous layer of loose reddish sand occurs between pebbles.

Aca 0 to 5 cm. Pinkish-gray (7.5YR 6/2, dry), dark brown (7.5YR 4/3, moist) gravelly sandy loam; massive and single grain; soft; few roots; thin carbonate coatings on pebbles, mainly on undersides; effervesces strongly; abrupt smooth boundary.

Bca 13179 5 to 20 cm. Light brown (7.5YR 6/3, dry) or dark brown (7.5YR 4/3, moist) gravelly sandy loam; weak very fine crumb and massive; soft; few roots; carbonate coatings on pebbles, thickest on undersides; a few pebbles cemented together; effervesces strongly; abrupt smooth boundary.

K21a (C1ca) 13180 20 to 23 cm. Laminar horizon occurs in the upper 1 to 10 mm.; carbonate laminae range from white (10YR 9/2, dry) or very pale brown (10YR 8/3, moist) to very pale brown (10YR 7/4, dry) or light yellowish-brown (10YR 6/4, moist); in places, tops of pebbles protrude from laminar horizon; laminar horizon underlain by nonlaminar, carbonate-cemented material, dominantly white (10YR 9/2, dry) or very pale brown (10YR 7.5/3, moist); extremely hard; no roots; pebbles widely separated by carbonate; effervesces strongly; clear smooth boundary.

K22a (C2ca) 13181 and 13182 23 to 74 cm. White (10YR 9/2 to 8/2, dry) or very pale brown (10YR 8/3 to 7/3, moist) very gravelly, carbonate-cemented material; massive; very and extremely hard; irregularly shaped channels and pockets, 1 to 10 mm. diameter filled with loamy material and containing a few fine roots, break out as aggregates of carbonate-cemented gravel; most pebbles are separated from each other by prominent carbonate coatings; few bands of relatively loose pebbles in lower part, with discontinuous pebble coatings; effervesces strongly; gradual wavy boundary. (Split for sampling.)

K3 (C3ca) 13183 74 to 104 cm. Very pale brown (10YR 8/3, dry) and light yellowish-brown (10YR 6/4, moist) very gravelly loamy sand-sandy loam; occurring as bands and pockets of both indurated and nonindurated material with tendency to be banded horizontally; in nonindurated zones, carbonate occurs mainly on pebble bottoms; indurated portions effervesce strongly, loose parts weakly; gradual wavy boundary.

Oca (O1ca) 13184 104 to 127 cm. Dominantly light brown (7.5YR 6.5/4, dry) or brown (7.5YR 5/4, moist) very gravelly loamy sand, occurring as horizontal bands, with few white, weakly indurated bands; mainly loose, with carbonate coatings occurring mainly on pebble bottoms; effervesces weakly and strongly.

Remarks: A sampling trench was cut back 5 feet from the steep south face of the interfluvium. This pedon occurs on the shoulder of the interfluvium; pedon S61NMex-7-10 occurs in the interfluvium center, on the crest of the ridge remnant.

The sands from the lower K22a and the K3 (LSL 13182, 13183) after carbonate removal contain an appreciable proportion of cream-colored earthy aggregates which appear similar to the aggregates present after carbonate removal in the middle and lower K horizon of S61NMex-7-7. These latter aggregates were determined to be the residue of sepiolite and attapulgite clays after breakdown on treatment with pH 5 NaOAc buffer (Vanden Heuvel, R. C., Clays and Clay Minerals, 13th Conf. 1964, pp. 193-207, Pergamon Press, New York). Vanden Heuvel, while at the Beltsville Soil Survey Laboratory, examined samples 13182, 13183. He wrote "The aggregates in the two samples examined appear to be cemented by amorphous silica. About 15 percent of the buffer-treated clay is amorphous silica as determined by Jackson's 0.5N NaOH solution method. Montmorillonite and mica are the chief crystalline components of the clay."

SOIL CLASSIFICATION: Ustollic Calciorthid; sandy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Rilloso, Ustollic variant SOIL Nos. S60-NMex-7-11 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13185-13191

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1			2A2 Coarse fragments i/		
		Total			Sand					Silt			Vol. 250-2	Wt. 3B1				
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.02-0.002)	(2-0.1)		76-2	19-2			
Pct. of < 2 mm											Carbonate Removed a/ b/		250	76	19			
0-4	A	77.4	14.5	8.1	2.3	8.6	11.3	33.8	21.4	9.7	4.8	47.9	56.0	15	33	17		
4-18	K21	72.3	16.5	11.2	5.0	7.6	10.2	29.7	19.8	12.6	3.9	47.2	52.5	40	62	49		
18-30	IIK22	62.2	23.8	14.0	1.6	4.1	6.9	24.4	25.2	18.2	5.6	56.6	37.0	-	-	-		
30-43	IIK22	70.3	19.3	10.4	4.0	10.5	12.4	23.4	20.0	14.7	4.6	47.1	50.3	3	6	6		
43-64	IIIC1ca	72.8	20.1	7.1	12.0	12.1	9.0	26.1	13.6	17.4	2.7	43.8	59.2	15	26	21		
64-86	IIIC2ca	85.8	9.2	5.0	12.2	25.2	17.3	20.3	10.8	6.9	2.3	27.4	75.0	20	32	32		
41-71	IIIB2cab	76.5	12.7	10.8	9.9	18.8	14.3	19.2	14.3	8.1	4.6	32.0	62.2	15	22	21		

Depth (cm.)	6A1a	6B1a	C/N	5A1a	Carbonate as CaCO ₃		Bulk density			Water content			Composition Whole Material d				
	Organic carbon c/ Pct. E	Nitrogen c/ Pct.		CEC	3A1a		4A1b Air-Dry g/cc	g/cc	g/cc	NONCARBONATE			Carbonate as CaCO ₃ Pct.				
				NH ₄ OAc a/ me./ 100g.	<2mm. e/ Pct.	<0.002 mm. Pct.				f/ g/cc	> 2mm. Pct.	Sand Pct.		Silt Pct.	Clay Pct.		
0-4	0.45	0.049	9	8.3	10	2	1.4					30	49	9	5	7	
4-18	0.62			11.2	23	2	1.4					57	24	5	4	10	
18-30	0.42			11.4	16	7	1.3					-	52	20	12	16	
30-43	0.28			9.2	14		1.4					5	58	16	8	13	
43-64	0.08			6.0	7		1.4					25	51	14	5	5	
64-86	0.04			4.1	3		1.4					31	58	6	3	2	
41-71	0.14			8.6	1		1.4					22	59	10	8	1	

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
- c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- d/ Inclusive of coarse fragments, carbonate, and gypsum.
- e/ Determination on whole material by Method 6E1a and 6E1c and calculated as a percentage of the < 2 mm. by Method 1B4.
- f/ Assumed bulk density of moist fine-earth fabric for calculations.
- g/ 2.4 kg/m² to 86 cm (Method 6A).
- h/ Volume on carbonate-containing basis; weight on carbonate-free basis.

Soil: Riloso, Ustollic variant. Soil Classification: Ustollic Calciorthid; sandy, mixed, thermic.
 Soil Nos.: S60NMex-7-11
 Location: Gravel pit dug about 1/4 mile east of New Mexico State University on Dripping Springs Road, in the un-sectioned Dona Ana Bend Colony, Dona Ana County, New Mexico. Geomorphic Surface: Picacho.
 Land Form: Alluvial fan sloping 2 percent west. Elevation: 4,025 feet. Vegetation: Creosotebush.
 Parent Material: Picacho fan alluvium derived mainly from rhyolite, with smaller amount of andesite, chert and quartz.
 Collected by: L. H. Gile, R. B. Grossman, J. L. Millet and F. F. Peterson, April 13, 1960.
 Described by: J. L. Millet and F. F. Peterson.

Soil Surface. Desert pavement of dominantly angular rhyolite pebbles, a few angular andesite pebbles and rounded quartz or chert pebbles.

A 13185 0 to 4 cm. Light brownish-gray (10YR 6/2 dry) or brown (10YR 5/3 moist) gravelly sandy loam; weak coarse platy; soft to slightly hard; few fine roots; few fine vesicles; thin discontinuous carbonate coatings on pebbles and sand grains; effervesces strongly; abrupt smooth boundary. Sample includes desert pavement of gravel.

K21 (C1ca) 13186 4 to 18 cm. Pinkish-gray (7.5YR 6/2 dry) or brown (7.5YR 5/4 moist) very gravelly fine sandy loam; massive breaking to very weak medium subangular blocky; soft; horizon digs out easily; many fine roots; pebbles have continuous thin (7.5YR 7/2 to 8/2 dry, 10YR 6/3 moist) carbonate coatings; pebble interstices filled with loosely packed, carbonate-rich material in which sand grains are essentially carbonate-coated throughout; effervesces strongly; abrupt smooth boundary.

IIK22 (IIC2ca) 13187, 13188 18 to 43 cm. Pinkish-gray (7.5YR 6.5/2 dry) or light brown (7.5YR 6/4 moist) fine sandy loam; massive breaking to weak medium fine subangular blocky; slightly hard; few roots; pebbles and sand grains most commonly have thin, continuous coatings of carbonate; common fine carbonate nodules; effervesces strongly; clear wavy boundary. (Sampled 7 to 12 and 12 to 17 inches.)

Note: Discontinuous B2cab, sampled from offset; horizon described below.

IIIC1ca (IIIC3ca) 13189 43 to 64 cm. Pinkish-gray (7.5YR 6/2 dry) or brown (7.5YR 5/4 moist) gravelly light sandy loam; massive; slightly hard; no roots; thin, discontinuous carbonate coatings on pebbles; effervesces strongly; gradual boundary.

IIIC2ca (IIIC4ca) 13190 64 to 86 cm. Light brown (7.5YR 6/4 dry) or brown (10YR 4/3 moist) gravelly loamy sand; massive; loose; no roots; thin, discontinuous carbonate coatings on pebbles, primarily on undersides; effervesces strongly.

IIIB2cab 13191 41 to 71 cm. About 4 feet to right of pedon, at same relative depth as IIIC1ca and IIIC2ca. Yellowish-red (5YR 5/6 dry) or reddish-brown (5YR 4/4 moist) gravelly sandy loam; massive breaking to coarse subangular aggregates of pebbles; slightly hard, firm in place; no roots; less reddish colored in upper few inches; yellowish-red clay coatings extend two to three inches into a subjacent gravel lens; many white carbonate filaments; pebbles have patchy, thin, discontinuous carbonate coatings on undersides; effervesces strongly.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Berino

SOIL Nos. S60-NMEX-7-13

LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska

LAB. Nos. 13198-13204

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A														7A1d i/		2A2 Coarse fragments k/		
		Total		Sand						Silt						2- 0.002	< 0.0002	Vol. 250-2 250	Wt. 3B1	
		Sand (2-0.05)	Silt (< 0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	76-2	19-2					
Pct. of < 2 mm																				
		Carbonate Removed						3A3	a/ b/											
0-8	A1	78.9	8.4	12.7	5.4	17.2	13.0	28.0	15.3	5.5	2.9	35.6	63.6	4.2	7.2	2	3	3		
8-28	B21t	71.5	10.8	17.7	12.5	17.5	9.2	19.1	13.2	6.4	4.4	29.7	58.3	4.9	12.8	5	9	9		
28-43	B22t	61.1	14.1	24.8	13.2	16.2	6.3	13.0	12.4	8.8	5.3	28.4	48.7	5.2	18.4	10	14	14		
43-56	B23tca	62.9	13.9	23.2	13.5	15.9	5.8	13.4	13.3	9.3	4.6	29.7	49.6	4.5	17.8	10	14	14		
56-71	K1	65.8	17.0	17.2	13.4	14.8	4.9	14.5	18.2	11.9	5.1	38.8	47.6	6.2	8.7	5	10	10		
71-86	K2	57.4	24.3	18.3	16.2	13.7	1.6	8.3	17.6	15.7	8.6	38.9	39.8			10	16	16		
86-114	Cca	81.5	11.4	7.1	20.9	20.4	9.9	17.2	13.1	7.7	3.7	30.0	68.4	2.4	4.7	15	22	22		

Depth (cm.)	6A1a Organic carbon g/1	Nitrogen Pct.	6S1a Total Phos. Pct.	6C2a Ext. Iron as Fe ₂ O ₃ Pct.	Carbonate as CaCO ₃		5A1a Bulk density		8A1a Elec. Cond. mmhos/cm.	Water content			Composition Whole Material d					
					3A1a NH ₄ OH e		4A1c 30-cm. g/cc	4B5 Air-Dry g/cc		4B3 30-cm. Pct.	4B2 15-Bar Pct.	NONCARBONATE				Carbonate as CaCO ₃ Pct.		
					< 0.002 mm. Pct.	3A1a mm. Pct.	me./100g.	g/cc		g/cc	Pct.	Pct.	Pct.	> 2mm Pct.	Sand Pct.		Silt Pct.	Clay Pct.
0-8	0.26		0.046	0.8	tr	7.5	1.4m	1.56	0.44				3	76	8	13	tr	
8-28	0.30		0.041	0.8	tr	9.6	1.50	1.56	0.45		14	6.2	9	65	10	16	tr	
28-43	0.29		0.034	0.9	tr	12.8	1.56	1.66	0.49		15	8.8	14	52	12	22	tr	
43-56	0.28		0.042	0.9	4	1	13.5	1.56	1.67	0.58		16	8.9	14	53	11	19	3
56-71	0.20		0.061	0.8	13	4	10.4	1.59	1.63	0.68		16	6.9	9	52	13	14	12
71-86	0.12		0.084	0.7	20	5	12.6	1.64	1.68	0.73		15	5.5	13	41	17	12	17
86-114	0.07		0.071	0.6	5		5.0	1.5m	0.75					21	62	8	5	4

Depth (cm.)	TOTAL ANALYSIS a/, f/ 7A1d, 7C2										Silica g/Extracted	
	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	TiO ₂	CaO	K ₂ O	MgO	BrO ₂	H ₂ O+	Total	< 0.002 mm.	< 0.0002 mm.
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
0-8	71.3	14.7	3.53	0.54	0.86	< 2 mm. 4.58	0.7	0.052	2.92	99.2	3.5	11.0
8-28	68.6	15.6	3.61	0.55	0.87	4.51	1.0	0.053	3.39	98.2	2.7	10.0
28-43	68.6	15.5	4.07	0.57	0.91	4.21	0.9	0.047	4.27	99.1	3.7	11.4
43-56	68.4	15.0	3.97	0.65	1.05	4.10	1.2	0.054	4.35	98.8	3.9	11.6
56-71	70.7	14.1	3.83	0.55	0.91	4.33	1.2	0.052	3.55	99.2	3.7	11.1
71-86	69.3	14.9	3.67	0.66	1.51	3.73	1.8	0.054	4.66	100.3	3.4	10.5
86-114	71.8	13.5	3.15	0.56	1.10	4.23	0.8	0.057	2.24	97.4	3.7	10.0

Depth (cm.)	TOTAL ANALYSIS a/, f/ 7A1d, 7C2										Silica g/Extracted	
	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	TiO ₂	CaO	K ₂ O	MgO	BrO ₂	H ₂ O+	Total	< 0.002 mm. h/	< 0.0002 mm. h/
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
0-8	49.3	25.0	8.45	0.46	0.04	2.80	2.0	0.014	12.94	101.0		
8-28	49.9	24.6	8.34	0.45	0.04	2.81	2.0	0.014	12.57	100.7		
28-43	48.9	25.2	8.27	0.48	0.04	2.40	2.1	0.014	12.47	99.9		
43-56	49.9	25.2	7.99	0.45	0.05	2.22	2.2	0.014	12.62	100.6		
56-71	50.1	24.9	8.37	0.43	0.02	1.97	1.8	0.013	13.04	100.6		
71-86	52.0	24.0	7.45	0.38	0.23	2.11	2.1	0.011	10.52	98.8		
86-114	51.0	23.4	8.06	0.44	0.13	2.22	2.6	0.014	11.51	99.4		

Depth (cm.)	TOTAL ANALYSIS a/, f/ 7A1d, 7C2										Silica g/Extracted	
	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	TiO ₂	CaO	K ₂ O	MgO	BrO ₂	H ₂ O+	Total	< 0.002 mm. h/	< 0.0002 mm. h/
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
0-8	73.1	13.9	3.15	0.55	0.93	4.72	0.6	0.055	2.15	99.2		
8-28	71.6	14.3	2.92	0.56	0.99	4.78	0.9	0.059	2.05	98.2		
28-43	73.2	13.3	3.13	0.59	1.11	4.63	0.7	0.054	2.43	99.1		
43-56	72.7	12.8	3.12	0.70	1.27	4.52	1.1	0.063	2.57	98.8		
56-71	72.8	13.1	3.40	0.56	1.00	4.56	1.1	0.056	2.65	99.2		
71-86	72.8	12.9	2.87	0.71	1.78	4.06	1.7	0.063	3.41	100.3		
86-114	72.9	13.0	2.91	0.57	1.14	4.34	0.8	0.059	1.79	97.5		

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
- c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- d/ Inclusive of coarse fragments, carbonate, and gypsum.
- e/ Determination of whole material by Method 6E1a and 6E1c and calculated as a percentage of the < 2 mm. by Method 1B4.
- f/ Beltsville Soil Survey Laboratory. NaHCO₃ used as dispersing agent. All measurements except magnesium were made using borate glass disks. Magnesium measurements were made on soil powders; these values are therefore only approximate. The < 2 mm. of the B22t contains 0.06 percent Mn expressed as MnO.
- g/ Beltsville Soil Survey Laboratory. Boiled 0.075 g. 2.5 minutes in 75 ml. 0.5N NaOH. The < 2 mm. was ground prior to analysis.
- h/ Beltsville Soil Survey Laboratory. Computed from analyses on < 2 mm. and < 0.0002 mm.
- i/ Beltsville Soil Survey Laboratory. Solution of NaHCO₃ used as dispersing agent; no treatment with 0.1N NaOH. See Mineralogy for comment on LSL 13202.
- j/ 3.0 kg/m² to 86 cm (Method 6A).
- k/ Volume on carbonate-containing basis; weight on carbonate-free basis.
- m/ Assumed values for calculation purposes.

60-13

Soil: Berino Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic
 Soil Nos.: S60NMex-7-13
 Location: SE 1/4 NE 1/4, Sec. 9, T22S, R3E, next to large borrow pit on south side Highway 70, 2½ miles southwest of the village of Organ, Dona Ana County, New Mexico. Geomorphic Surface: Jornada II.
 Land Form: Coalescent fan piedmont sloping 2 percent to west; site is very gently undulating.
 Parent Material: Monzonitic alluvial fan sediments; calcareous dust. (See remarks)
 Vegetation: Snakeweed, Mormon tea, scattered Yucca elata, fluffgrass and a few clumps of three-awn.
 Elevation: 4,675 feet.
 Collected by: L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 18, 1960.
 Described by: L. H. Gile and F. F. Peterson.

Soil Surface. Fifteen to 25 percent covered by fine monzonite gravel.

A1 13198 0 to 8 cm. Reddish-brown (5YR 4/4 dry) or dark reddish-brown (5YR 3/4 moist) heavy loam; weak medium and coarse subangular blocky; slightly hard; slightly sticky; few roots; somewhat porous peds, sand grains uniformly covered by fines but not reddish-coated; noncalcareous; clear undulating boundary. Desert pavement of gravel included in sample.

B21t 13199 8 to 28 cm. Reddish-brown (5YR 4/4 dry) or dark reddish-brown (5YR 3/3 and 3/4 moist) heavy loam; weak medium and coarse subangular blocky; slightly hard; slightly sticky; few roots; peds are somewhat porous and the surfaces have smooth patches; sand grains have weak clay coatings; noncalcareous; clear smooth boundary.

B22t 13200 28 to 43 cm. Reddish-brown (3YR 3.5/4 dry) or dark reddish-brown (3YR 3/4.5 moist) sandy clay loam; weak coarse subangular blocky; hard; sticky, plastic; a few fine roots; some tubular pores; sand grains have thin, continuous clay coatings; ped surfaces smooth; in lower one-third of horizon a few parts effervesce weakly, remainder noncalcareous; clear smooth boundary.

B23tca 13201 43 to 56 cm. Red (2.5YR to 5YR 4/6 dry) or reddish-brown (2.5YR to 5YR 3.5/4 moist) sandy clay loam; weak medium and coarse subangular blocky; hard; sticky but slightly less than above; very few roots; many 1- to 2-mm. pores; reflective surfaces on some peds; sand grains have thin reddish-brown coatings; many carbonate filaments; effervesces strongly; clear smooth boundary.

K1 (B3tca) 13202 56 to 71 cm. Reddish-brown (5YR 5/3 dry, 5YR to 7.5YR 5/4 moist) and pinkish-white (5YR 8/2 dry) or pink (5YR 7/3 moist) heavy loam; moderate medium to fine subangular blocky; hard; very few fine roots; ped surfaces commonly whiter colored; small, white parts of ped surfaces (1 to 2 mm. thick) of apparent high carbonate content lend spotted appearance to horizon; effervesces strongly; clear smooth boundary.

K2 (C1ca) 13203 71 to 86 cm. Pinkish-white (5YR 8/2 dry) or pinkish-gray (5YR 7/2 moist) and light reddish-brown (5YR 6/3 dry) or reddish-brown (5YR to 7.5YR 5/4 moist) loam; weak medium to coarse subangular blocky with structure controlled by carbonate aggregation; hard; no roots; few pores; more dense than superjacent horizon; few small parts of more reddish-brown; very similar to superjacent horizon in morphological organization of pinkish-white and reddish-brown materials; effervesces strongly; clear wavy boundary.

Cca (C2ca) 13204 86 to 114 cm. Light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 4/4 moist) sandy clay loam; very weak medium subangular blocky; slightly hard; no roots; effervesces strongly.

SOIL CLASSIFICATION: Ustollic Calciorthid; fine-silty, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Reagan SOIL Nos. S60-NMex-7-14 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13205-13211

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)												2A2 Coarse fragments			
		Total				Sand				Silt				3Alb Fine Clay <0.0002	Vol. - 2	Wt. 3B1	
		Sand (2-0.05)	Silt (0.05- 0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02- 0.002)	Int. II (0.2-0.02)	(2-0.1)			76-2	19-2
		Pct. of < 2 mm												pH	(1:1)		
Carbonate Removed a/ b/																	
0-5	A	28.3	45.1	26.6	0.2	0.5	0.8	6.6	20.2	18.2	26.9	43.3	8.1	3.6	-	-	
5-28	A	30.1	40.9	29.0	0.3	0.4	0.7	8.1	20.6	14.2	26.7	40.6	9.5	3.8	-	-	
28-56	B21	15.5	49.4	35.1	<0.1	<0.1	0.2	2.9	12.4	15.5	33.9	30.1	3.1	7.0	-	-	
56-76	B22	11.6	44.2	44.2	<0.1	0.1	0.3	2.6	8.6	11.4	32.8	21.9	3.0	8.9	-	-	
76-99	B23ca	12.2	44.8	43.0	<0.1	0.4	0.4	3.1	8.3	10.8	34.0	21.4	3.9	13.8	-	-	
99-122	C	24.2	44.2	31.6	<0.1	0.2	0.8	5.7	17.5	18.4	25.8	40.0	6.7	15.0	-	-	
122-140+	IIBb	63.7	20.1	16.2	1.0	3.5	3.8	25.4	30.0	10.0	10.1	57.5	33.7	8.6	-	-	
Carbonate Not Removed b/																	
0-5	A	24.5	53.5	22.0	0.5	0.6	0.7	5.4	17.3	42.0	11.5	63.3	7.2				
5-28	A	23.8	48.4	28.0	0.3	0.4	0.6	6.0	16.5	43.6	4.8	54.5	7.3				
28-56	B21	11.2	53.6	35.2	0.1	0.1	0.2	2.1	8.7	43.8	9.8	54.1	2.5				
56-76	B22	8.3	49.6	42.1	0.1	0.3	0.3	1.9	5.7	43.8	5.8	50.9	2.6				
76-99	B23ca	8.1	50.9	41.0	0.1	0.3	0.3	2.1	5.3	49.2	1.7	56.1	2.8				
99-122	C	20.3	47.3	32.4	0.2	0.4	0.7	5.0	14.0	32.5	14.8	49.9	6.3				
122-140+	IIBb	60.5	21.2	18.3	1.2	3.4	4.5	22.8	28.6	7.6	13.6	41.3	31.9				
Depth (cm.)	6A1a Organic carbon g/ d/ Pct.	6B1a Nitrogen g/ Pct.	C/N	6C2a Ext. Iron B/as Fe Pct.	Carbonate as CaCO ₃		Bulk density			5A1a CEC NH ₄ OAc		pH					
					6E1a <2mm. Pct.	3A1a <0.002 mm. Pct.	e/ g/cc	4A1b Air- Dry g/cc	a/ me./100g.								
0-5	2.00	0.178	11		16	4		1.3		24.6	17.7						
5-28	1.13	0.111	10		15	7		1.4	1.47	25.2	18.2						
28-56	0.73	0.071	10		22	10		1.4	1.50	27.2	17.1						
56-76	0.70			1.3	23	12		1.4	1.48	29.2	18.0						
76-99	0.51				26	13		1.4	1.47	26.9	16.0						
99-122	0.36				21	9		1.3	1.37	21.6	14.1						
122-140+	0.19			0.8	8	3		1.6		11.8	9.9						

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
- c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis. Explanation
- d/ 11 kg/m² to 99 cm (Method 6A).
- e/ Assumed bulk densities of moist fine-earth fabric for calculations.

Soil: Reagan Soil Classification: Ustollic Calciorthid; fine-silty, mixed, thermic
 Soil Nos.: S60NMex-7-14
 Location: SW 1/4 NW 1/4, Sec. 19, T21S, R3E, at a west-facing escarpment of about 4 feet cut into silty sediments, Dona Ana County, New Mexico. Geomorphic Surface: Organ. Elevation: 4,400 feet.
 Land Form: Scarplet dissected coalescent fan piedmont sloping about 1 percent west.
 Parent Material: Organ fan alluvium from limestone, calcareous sandstone and siltstone; calcareous dust.
 Vegetation: On top of escarpment dominantly burro grass, with some tobosa, scattered tarbush, creosotebush, desert holly, and very few snakeweed.
 Collected by: L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 19, 1960.

Soil Surface. Cracked into polygonal plates up to 1/8-inch thick, several inches in diameter. A discontinuous layer of reddish sand is scattered over the surface and between the plates.

A 13205 0 to 5 cm. Grayish-brown (10YR 5.5/2 dry) or dark grayish-brown (10YR 3.5/2 moist) silt loam; moderate medium platy breaking to fine platy; slightly hard; roots common under clumps of burrograss; layers of reddish very fine sand, less than 1 mm. thick, between plates; effervesces strongly; clear smooth boundary.

A 13206 5 to 28 cm. Light brownish-gray (10YR 6/2 dry) or brown (10YR 4/3 moist) somewhat heavy silt loam; weak medium subangular blocky; upper part very weak platy; hard; roots common; pores common and have smooth walls; effervesces strongly; clear wavy boundary.

B21 13207 28 to 56 cm. Brown (10YR 5/2.5 dry, 4/3 moist) silty clay loam; weak medium prismatic breaking to moderate medium subangular blocky; hard; few roots; many of pores and channels have thin carbonate linings; ped surfaces slightly lighter colored and smoother than fracture surfaces; very few carbonate filaments; effervesces strongly; clear wavy boundary.

B22 13208 56 to 76 cm. Light yellowish brown (10YR 6/4 dry) or yellowish brown (10YR 5/4 moist) silty clay loam; weak medium prismatic, breaking to moderate fine subangular blocky; hard; few roots; few carbonate filaments on ped surfaces; effervesces strongly; clear wavy boundary.

B23ca 13209 76 to 99 cm. Pale brown (10YR 6/3 dry) or yellowish brown (10YR 4.5/4 moist) silty clay loam; weak medium prismatic, breaking to moderate medium and fine subangular blocky; hard; few roots; common carbonate filaments on ped surfaces and along channels and pores in ped interiors; effervesces strongly; clear wavy boundary.

C 13210 99 to 122 cm. Light yellowish brown (10YR 6/4 dry) or yellowish brown (10YR 4.5/4 moist) silt loam; weak medium subangular blocky; slightly hard; few roots; very few carbonate filaments; few parts reddish brown (5YR 5/4 dry); effervesces strongly; clear wavy boundary.

IIBb 13211 122 to 140 cm. plus. Reddish-brown (5YR to 7.5YR 5/4 dry, 5YR 4/4 moist) fine sandy loam; massive; slightly hard to hard; few roots; few pores with smooth wall linings; few carbonate filaments; effervesces strongly.

Remarks: Structural expression is the basis for the recognition of the B horizon.

Micromorphology, Method 4E1b. The A (5-28 cm.), B21, B22, and IIBb horizons were examined in thin section. The upper four horizons contain abundant fine-grain carbonate. This carbonate has strong birefringence, which masks the interference color from the silicate clay, except adjacent to sand grains. The fabric would be plasmic and aseplic. Planar voids are common but there is also a clumpiness which is stronger nearer the surface. Quartz and feldspar predominate. Ferromagnesian minerals are scarce with biotite followed by pyroxene, the principal minerals. Mostly the sand grains are discrete minerals rather than being composites, although some feldspar grains do contain biotite and a yellowish-brown infilling is found, which in some instances is isotropic or nearly so. Occasional feldspar have patchy coatings of reddish-brown earthy material. Some feldspar grains appear rough and weathered along twinning planes. Many sand grains have thin, nearly continuous clay coatings. Most of the biotite has largely lost its second order interference color (as viewed on edge) and, although distinguishable from oriented clay bodies, has altered towards clay. The pyroxene grains are somewhat weathered, but alteration of the birefringence is only peripheral. A curious feature are bodies that may be glaeboles of clay, but which are largely isotropic and cannot be readily distinguished from altered plant remains. Occasional sand-size grains of carbonate showing optical continuity over much of the grain are present. These are interpreted to have a geological source and not pedogenic. They are rough and otherwise appear to have been etched. Dark bodies ranging downward in size from 100 microns, with most 5 microns or less, have an average repeat distance of perhaps 10 microns. These bodies are roughly equidimensional. Their occurrence shows no relationship to boundaries of pedological features.

The IIBb horizon has insufficient plasma to fill the spaces between sand grains. The plasma occurs as crudely oriented coatings on the sand grains. Fine grain carbonate partially fills the interstices. The mineralogy is similar to that of the sand in horizons above. The few grains of carbonate with sufficient optical continuity to suggest a geological origin are frayed and appear etched. Many of the sand grains have patchy, thick reddish-brown coatings of weakly oriented silicate clay which fills cavities and extends inward along planes of weakness. These patchy coatings have the appearance of being allogenic. The fine grain carbonate on sand grains may obscure and possibly has disrupted authigenic clay coatings.

Sand Mineralogy, Method 7B1. The very fine and fine sand from the B22 horizon after carbonate removal by Method 1B3 was examined under the petrographic microscope. A count of 300 grains of very fine sand yielded 50 percent quartz, 35 percent feldspar, 10 percent microcrystalline aggregates, and 2 percent assorted ferromagnesian grains. The feldspar is mostly orthoclase with some microcline, albite, and roughly a fifth is plagioclase of intermediate calcium content. The microcrystalline aggregates are mostly altered small optical domains of feldspar, but some may be weathered chert. Some chert was included with the quartz. The discrete feldspar grains appear quite weathered. The biotite flakes mostly show dull yellowish interference color, consistent with appreciable alteration. Many grains have patchy coatings of reddish-brown clay. This clay may have been cemented to the grains in the process of forming the sedimentary rock. The expression of these coatings may be somewhat weaker in the A (0-5 cm.), but the difference is small.

Clay Mineralogy, Methods 7A2, 7A3. B21 horizon (Lincoln). Clay contains small amounts of vermiculite, mica, and kaolinite, plus additional component of interlayer mineral, involving vermiculite, mica, and chlorite. Small to moderate amount of calcite is present. B22 horizon (Beltsville). Carbonate removed by Method 3A3. A moderate amount of a poorly ordered montmorillonite-vermiculite mineral is present, plus small amount of vermiculite and kaolinite (10 percent kaolinite). IIBb horizon (Lincoln). Small amounts of vermiculite and mica are present, plus a trace of kaolinite and an additional component of interlayer mineral, involving vermiculite, mica, and chlorite. A small amount of calcite is present.

SOIL CLASSIFICATION: Typic Torrifluvent; fine-silty, mixed, calcareous, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Glendale SOIL Nos. S60-IMex-7-15 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13212-13217

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1b Fine Clay <0.002	2A2 Coarse fragments			
		Total			Sand					Silt				Vol. - 2 %	Wt. 3B1		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)			(2-0.1)	76-2	19-2
Pct. of < 2 mm																	
Carbonate Removed - 3A3 a, b																	
0-5	A	55.2	30.7	14.1	0.4	0.9	1.9	18.8	33.2	16.4	14.3	64.3	22.0	5.3			
5-20	A	26.0	50.0	24.0	0.1	0.3	0.4	4.1	21.1	23.6	26.4	47.9	4.9	7.3			
20-38	B21	11.2	56.9	31.9	0.1	0.2	0.2	1.8	8.9	22.5	34.4	32.7	2.3	14.7			
38-64	B22	16.3	55.5	28.2	tr	0.4	1.3	4.8	9.8	22.9	32.6	35.7	6.5	12.9			
64-86	B3	18.2	54.6	27.2	0.6	2.0	0.5	4.3	10.8	20.5	34.1	34.4	7.4	12.1	tr	tr	
86-112	C	18.4	54.4	27.2	0.4	1.8	0.2	2.2	13.8	21.9	32.5	37.6	4.6	11.2	tr	tr	
Carbonate Not Removed - 3A1 b																	
0-5	A	51.7	35.5	12.8	0.3	0.8	1.7	17.7	31.2	17.1	18.4	60.9	20.5				
5-20	A	23.4	55.2	21.4	0.3	0.4	0.5	4.2	18.0	44.6	10.6	65.6	5.4				
20-38	B21	9.4	60.1	30.5	0.1	0.3	0.3	1.9	6.8	59.8	0.3	67.9	2.6				
38-64	B22	16.6	57.0	26.4	0.2	1.4	1.7	5.0	8.3	49.9	7.1	61.1	8.3				
64-86	B3	14.9	58.9	26.2	0.1	0.3	0.5	4.6	9.4	51.2	7.7	63.7	5.5				
86-112	C	15.1	60.5	24.4	tr	0.1	0.2	2.8	12.0	51.5	9.0	65.7	3.1				
Depth (cm.)	6A1a Organic carbon C _d e	6B1a Nitrogen C	C/N	Carbonate as CaCO ₃		Bulk density			5A1a CEC NH ₄ OAc		pH						
				6E1a <2mm Pct.	6E1c <0.002 mm. Pct.	f g/cc	g/cc	g/cc	a me/100g.	8C1a (1:10)	8C1a (1:1)						
0-5	0.82	0.081	10	14	2	1.2			13.5	10.0	8.8	8.3					
5-20	0.77	0.081	9	17	5	1.3	1.30		19.3	13.7	8.9	8.3					
20-38	0.70	0.074	10	26	10	1.3	1.29		23.2	13.3	8.7	8.1					
38-64	0.58			26	8	1.3	1.39		19.8	12.4	8.6	8.0					
64-86	0.44			25	8	1.3	1.37		18.7	12.2	8.4	7.8					
86-112	0.36			26	7	1.3			18.8	11.7	8.4	7.8					
Depth (cm.)	Extractable bases 5B1a				Water extract from saturated paste 8A1												
	Ca	6O2b Mg	6P2a Na	6Q2a K	6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	CO ₃	6J1a HCO ₃	6K1a Cl	6L1a SO ₄	8A1a Electrical conductivity mmho/cm				
0-5		1.1	<0.1	0.8		6.0	<0.1	0.4	0.5				0.7				
5-20		1.7	<0.1	1.2		4.9	0.3	0.4	0.4				0.6				
20-38		2.2	0.1	1.0		5.0	0.6	0.6	0.4				0.7				
38-64		2.5	0.3	0.7		8.4	1.2	1.9	0.4	1.6			1.2				
64-86		4.0	0.8	0.7		33.7	10.7	8.3	0.6	1.2	21.0	1.4	5.0				
86-112		4.7	1.1	0.6		33.7	12.2	11.6	0.6	0.9	27.7	1.5	5.6				

Depth (cm.)	8A Water at Saturation	5D2 Exchangeable Na
	Pct.	Pct.
0-5	37.2	< 1
5-20	38.3	< 1
20-38	49.1	< 1
38-64	46.7	2
64-86	48.2	3
86-112	46.0	5

- Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- In contact overnight with 0.1N NaOH in addition to regular treatments to aid dis-aggregation.
- Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- A composite sample of four 3-inch diameter auger holes to 38 cm from a barren area 7 m. west contains 0.75 organic carbon.
- 8.1 kg/m² to 112 cm (Method 6A).
- Assumed bulk densities of moist fine-earth fabric for calculations.

Radiocarbon Dates a

The radiocarbon age for the carbonate from the C3 horizon (13216, I-5084) is 10,580 yrs. B.P. δc (C¹³) ‰ is +1.3.

- Sample number 2 in Soil Monograph.

60-15

Soil: Glendale Soil Classification: Typic Torrifluent; fine-silty, mixed, calcareous, thermic
 Soil Nos.: S60NMex-7-15
 Location: NE 1/4 NW 1/4, Sec. 20, T21S, R3E, about 25 feet south of section line road, Dona Ana County, N. M. Mexico. Geomorphic Surface: Organ.
 Land Form: Coalescent fan piedmont sloping 2 percent to west; site on flat area just headward from a subdued (6-inch) scarplet. Elevation: 4,500 feet
 Parent Material: Organ fan alluvium from limestone, and calcareous sandstone and siltstone.
 Vegetation: Burro grass in small bunches, spaced 3 to 8 inches apart, on subdued pedestals and on slightly higher "flats" behind subdued scarplets.
 Collected by: L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 19, 1960.
 Described by: L. H. Gile and F. F. Peterson.

Soil Surface. Between clumps of burrograss the surface is smooth and has 1- to 2-mm. wide cracks that delineate 2 to 5 cm. in diameter, polygonally shaped plates, about 1/2 cm. thick. Edges of the plates are slightly curled upward and the plates are easily separated from the main body of the underlying horizon.

A 13212 0 to 5 cm. Light brownish-gray (10YR 6.5/2 dry) or brown (10YR 4/3 moist) silt loam; moderate thin and very thin platy; soft; many fine roots; brown (7.5YR 5.5/4 dry, 4/4 moist) loose sand between plates; effervesces strongly; clear wavy boundary.

A 13213 5 to 20 cm. Brown (10YR 5.5/3 dry, 4/3 moist) light silt loam; weak medium and fine subangular blocky; some very weak platiness in upper part; slightly hard; many fine roots; effervesces strongly; clear smooth boundary.

B21 13214 20 to 38 cm. Light yellowish-brown (10YR 6/4 dry) or brown (10YR 4/3 moist) silt loam; very weak medium and fine subangular blocky; slightly hard; slightly sticky; digs out with more difficulty than above; some fine roots; a very few ped surfaces have very weak carbonate coatings; effervesces strongly; gradual wavy boundary.

B22 13215 38 to 64 cm. Brown (10YR 5.5/3 dry, 4/3 moist) silt loam; very weak coarse subangular blocky to massive; slightly hard to hard; digs out slightly more difficultly than C1; few roots; effervesces strongly; gradual wavy boundary.

B3 13216 64 to 86 cm. Brown (10YR 5.5/3 dry, 4/3 moist) silt loam; very weak coarse subangular blocky to massive; slightly hard to hard; digs out somewhat more easily than C2; very few roots; effervesces strongly; gradual wavy boundary.

C 13217 86 to 112 cm. Brown (10YR 5.5/3 dry, 4/3 moist) silt loam; massive; slightly hard; digs out noticeably easier than above horizon; no roots; effervesces strongly.

Micromorphology, Method 4E1b. Thin sections of the A (5-20 cm.), B21, and B22 horizons were examined. The overall morphology is largely controlled by continuous fine-grain carbonate. The plasma would be aseptic. Parts show pronounced clumpiness. Cracks appear to represent where the fabric has torn apart. Quartz and feldspar predominate. Ferromagnesian grains are scarce. There is a sprinkling of sand-size grains of carbonate showing long-range optical continuity indicating a geological source. Dark bodies, ranging from 0.1 mm. down to a few microns, occur every 20 microns. The evidence of weathering is weak. Some mica grains are strongly altered, but others are only moderately so. Some grains of geological carbonate are irregular and rough, but some are rather perfect rhombs and show little alteration.

Sand Mineralogy, Method 7B1. A count after carbonate removal of 300 grains of very fine sand from the B22 yielded 40 percent quartz, 40 percent feldspar, and 20 percent microcrystalline aggregates. One percent ferromagnesian minerals is present, mostly pyroxene and amphibole. About 10 percent of the feldspar are plagioclase of intermediate calcium composition. The microcrystalline aggregates are mostly weathered composites of small feldspar optical domains. The discrete feldspar grains appear quite altered, presumably inherited from the geological source. Some grains have patchy, relatively thick reddish-brown coatings of clay that may be an inherited feature, perhaps related to cementation in the parent rock or a product of soil development prior to the last cycle of erosion and deposition. The very few grains of biotite present mostly show little alteration to judge from the interference color.

Clay Mineralogy, Method 7A2. B21 and C horizons. Clay mineral suites the same in the two horizons. B21 horizon: The clays contain small amounts of vermiculite, mica, and kaolinite, plus an interlayer mineral component, probably a vermiculite-mica. A small to moderate amount of calcite is present. A chlorite-like mineral remains stable at 300° C., but collapses partially at 500° C.

SOIL CLASSIFICATION: Typic Torrtent; very fine, mixed, thermic

SOIL Dalby taxadjunct SOIL Nos. S60-NMex-7-16 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13218-13222

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)													3A1			2A2 Coarse fragments										
		Total			Sand					Silt					3A1b Fine Clay <0.0002	Vol. - 2	Wt. 3B1											
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	76-2			19-2											
Pct. of < 2 mm																												
					Carbonate Removed		a, b																					
0-5	A	5.9	30.5	63.6	0.1	0.2	0.1	1.0	4.5	5.4	25.1	10.7	1.4	9.1										tr	tr			
5-23	AC	6.0	28.4	65.6	0.3	0.4	0.2	1.3	3.8	5.8	22.6	10.5	2.2	20.6										tr	tr			
23-48	C1	5.6	31.9	62.5	0.2	0.2	0.2	1.4	3.6	5.8	26.1	10.4	2.0	18.8										tr	tr			
48-81	C2	5.6	28.7	65.7	0.1	0.2	0.2	1.4	3.7	6.2	22.5	10.9	1.9	28.0										tr	tr			
81-114	C2	5.8	28.3	65.9	0.2	0.4	0.2	1.4	3.6	6.4	21.9	11.0	2.2	24.8										tr	tr			
Depth (cm.)	6A1a Organic carbon c/s, d/ Pct.	6B1a Nitro- gen Pct.	6C1a Ext. Iron asa Fe Pct.	6E1a <2mm. mm. Pct.	Carbonate as CaCO ₃ mm. Pct.	CEC NH ₄ OAc me./ 100g.	Bulk density		4D1 COLE	Water content			pH 8C1a															
							4A1d 1/3- Bar g/cc	4A1h Air- Dry g/cc		4B1c 1/3- Bar Pct.	4B2 15- Bar Pct.																	
0-5	0.58		1.3	4		33.1	1.2e							8.2	7.6													
5-23	0.45		1.2	4		34.9	1.28	1.56	0.068	36.1	18.8			8.4	7.9													
23-48	0.26		1.2	3		31.9	1.29	1.63	0.081	34.4				8.4	7.9													
48-81	0.24		1.2	3		32.8	1.3e							8.4	7.9													
81-114	0.29		1.2	3		33.2	1.38	1.72	0.076	31.3	20.0			8.4	7.8													
Depth (cm.)	Extractable bases				5A1a CEC NH ₄ OAc	Water extract from saturated paste								8A1a Electrical conductivity mmho/cm														
	6O2a Ca	6P2a Mg	6Q2a Na	6Q2a K		6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	CO ₃	HCO ₃	Cl	SO ₄															
0-5	4.6	tr	tr		33.1	8.9	0.9	0.5	0.7						1.1													
5-23	4.4	tr	tr		32.2	3.8	0.2	0.2	0.4						0.5													
23-48	4.4	tr	tr		31.1	3.3	0.8	0.3	0.3						0.4													
48-81	4.4	0.1	0.1		30.4	3.3	0.8	0.3	0.3						0.5													
81-114	4.8	0.1	0.1		29.2	3.4	0.4	0.2	0.3						0.4													
Depth (cm.)	8A Water at Saturation Pct.	Exchange- able Na Pct.	a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.																									
	0-5		59.9		b/ The < 2 mm. in contact overnight with 0.1N NaOH in addition to regular treatments designed to aid disaggregation. Explanation																							
5-23	61.6		c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.																									
23-48	63.6		d/ 4.6 kg/m ² to 114 cm (Method 6A).																									
48-81	66.9		e/ Assumed bulk density for calculations.																									
81-114	66.9																											

SOIL CLASSIFICATION: Ustollic Calciorthid; fine-silty, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Reagan SOIL Nos. S60(65)RMex-7-17 LOCATION Dona Ana County, New Mexico
SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13223-13228, 20822, 20823
GENERAL METHODS: 1A1, 1B1a, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Soil class and particle diameter (mm) 3A1													3A1b Fine Clay < 0.0002	3A2 Coarse fragments		
		Total		Sand							Silt					Vol. %	Wt. %	
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	0.02-0.002	0.2-0.02	(2-0.1)	<0.074			76-2	19-2
Pct. of < 2 mm																		
Carbonate Removed a, b																		
0-8	A	26.3	39.3	34.4	0.2	0.8	2.2	8.1	15.0	15.3	24.0	36.1	11.3	4.5			tr	tr
8-20	B21	26.5	31.7	41.8	0.1	1.2	1.9	9.2	14.1	13.6	18.1	33.9	12.4	7.6			tr	tr
20-43	B22	34.6	31.2	34.2	tr	0.7	2.7	12.6	18.6	14.8	16.4	41.8	16.0	10.3			tr	tr
43-76	B23ca	5.2	39.8	55.0	tr	tr	0.3	1.0	3.9	12.6	27.2	17.1	1.3	13.3			tr	tr
76-112	K2	18.8	29.7	51.5	0.4	1.4	1.1	5.3	10.6	9.7	20.0	23.7	8.2	16.8			tr	tr
112-142	C1ca	11.6	37.7	50.7	0.3	1.1	0.6	2.7	6.9	8.6	29.1	17.3	4.7	11.0			tr	tr
142-190	C2ca	18.9	33.1	48.0	0.2	1.2	1.4	6.1	10.0	8.3	24.8	22.5	8.9	87.6	10.8			
190-206	Btbc	50.2	14.0	35.8	1.0	5.2	5.9	23.2	14.9	7.3	6.7	37.3	35.3	57.3	14.5			
Carbonate Not Removed b																		
0-8	A	24.1	45.4	30.5	0.2	1.2	1.6	7.4	13.7	16.7	28.7	35.4	10.4					
8-20	B21	23.3	38.1	38.6	0.3	1.3	1.7	8.2	11.8	13.7	24.4	31.1	11.5					
20-43	B22	28.6	36.1	35.3	0.1	1.4	2.2	10.3	14.6	13.0	23.1	34.6	14.0					
43-76	B23ca	31.1	33.7	35.2	0.5	2.1	2.8	11.6	14.1	12.4	21.3	34.1	17.0					
76-112	K2	11.5	40.6	47.9	0.3	0.8	0.7	3.1	6.6	7.4	33.2	16.2	4.9					
112-142	C1ca	7.0	48.1	44.9	0.3	0.3	0.3	1.7	4.4	8.1	40.0	13.7	2.6					
142-190	C2ca	13.3	42.5	44.2	0.3	0.9	1.0	4.1	7.0	7.2	35.3	17.1	6.3	91.2			tr	tr
190-206	Btbc	46.2	18.8	35.0	0.5	4.0	4.9	21.6	15.2	8.3	10.5	37.8	31.0	61.6			tr	tr
Depth (cm.)	6A1a Organic carbon %	6B1a Nitrogen %	C/N	5A1a CEC NH ₄ OAc me./100g		Carbonate as CaCO ₃ 6E1a 3A1a 6E1b <0.002 <0.002 mm. Pct.		Bulk density 4A1c 4A1b 30-cm. Air- Dry g/cc g/cc g/cc			4D1 Water content 4B1c 4B2 30-cm. 15- Bar Pct. Pct. Pct.							
				0-8	1.01	0.099	10	23.8	10	5								
8-20	0.84	0.092	9	24.7	12	6	1.3f	1.46	1.52		20.2	13.6						
20-43	0.65			23.5	12	7	1.45	1.52			20.6							
43-76	0.62			29.4	12	6	1.4f	1.47										
76-112	0.24			24.8	29	19	1.4f	1.45										
112-142	0.12			26.3	32	16	1.4f											
142-190				29	11		1.44d	1.56d	0.028	22.9	13.8							
190-206				7	1						11.3							
Depth (cm.)	Extractable bases 5B1a				5A1a CEC NH ₄ OAc	Water extract from saturated paste 8A1												
	Ca	Mg	Na	K		6W1a	6O1a	6P1a	6Q1a	CO ₂	6J1a	6K1a	6L1a	8A1a Electrical conductivity mmho/cm				
0-8	2.7	<0.1	2.2			19.6	5.1	0.3	0.3	0.5				0.6				
8-20	2.9	0.1	2.8			20.4	4.9	0.2	0.4	0.8				0.6				
20-43	2.8	0.1	2.2			16.3	8.5	1.2	0.9	0.9				1.1				
43-76	3.7	0.2	1.9			15.9	8.4	1.8	1.3	0.7			1.6	1.2				
76-112	5.2	0.3	1.3			14.5	11.8	4.4	3.0	0.6			1.2	1.9				
112-142	7.1	0.5	1.2			15.9	10.2	6.4	3.9	0.6			0.9	6.9				
142-190													1.2	8.4				
190-206													0.5	2.2				
Depth (cm.)	8A1 Water at Saturation Pct.	Exchange- able Na Pct.	<p>a. Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.</p> <p>b. < 2 mm. in contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation. Explanation</p> <p>c. Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis. Explanation</p> <p>d. 1/3-bar, Method 4A1d; oven-dry, Method 4A1h.</p> <p>e. 8.8 kg/m² to 112 cm (Method 6A).</p> <p>f. Assumed bulk densities for calculations.</p>															
0-8	39.1																	
8-20	41.8																	
20-43	43.6																	
43-76	44.0																	
76-112	49.4																	
112-142	48.4																	
142-190																		
190-206																		

Soil: Reagan Soil Classification: Ustollic Calciorthid; fine-silty, mixed, thermic
 Soil Nos.: S60(65)NMex-7-17
 Location: NW 1/4 NW 1/4, Sec. 23, T21S, R2E, Dona Ana County, New Mexico.
 Geomorphic Surface: Petts Tank. Elevation: About 4,300 feet.
 Land Form: Floor of Jornada del Muerto Basin, slightly higher than Isaacks' Lake Playa, sloping less than 1/2 percent to west.
 Parent Material: Petts Tank sediments derived from limestone, calcareous sandstone and shale; and from mixed igneous rocks.
 Vegetation: Mainly burro grass, with a few scattered desert holly, sumac and crucifixion thorn.
 Collected by: 1960 - L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 20, 1960.
 1965 - L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, September 29, 1965.
 Described by: 1960 - L. H. Gile and F. F. Peterson; 1965 - L. H. Gile and R. B. Grossman.

Soil Surface. Broken into loose, curled, roughly rounded, smooth-topped plates from 1 to 2 inches in diameter, about 1/8-inch thick and 1/4 inch apart; edges are curled upward about 1/4 inch.

A 13223 0 to 8 cm. Pinkish-gray (7.5YR 7/2 dry) or brown (7.5YR 5.5/4 moist) clay loam; moderate medium prismatic and weak medium platy; slightly hard to hard; numerous fine roots; somewhat finely vesicular; effervesces strongly; clear smooth boundary.

B21 13224 8 to 20 cm. Pinkish-gray (7.5YR 6/2 dry) or dark brown (7.5YR 4/2 moist) light silty clay loam; weak medium prismatic and strong coarse to medium subangular blocky; prismatic structure more or less continuous with that of A1, but blocky structure lends aspect of rounded tops to prisms; hard; many fine roots; ped surfaces slightly lighter colored and smoother than fracture surfaces; effervesces strongly; clear wavy boundary.

B22 13225 20 to 43 cm. Light brown (5YR-7.5YR 5.5/4 dry) or brown (7.5YR-5YR 4/4 moist) light silty clay loam; weak medium to coarse prismatic breaking to moderate medium to coarse subangular blocky; slightly hard and hard; few fine roots; ped surfaces slightly grayish, especially in upper part; ped surfaces smoother than fracture surfaces; few carbonate filaments; effervesces strongly; clear wavy boundary.

B23ca 13226 43 to 76 cm. Light reddish-brown (5YR 5.5/4 dry) or reddish-brown (5YR 4/4 moist) light silty clay loam; weak coarse prismatic breaking to very weak medium subangular; slightly hard; few fine roots; few carbonate filaments both within and on ped surfaces; effervesces strongly; clear wavy boundary.

B2 (C1ca) 13227 76 to 112 cm. Light brown (7.5YR 5.5/4 dry) or brown (7.5YR 4.5/4 moist) silty clay loam; moderate fine subangular blocky; slightly hard; very few fine roots; common, white (7.5YR 8/1 dry) or pink (7.5YR 8/4 moist) very fine subangular blocky carbonate aggregates; few fine (3 to 4 mm. diameter) reddish-brown parts; effervesces strongly; clear wavy boundary.

C1ca (C2ca) 13228 112 to 142 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) silty clay loam; strong to moderate fine to very fine subangular blocky; slightly hard; few fine roots; ped surfaces smooth; very few fine carbonate aggregates; effervesces strongly; clear wavy boundary.

C2ca (C3ca) 20822 142 to 190 cm. Dominantly light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist); silty clay loam; few carbonate nodules that are pink (7.5YR 7/4 dry) or light brown (7.5YR 6/4 moist) and that are less prominent than in overlying horizon; weak medium and coarse prismatic, breaking to moderate fine subangular blocky; slightly hard and hard; few fine roots; effervesces strongly; clear smooth boundary.

Btcab 20823 190 to 206 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) clay loam; generally massive, with some weak medium subangular blocky; slightly hard and hard; roots; few very fine tubular pores, some lined with carbonate, some lined with dark material; parts are noncalcareous, other parts effervesce weakly.

REMARKS: A transitional horizon, 2 to 3 inches thick, occurs between the C2ca horizon and the Btcab horizon, and was excluded from the samples. This transitional horizon is redder than the C2ca but not as red as Btcab.

Petts Tank sediments (including "silt zone" in lower part) from 0 to 190 cm; Upper Camp Rice basin fill below 190 cm.

Micromorphology, Method 4Elb. The B23ca horizon was examined in thin section. Fine grain carbonate appears to be continuous throughout the matrix. The fabric overall would be aseptic as viewed with the carbonate present, although there are scattered sand grains with patchy, moderately thick skeletons. Lower chroma parts of the thin section, as viewed with the naked eye, have a pronounced clumpy fabric with large voids common and many bits of fabric nearly discrete. Linear features are nearly absent. The higher chroma parts also show clumpiness but the interconnection is more complete, and large voids are scarcer.

Quartz and feldspar predominate the skeletal grains. The feldspar appear very fresh. A few grains of ferromagnesian minerals are present; these are mostly pyroxene and amphibole, and they commonly appear fairly fresh. Discrete mica grains are very scarce. Occasional sand-size fragments of rock show appreciable alteration and/or infiltration with reddish-brown material; the alteration often is stronger around the periphery. The rock fragments more commonly are fine grain, suggestive of volcanics. Patchy coatings of clay, ranging up to 20 microns with most less than 10 microns, are found on 5 to 10 percent of the sand grains; these patches of clay show moderate internal orientation and commonly are strongly reddish-brown. They may be largely inherited. Many grains are partially to completely surrounded by a fringe of oriented clay less than 10 microns thick that is pale yellow and shows weak to moderate internal orientation; this clay probably was deposited in place. Of particular interest is a composite sand-size grain of plagioclase feldspar showing continuous twinning that contains numerous biotite grains, mostly in the 0.05-0.1 mm. range. Over most of the periphery, the biotite grains do not appear any more weathered than in the central part of the grain. In a few places, there is a suggestion that mica oriented with the parting plains normal to the edge of the host grain has undergone some weathering beyond that common to the mica in the host grain as a whole. It cannot be determined whether this weathering has occurred in place. There are patchy, black opaque coatings, usually less than 10 microns thick, along some macrosurfaces and on skeletal grains.

Clay Mineralogy (Methods 7A2, 7A3). B22 horizon. The Beltsville Soil Survey Laboratory reported abundant montmorillonite, a trace of mica, and 10 percent kaolinite. Carbonate was removed by Method 3A3 prior to examination.

SOIL CLASSIFICATION: Ustollic Haplargid; fine-loamy, mixed, thermic

SOIL Headquarters SOIL Nos. S60(65)NMex-7-18 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13229-13233; 20824, 20825

GENERAL METHODS: 1A1, 1B1a, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1													2A2 Coarse fragments		
		Total			Sand					Silt					Vol. 250-2	Wt. 76-2	3B1 19-2
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	<0.074			
Pct. of < 2 mm																	
Carbonate Removed a, b																	
0-8	A	46.3	27.7	26.0	0.5	2.5	6.0	16.3	21.0	12.5	15.2	44.3	25.3				
8-23	AB	49.6	13.6	36.8	3.0	6.1	6.1	20.4	14.0	5.5	8.1	33.0	35.6				
23-33	B2tca	49.4	14.5	36.1	3.0	6.1	5.2	20.7	14.4	5.7	8.8	33.0	35.0				
33-51	K21	59.0	12.1	28.9	2.9	6.5	6.5	24.7	18.4	6.9	5.2	40.4	40.6				
51-74	K22	64.3	12.2	23.5	13.1	12.2	4.3	19.2	15.5	6.2	6.0	33.9	48.8				
74-97	I1K3	77.7	9.3	13.0	23.0	11.5	7.2	23.2	12.8	4.5	4.8	31.8	64.9	28.0			
97-122	I1Cca	84.2	6.8	9.0	28.0	21.8	9.5	17.2	7.7	2.8	4.0	20.1	76.5	19.2			
Carbonate Not Removed b																	
0-8	A	42.5	34.7	22.8	1.4	3.8	3.7	13.8	19.8	11.6	23.1	40.3	22.7		1	1	1
8-23	AB	54.6	21.0	24.4	4.2	8.6	6.8	21.7	13.3	1.5	22.5	24.9	41.3		1	2	2
23-33	B2tca	37.1	22.8	40.1	3.2	4.5	4.0	14.7	10.7	5.8	17.0	25.3	26.4		1	2	2
33-51	K21	34.6	26.6	38.8	3.4	4.4	3.6	13.3	9.9	6.8	19.8	24.6	24.7		1	2	2
51-74	K22	42.1	26.1	31.8	7.2	5.8	3.8	14.5	10.8	18.3	7.8	37.9	31.3		15	19	19
74-97	I1K3	70.6	14.8	14.6	24.0	10.6	6.6	19.0	10.4	5.4	9.4	27.4	60.2	34.2	50	61	61
97-122	I1Cca	81.7	8.7	9.6	27.5	21.0	9.6	16.6	7.0	3.6	5.1	19.6	74.7	21.4	40	53	53

Depth (cm.)	6A1a Organic carbon C, h Pct.	6B1a Nitrogen c Pct.	C/N	6C1a Ext. Iron as Fe a Pct.	CEC NH ₄ OAc 5A1a me./100g.			Carbonate as CaCO ₃			Bulk Density		Water Content		Composition Whole Material d/			
					5A1a		3A1a		4A1c 30-cm.	4A1b Air-Dry	4B1c 30-cm.	4B2 15-Bar	NONCARBONATE				Carbonate as CaCO ₃ Pct.	
					>2mm. Pct.	<2mm. Pct.	>2mm. Pct.	<0.002mm. Pct.	g/cc	g/cc	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.		Pct.
0-8	1.17	0.111	11	0.9	18.1	1.53	9	4	1.41	1.41	14.2	8.2	2	1	40	25	23	9
8-23	0.48			0.9	15.8	13.3	9	3	1.47	1.52	14.2	8.2	2	2	52	16	20	9
23-33	0.52			1.0	20.7	13.6	22	14	1.35	1.42	21.1	8.2	2	2	38	11	27	22
33-51	0.41			1.1	15.2	9.1	37	21	1.61	1.60			1	1	36	7	18	37
51-74	0.13			0.8	12.8	7.2	35	32	1.71	1.78				13	35	6	13	33
74-97							56	25	1.61				4.9	28	23	3	4	44
97-122								42	13	1.51			3.9	31	34	3	4	28

- Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- Samples 13229, 13230 in contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
- Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis. Some of > 2 mm. allogenic carbonate dissolved in treatment of whole material to remove carbonate. This leads to a positive error in the carbonate percentage calculated for the < 2 mm. Error not applicable to 20824, 20825. On these samples carbonate determined directly on < 2 mm.
- Inclusive of coarse fragments, carbonate, and gypsum. Correction made for carbonate in > 2 mm.
- Determination on whole material by Method 6E1a or 6E1b and calculated as a percentage of the < 2 mm. by Method 1B4.
- Carbonate for whole material and < 2 mm. used to calculate carbonate in > 2 mm.
- Ec x 10³ mmhos/cm for 13233 is 0.40.
- 4.7 kg/m² to 74 cm (Method 6A).
- Assumed bulk densities for calculations.

Soil: Headquarters Soil Classification: Ustollic Haplargid; fine-loamy, mixed, thermic
 Soil Nos.. S60(65)NMex-7-18
 Location: NW 1/4 NW 1/4, Sec. 13, T21S, R2E, Dona Ana County, New Mexico.
 Geomorphic Surface: Jornada II. Elevation: 4,330 feet.
 Land Form: Coalescent fan piedmont sloping 1 percent west.
 Parent Material: Jornada II alluvium derived from limestone, calcareous sandstone and siltstone.

Vegetation: Relatively dense burro grass; many tarbush 1½ to 2 feet high and about 2 to 6 feet apart; some creosote-bush; scattered crucifixion thorn.

Collected by: 1960 - L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 20, 1960.
 1965 - L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, September 29, 1965.
 Described by: 1960 - L. H. Gile and F. F. Peterson; 1965 - L. H. Gile and R. B. Grossman.

Soil Surface. Soil surface covered with loose, tightly curled plates about 1 inch in diameter and 1/8 inch thick.

A 13229 0 to 8 cm. Light brownish-gray (7.5YR-10YR 6.5/2 dry) or brown (7.5YR-10YR 4/3 moist) loam; moderate fine platy; slightly hard; fine roots common; many small vesicles; discontinuous layers, 1 mm. thick, of reddish-brown fine sand between plates; effervesces strongly; abrupt boundary.

AB 13230 8 to 23 cm. Reddish-brown (5YR 4/4 dry, 3.5/4 moist) sandy clay loam; very weak coarse subangular blocky; slightly hard to hard; many roots; grayer near top and more reddish with depth; effervesces strongly; abrupt smooth boundary.

B2tca 13231 23 to 33 cm. Reddish-brown (5YR 5.5/4 dry, 4/4 moist) sandy clay loam; weak medium subangular blocky; slightly hard; many roots; many sand grains in reddish-brown part are coated with silicate clay; parts of the ped surfaces smooth; few pinkish-white carbonate nodules; few carbonate filaments; effervesces strongly; clear wavy boundary (see Remarks).

K21 (B3ca) 13232 33 to 51 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 and 4/4 moist) clay loam; weak medium subangular blocky; hard; few roots; about half of horizon fine white (7.5YR 8/1 dry) or pink (7.5YR 7/4 dry) carbonate nodules; effervesces strongly; clear wavy boundary.

K22 (Clca) 13233 51 to 74 cm. White (7.5YR 8/1 dry) or pinkish-gray (7.5YR 7/2 moist) with some light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) sandy clay loam; massive to weak medium subangular blocky; hard; very few roots; effervesces strongly; abrupt wavy boundary.

I1K3 (I1C2ca) 20824 74 to 97 cm. Pink (7.5YR 7/4 dry) or brown (7.5YR 5.5/4 moist) gravelly heavy sandy loam; interpebble fine earth is massive; hard; few roots; thin, continuous carbonate coatings on pebbles; effervesces strongly; clear wavy boundary.

I1Cca (I1C3ca) 20825 97 to 122 cm. Light yellowish-brown (10YR 6/4 dry) or yellowish-brown (10YR 5/4 moist) gravelly sandy loam; massive; soft; very few roots; most pebbles have thin discontinuous coatings, with some pebbles carbonate-free; effervesces strongly.

Remarks: Thin sections of the reddish-brown parts in the B2tca horizon show that while carbonate impregnation has obliterated the oriented coatings in places, that in scattered places at least 1 percent of the oriented coatings are present.

Clay Mineralogy (Methods 7A2, 7A3). B2tca horizon. The Beltsville Laboratory examined the clays. A moderate amount of poorly organized montmorillonite-vermiculite is present, as is also a trace of mica and 15 percent kaolinite.

SOIL CLASSIFICATION: Pachic Haplustoll; coarse-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Aladdin, calcareous variant

SOIL Nos. S60-NMex-7-19

LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska

LAB. Nos. 13234-13238

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											2A2 Coarse fragments b/					
		Total				Sand				Silt			Vol. - 2	Wt.				
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.02-0.002)	Int. I (2-0.1)						
Pct. of < 2 mm													76-2	19-2				
Carbonate Removed a/													76-2	19-2				
0-20	A11ca	67.3	22.4	10.3	20.9	15.3	6.2	12.4	12.5	14.4	8.0	33.3	54.8	28	28			
20-48	A12ca	76.5	16.1	7.4	37.4	22.3	2.9	6.3	7.6	8.7	7.4	19.8	68.9	38	36			
48-76	A13ca	71.3	19.8	8.9	29.9	18.2	4.4	9.2	9.6	11.0	8.8	25.6	61.7	33	30			
76-102	C1ca	74.8	16.7	8.5	32.1	19.3	5.0	9.5	8.9	9.8	6.9	23.5	65.9	33	30			
102-124	C2ca	72.2	17.1	10.7	26.4	17.9	4.8	11.5	11.6	9.4	7.7	27.4	60.6	49	32			
Carbonate Not Removed																		
0-20	A11ca	72.9	19.0	8.1	33.8	18.2	5.9	8.2	6.8	8.8	10.2	19.6	66.1					
20-48	A12ca	69.0	21.1	9.9	28.0	16.6	6.4	9.6	8.4	11.4	9.7	24.6	60.6					
48-76	A13ca	69.7	19.9	10.4	29.0	16.8	6.3	9.6	8.0	10.7	9.2	23.4	61.7					
76-102	C1ca	67.8	22.4	9.8	24.0	17.0	7.2	10.6	9.0	12.4	10.0	26.6	58.8					
102-124	C2ca	74.1	17.4	8.5	31.3	19.7	7.3	9.5	6.3	6.0	11.4	16.6	67.8					
Depth (cm.)	6A1a Organic carbon c/ f/ Pct.	6B1a Nitrogen c/ Pct.	C/N	Carbonate as CaCO ₃			Bulk density		4B5 Air-Dry g/cc	5A1a CEC NH ₄ OAc a/ mEq./ 100g.	Water content			Composition Whole Material e/ NONCARBONATE				Carbonate a/ CaCO ₃ Pct.
				>2mm. d/ Pct.	<2mm. Pct.	<0.002 mm. Pct.	g/cc	g/cc			Pct.	Pct.	Pct.	>2mm. Pct.	Sand Pct.	Silt Pct.	Clay Pct.	
0-20	0.84	0.074	11	50	7	1	1.4		10.3				16	44	14	7	19	
20-48	0.65	0.059	11	22	9	2	1.4	1.42	7.7				32	41	9	4	14	
48-76	0.67			28	10	3	1.4		8.7				26	41	12	5	16	
76-102	0.40			20	11	2	1.4		6.9				28	43	10	5	14	
102-124	0.30			20	12	2	1.4		8.1				43	29	7	5	16	

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ Treated by Method 1B3 to remove carbonate. Much of carbonate in form of limestone pebbles remained, but some dissolved.
- c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- d/ Carbonate for whole material and < 2 mm. used to calculate carbonate in > 2 mm.
- e/ Inclusive of coarse fragments, carbonate, and gypsum. Carbonate on whole material by Method 6E1b. Correction made for carbonate in > 2 mm. treated by Method 1B3.
- f/ 6.7 kg/m² to 102 cm (Method 6A). Assumed 25 percent by volume coarse fragments (inclusive of limestone).
- g/ Assumed bulk density of moist fine-earth fabric for calculations. Assumed 25 percent by volume coarse fragments.

60-19

Soil: Aladdin, calcareous variant Soil Classification: Pachic Haplustoll; coarse-loamy, mixed, thermic
 Soil Nos.: S60NMex-7-19
 Location: NE 1/4 NE 1/4, Sec. 13, T21S, R3E, cut bank on south side of the arroyo at the mouth of Lohman Canyon,
 Dona Ana County, New Mexico. Elevation: 5,200 feet. Geomorphic Surface: Organ.
 Land Form: Alluvial fan sloping 5 percent west.
 Parent Material: Organ fan alluvium, primarily derived from limestone and calcareous sandstone, with lesser amount
 of quartzite, shale and granite.
 Vegetation: A relatively dense stand of black grama grass (about 30 percent maximum coverage with 10 to 15 percent at
 site); about 30 percent of coverage by fluffgrass; scattered sand dropseed concentrated under creosote-
 bushes; few creosotebush, 2 to 8 feet apart and 1 to 6 feet high; scattered mesquite, snakeweed, Yucca
 elata, barrel cactus, prickly pear, sumac, and one ocotillo.
 Collected by: L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 21, 1960.
 Described by: L. H. Gile and F. F. Peterson.

Soil Surface. Desert pavement of fine pebbles; loose sand between pebbles.

A11ca 13234 0 to 20 cm. Dark grayish-brown (10YR 4/1.5 dry) and very dark grayish-brown (10YR 2.5/2 moist) fine
 gravelly sandy loam; weak medium and fine crumb; slightly hard; many fine roots; thin carbonate coatings on pebbles,
 mostly on undersides; few carbonate filaments; effervesces strongly; clear wavy boundary.

A12ca 13235 20 to 48 cm. Dark grayish-brown (10YR 4.5/2 dry) and very dark grayish-brown (10YR 3/2 moist) fine
 gravelly sandy loam; weak medium and fine crumb; slightly hard; many fine roots; carbonate filaments common; thin
 carbonate coatings on pebbles; effervesces strongly; gradual wavy boundary.

A13ca 13236 48 to 76 cm. Grayish-brown (10YR 5/2 dry) and very dark grayish-brown (10YR 3/2.5 moist) fine grav-
 elly sandy loam; massive breaking to weak fine crumb and single grain; soft; few roots; thin, discontinuous carbonate
 coatings on pebbles; few carbonate filaments; effervesces strongly; gradual wavy boundary.

C1ca 13237 76 to 102 cm. Brown (10YR 5/2.5 dry) and dark yellowish-brown (10YR 3/4 moist) fine gravelly sandy
 loam; massive breaking to very weak fine crumb and single grain; soft; few roots; thin, discontinuous carbonate
 coatings on pebbles; few carbonate filaments; effervesces strongly; clear wavy boundary.

C2ca 13238 102 to 124 cm. About 50 percent grayish-brown (10YR 5/2.5 dry) or dark yellowish-brown (10YR 3/4
 moist), fine gravelly loamy coarse sand; weak fine crumb; few roots; thin carbonate coatings on pebbles; few
 carbonate filaments; 50 percent pockets (2 to 6 inches wide) of light brown (7.5YR 5.5/4 dry) or brown (7.5YR 4.5/4
 moist) fine gravelly coarse sand; loose; few roots; pebbles thinly coated with carbonate; effervesces strongly.

Remarks: Scattered rock fragments, 3 to 6 inches in diameter, compose about 5 percent of the pedon sampled; at other
 sites reach 50 percent.

Clay Mineralogy, Methods 7A2, 7A3. A12ca horizon. Clay contains small amounts of mica and kaolinite, plus traces of
 vermiculite and montmorillonite. A small amount of calcite is present. A chlorite-like mineral (small amount) remains
 stable at 300° C., collapses partially at 500° C.

A13ca horizon (Beltsville). The clay contains a moderate amount of a poorly ordered montmorillonite-vermiculite, and
 small amounts of montmorillonite, mica, and kaolinite (10 percent kaolinite).

C2ca horizon. Clay contains a small to moderate amount of mica, small amount of kaolinite, trace to small amount of
 poorly ordered montmorillonite. A small amount of calcite is present. A chlorite-like mineral (small amount) remains
 stable at 300° C., collapses partially at 500° C.

Mineralogy (Method 7B1). The very fine (0.1-0.05 mm) and fine sand (0.1-0.25 mm) from the A13ca (13236) after
 carbonate removal were examined. The very fine sand contains 25 percent quartz, 45 percent feldspar, 15 percent
 microcrystalline aggregates, 5 percent opaques, and 2 percent ferromagnesian minerals (other than biotite) and one
 percent biotite. The fine sand contains 30 percent quartz, 40 percent feldspar, 15 percent microcrystalline aggre-
 gates, 8 percent biotite, 5 percent opaques and a trace of ferromagnesian minerals. The feldspar are mostly albite,
 orthoclase, and microcline with 10 percent relative plagioclase of intermediate calcium content in the very fine
 sand. The microcrystalline aggregates are mostly altered feldspar groundmass (sericitized). The biotite grains as
 viewed face-on show a wide range of interference color from virtually none to weak yellowish-brown. The measured
 mica percentages were reduced by 80 percent and the other components commensurately increased to make the area per-
 centages more nearly weight percentages.

SOIL CLASSIFICATION: Ustollic Paleorthid; loamy, mixed, thermic, shallow

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Conger SOIL Nos. S60-NMex-7-20 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13239-13245, 71L080

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1			2A2 Coarse fragments b/			
		Total			Sand					Silt			Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	Vol. -2 %	Wt. 76-2 %	3B1 19-2 %	
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	0.02-0.002	0.2-0.1							
Pct. of < 2 mm																			
						Carbonate Removed a/													
0-5	Aca	56.3	28.0	15.7	3.3	3.9	2.6	17.0	29.5	17.9	10.1	59.6	26.8				27	19	
5-13	B2ca	63.4	22.6	14.0	4.9	8.9	8.5	21.0	20.1	14.0	8.6	45.3	43.3				36	22	
13-23	K1	29.3	43.8	26.9	tr	0.1	0.7	8.5	20.0	20.9	22.9	47.5	9.3				-	-	
23-28	K21m	44.6	32.9	22.5	4.2	3.0	1.7	13.1	22.6	16.9	16.0	49.1	22.0				19	19	
28-46	K22m	42.7	32.3	25.0	3.7	2.9	2.1	13.0	21.0	16.8	15.5	46.6	21.7				18	18	
46-74	K31	41.2	33.6	25.2	4.8	3.1	1.5	11.9	19.9	16.6	17.0	44.9	21.3				46	28	
74-107	I1K32	47.0	36.0	17.0	11.2	7.2	2.3	11.1	15.2	15.1	20.9	37.5	31.8				61	53	
0-18	f/	60.1	28.6	11.3	7.5	9.3	5.6	15.6	22.1	19.0	9.6	51.7	38.0				43	36	

Depth (cm.)	6A1a Organic carbon a/ Pct.	6B1a Nitrogen a/ Pct.	C/N	6C1a Ext. Iron a/ as Fe Pct.	Carbonate as CaCO3		Bulk density			5A1a CEC NH4OAc a/ me./100g.	Water content			Composition Whole Material c/				Carbonate as CaCO3 Pct.
					>2mm. d/ Pct.	<2mm. Pct.	g/cc	g/cc	g/cc		NONCARBONATE			Carbo-				
											>2mm. Pct.	Sand Pct.	Silt Pct.		Clay Pct.	ate as CaCO3 Pct.		
0-5	0.54			0.8	5	17				13.1				26	31	16	9	18
5-13	0.79			1.1	8	26				12.8				34	19	7	4	36
13-23	0.88	0.104	8	1.1		44				21.8								44
23-28	0.55			1.3	2					18.2				19	9	7	5	60
28-46	0.35				3					18.2				18	8	6	5	65
46-74	0.20				8					15.3				44	6	4	4	42
74-107	0.22				23					11.4								44
0-18	0.61f																	

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ Contains some carbonate; see > 2 mm carbonate data.
- c/ Inclusive of coarse fragments, carbonate, and gypsum. Carbonate directly by Method 6E1a.
- d/ After carbonate removal by Method 1B3.
- e/ For 13239-13241, carbonate determined directly on < 2 mm. Computations from the whole-soil carbonate determination have not been made for 13242-13245 because some of the carbonate in the form of limestone pebbles was dissolved by Method 1B3.
- f/ Composite sample of shallow pits in an area of Upton soil 2.4 km northeast of S60NMex-60-20, in the NE 1/4 NW 1/4, Sec. 14, T21S, R3E. 1.1 kg/m² (Method 6A).

Soil: Conger Soil Classification: Ustollic Paleorthid; loamy, mixed, thermic, shallow.
 Soil Nos.: S60NMex-7-20
 Location: SW 1/4 NE 1/4, Sec. 22, T21S, R3E, about 1 mile west-southwest of Hardscrabble Hill at the south end of the San Andres Mountains, Dona Ana County, New Mexico; cut bank about 10 feet high on south side of an arroyo. Geomorphic Surface: Jornada (undifferentiated). Elevation: 4,825 feet.
 Land Form: Alluvial fan sloping 3 percent west.
 Parent Material: Jornada alluvium derived from limestone, calcareous sandstone, and a small amount of andesite.
 Vegetation: Creosotebush, mesquite, a few snakeweed and dead tarbush.
 Collected by: L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 21, 1960.
 Described by: R. B. Grossman and F. F. Peterson.

Soil Surface. Desert pavement of subrounded limestone and calcareous sandstone pebbles plus a few andesite pebbles, mainly less than 1 inch in diameter, cover 50 to 90 percent of the soil surface. Many pebbles have discontinuous, thick carbonate coatings.

Aca 13239 0 to 5 cm. Pinkish-gray (7.5YR 6/2 dry) or brown (7.5YR 4.5/2 moist) gravelly light sandy loam; weak very fine crumb; soft; few roots; material appears less gravelly than subjacent horizon; thin patchy carbonate coatings on pebbles; effervesces strongly; abrupt smooth boundary. Desert pavement included in sample. Offset from arroyo bank.

B2ca 13240 5 to 13 cm. Light brown (7.5YR 6/3 dry) or dark brown (7.5YR 4/4 moist) gravelly sandy loam; weak fine crumb; soft; few to many roots; pebbles have continuous carbonate coatings; effervesces strongly; clear irregular boundary with pockets extending to about 9-inch depth. Offset from arroyo bank.

K1 (C1ca) 13241 13 to 23 cm. A discontinuous zone of light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5.5/4 moist) and white (10YR 8/1 dry) or light gray (10YR 7/2 moist) moderately indurated nodules and nodular masses of somewhat indurated material occurs above and either in place of, or easily separable from, the Km; nodules $\frac{1}{2}$ to 2 inches in diameter and with very irregular and pitted surface relief and many smooth protuberances of rounded form; light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist) sandy loam, slightly hard, occurs between nodules; many fine roots; effervesces strongly; clear irregular boundary. Offset from arroyo bank.

Only carbonate nodules sampled from this horizon; the loamy material between the nodules discarded.

K21m (C2cam) 13242 23 to 28 cm. White (10YR 9/2 dry, 8/2 moist) carbonate-cemented material; massive and weak coarse platy; hard and very hard; brown, friable material occurs between plates and in fractures and contains all the roots in the horizon; laminar horizon formed by discontinuous pinkish-white (7.5YR 8/2 dry) laminae, $\frac{1}{8}$ inch thick, and difficult to score with a knife; effervesces strongly; abrupt smooth boundary.

K22m (C3cam) 13243 28 to 46 cm. White (10YR 8/1 dry) or very pale brown (10YR 7/3 moist) carbonate-cemented material; massive; hard and very hard; few coarse roots; pebbles have thick (2 to 3 mm.) strongly adhering rough-surfaced carbonate coatings; few pockets of light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist) nonindurated loam which is massive to weak fine granular in which roots are concentrated; some loamy pockets connect to A horizon; effervesces strongly; gradual wavy boundary.

K31 (C4ca) 13244 46 to 74 cm. Very pale brown (10YR 8/3 dry) or pale brown (10YR 6.5/3 moist) carbonate-cemented material; weak coarse subangular blocky; hard; very few coarse roots; many channels with linings and fillings of pale brown (10YR 6.5/3 dry) or brown (10YR 4.5/3 moist) loamy material, in which occurs scattered fine roots; thick hard carbonate coatings on pebbles; effervesces strongly; clear wavy boundary.

I1K32 (I1C5ca) 13245 74 to 107 cm. Gravel with white (10YR 8/1 dry) or very pale brown (10YR 7/3 moist) calcareous material between pebbles; interstitial material ranges from loose to weakly and moderately indurated; few roots; pebbles may be dug out with knife; thin carbonate coatings on pebbles; effervesces strongly.

Remarks: Upper three horizons sampled from pit located 15 feet north of arroyo bank, where soil is not beveled.

SOIL CLASSIFICATION: Ustollic Haplargid; fine, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Stellar, overflow phase

SOIL Nos. 560(65)RMex-7-2 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska

LAB. Nos. 13246-13251, 20826-20832

GENERAL METHODS: 1A1, 1B1a, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1b Fine Clay <0.0002	2A2 Coarse fragments			
		3A1												Vol. - 2	Wt. 76-2	3B1 19-2	
		Total		Sand					Silt								Clay
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (2-0.1)	<0.07				
Pct. of < 2 mm																	
Carbonate Removed a, b																	
0-8	A2	31.9	30.7	37.4	0.5	2.3	2.5	10.8	15.8	12.6	18.1	36.0	16.1		2.6		-
8-13	A3	31.8	23.6	44.6	0.4	3.6	2.4	11.5	13.9	8.6	15.0	30.1	17.9		10.1		-
13-25	B1t	32.1	21.3	46.6	0.1	1.6	2.7	12.5	15.2	9.3	12.0	32.5	16.9		14.0		tr
25-51	B21t	30.9	24.8	44.3	0.2	2.3	3.0	11.0	14.4	10.7	14.1	32.2	16.5		12.7		-
51-79	B22t	30.8	20.1	49.1	0.8	3.1	2.4	10.6	13.9	9.2	10.9	30.1	16.9		23.2		-
79-99	K1	36.2	16.0	47.8	0.8	4.2	3.4	13.6	14.2	8.9	7.1	32.0	22.0		24.5		tr
99-130	K21	58.8	12.1	29.1	2.0	8.8	7.7	25.2	15.1	6.9	5.2	38.3	43.7	48.7			tr
130-155	K22	64.1	4.2	24.7	2.2	8.4	8.7	28.8	16.0	6.9	4.3	41.3	48.1	43.3			tr
155-178	K23	65.6	11.4	23.0	2.5	8.0	8.2	29.3	17.6	7.2	4.2	44.1	48.0	42.5			tr
178-216	K24	68.3	10.8	20.9	2.4	9.2	9.3	29.7	17.7	6.3	4.5	43.8	50.6	39.6			tr
216-254	K3	69.6	10.9	19.5	3.3	9.7	9.9	30.9	15.8	5.5	5.4	41.4	53.8	37.4			3
254-284	C1ca	78.0	7.4	14.6	2.2	10.8	13.1	38.6	13.3	3.9	3.5	40.7	64.7	27.3			3
284-305	IIC2	87.0	4.0	9.0	1.3	12.3	17.1	44.9	11.4	1.9	2.1	40.4	75.6	16.8			tr

Depth (cm.)	Organic carbon C ₁ i	Nitrogen C	C/N	5A1a CEC NH ₄ OAc me/100g.	Carbonate as CaCO ₃		6C2a Ext. Iron as Fe Pct.	Bulk density 4Alc 30- cm. Dry f g/cc	4Alb Air- Dry f g/cc	4D1 COLE h/	Water content			Composition Whole Material d					
					6E1a CEC NH ₄ OAc me/100g.	3A1a Dry <0.002 mm. Pct.					6C2a Ext. Iron as Fe Pct.	4B1c 30- cm. Bar f Pct.	4B2 15- Bar f Pct.	4C1 WRD	NONCARBONATE			Carbonate as CaCO ₃	
															> 2mm	Sand	Silt		Clay
0-8	1.22	0.126	10	24.4	2	1.1	1.41												
8-13	0.65			25.2	tr	1.1	1.41												
13-25	0.57			24.0	tr	1.3	1.47	1.61	0.032	22.6	13.6								
25-51	0.40			22.4	3	1.0	1.53	1.67	0.028	20.8	13.4								
51-79	0.27			22.1	6	2	1.47	1.61	0.032	23.7	14.7								
79-99	0.17			23.4	24	14	1.51	1.61											
99-130				51			1.61				7.6								
130-155				46			1.75	1.83	0.014	13.8	7.3	0.11							
155-178				49			1.71				7.5								
178-216				36			1.62	1.69	0.015	15.3	7.8	0.12							
216-254				12			1.55	1.63	0.015	13.1	8.3	0.07	3						
254-284				0			1.51				6.1		3						
284-305				1			1.51				3.7		tr						

Depth (cm.)	Extractable bases				5B1a Sum	6B1a Ext. Acidity	5A1a CEC NH ₄ OAc	Water extract from saturated paste				6A1 CO ₃	HCO ₃	Cl	SO ₄	8A1a Electrical conductivity mmho/cm		
	602a		6P2a					6Q1a	6Q2a	6R1a	6R2a						6S1a	6S2a
	Ca	Mg	Na	K														
0-8		3.5	<0.1	2.7	<0.1	23.3		7.0	0.8	0.2	0.8					0.9		
8-13		4.1	<0.1	2.9	1.0	25.8		4.8	1.0	0.2	0.7					0.6		
13-25		4.7	<0.1	2.6	0.8	23.4		3.9	0.6	0.2	0.5					0.5		
25-51		5.5	<0.1	2.4	<0.1	20.7		3.1	0.8	0.2	0.5					0.4		
51-79		6.6	0.1	2.2	<0.1	20.8		2.8	1.1	0.4	0.4					0.5		
79-99		5.3	0.1	1.7	<0.1	16.3		2.8	1.1	0.5	0.5					0.5		
99-130		2.4	tr	0.6		8.7												
130-155		2.2	0.1	0.6		8.3												
155-178		1.5	0.1	0.4		5.6												
178-216		1.7	0.1	0.5		6.5												
216-254		2.4	0.1	0.6		10.7												
254-284		1.8	0.1	0.5		8.7												
284-305		1.3	0.2	0.4		6.6												

- a. Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b. < 2 mm. of samples 13246 and 20826-20832 in contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
- c. Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- d. Inclusive of coarse fragments, carbonate, and gypsum.
- e. Determination of whole material by Method 6E1a and 6E1c and calculated as a percentage of the < 2 mm.
- f. Method 4Alc (1/3-bar) and 4Alh (oven-dry) for 20826-20832.
- g. Determined on sample containing carbonate and computed to a carbonate-free basis assuming the carbonate as diluent.
- h. An experiment was conducted 100 m. south of this pedon on a similar soil to compare the rise in land surface elevation on wetting to the cumulative linear extensibility as computed from the charge in natural-clod bulk densities. Four metal plates were placed on the top of the B horizon at 15 cm. depth in an area 3 m. square. A concrete benchmark was emplaced nearby, away from the area wetted. Water was applied to the 3 m. square area; it was then covered with a plastic sheet and left for two weeks. At the end of this time, the average increase in elevation was 1.0 cm. with a range from 0.6 to 1.2 cm. A trench was then dug across the wetted area. Clods were removed from four 13-cm. zones down to a depth of 66 cm., which encompassed the depth of wetting. Bulk density of the clods at the field-state moisture and at air dryness was determined. COLE was computed. From the COLE values, a cumulative linear extensibility of 0.7 cm. was calculated for the zone from 15 to 66 cm.
- i. 6.0 kg/m² to 99 cm (Method 6A).
- j. Assumed for calculations.

Soil: Stellar, overflow phase Soil Classification: Ustollic Haplargid; fine, mixed, thermic
 Soil Nos.: S60(65)NMex-7-21
 Location: NW 1/4 Sec. 22, T21S, R2E; about 0.8 mile east of main Jornada Experimental Range gate, Dona Ana County,
 Geomorphic Surface: Jornada I. Elevation: 4,300 feet. N. M.
 Land Form: Floor of Jornada del Muerto Basin, slightly above Isaacks' Lake Playa; nearly level with slight slope to
 south.
 Parent Material: Jornada I basin fill with probable thin surface increment of younger sediments, derived mainly
 from monzonite, rhyolite, andesite, and latite.
 Vegetation: Tobosa grass (75 to 100 percent coverage); snakeweed, 2 to 10 feet apart; scattered mesquite.
 Collected by: 1960 - L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 22, 1960.
 1965 - L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, September 29, 1965.
 Described by: 1960 - L. H. Gile and F. F. Peterson; 1965 - L. H. Gile and R. B. Grossman.

Soil Surface. Covered with a layer of curled plates except in tobosa bunches. The layer is 1/4 to 1/2 inch thick and is composed of plates 1 to 2 mm. thick; individual stacks of plates are 1 to 2 cm. across; tops of the plates have a thin, black algal crust.

A2 13246 0 to 8 cm. Pinkish-gray (7.5YR 6/3 dry) or dark brown (7.5YR 4/3 moist) clay loam; moderate medium subangular, blocky; slightly hard and hard; slightly sticky; numerous roots; weak to moderate effervescence, abrupt smooth boundary.

A3 13247 8 to 13 cm. Reddish-brown (5YR 4.5/3 dry) or dark reddish-brown (5YR 3.5/4 moist) clay; moderate medium subangular blocky; firm, hard; many roots; sand grains slightly stained; ped surfaces have slight smoothness; noncalcareous; abrupt smooth boundary.

B1t 13248 13 to 25 cm. Reddish-brown (5YR 4.5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) clay; weak medium prismatic breaking to moderate medium subangular blocky; firm, hard; many fine and medium roots; ped surfaces slightly darker colored than interiors but have little smoothness; pores have slightly reflective linings; non-calcareous; clear boundary. (See remarks)

B2lt 13249 25 to 51 cm. Reddish-brown (5YR 5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) clay; weak medium prismatic breaking to moderate medium angular and subangular blocky; firm, hard; many to few roots; ped surfaces somewhat reflective and smooth in places, but apparently no coatings; some root channels have thin clay linings; very few carbonate nodules less than 1 mm. in diameter; weak to moderate effervescence; clear smooth boundary.

B22t 13250 51 to 79 cm. Reddish-brown (2.5YR-5YR 5/4 dry) or dark red (2.5YR 3/6 moist) clay; weak medium prismatic breaking to moderate medium to fine subangular blocky; few roots; ped surfaces smooth and reflective; few light reddish-brown (5YR 6/4 moist) or pink (5YR 7.5/3 dry) fine carbonate nodules, some of which have indurated centers; effervesces strongly; clear smooth boundary. (See remarks)

K1 (B3ca) 13251 79 to 99 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) heavy silty clay loam; weak moderate medium subangular blocky and fine angular blocky; firm, hard; very few roots; ped surface alteration ranges from parts apparently coated to smooth reflective parts; pink (5YR 7/3 dry) or light reddish-brown (5YR 6/4 moist), fine, nonindurated, subangular blocky carbonate nodules common; effervesces strongly; clear smooth boundary.

K21 (C1ca) 20826 99 to 130 cm. Dominantly light brown (5YR-7.5YR 6.5/4 dry) or light reddish-brown (5YR 6/5 moist) clay loam; moderate coarse to medium platy; friable; few roots; surfaces of many plates are stained yellowish-red (5YR 5/6 moist) and reddish-yellow (5YR 6/8 moist); effervesces strongly; clear boundary.

K22 (C2ca) 20827 130 to 155 cm. Dominantly pink (7.5YR 7.5/4 moist) or light brown (7.5YR 6/4 dry) with lesser amounts white (7.5YR 9/2 dry) or pink (7.5YR 7/4 moist) clay loam; generally weak to moderate coarse and medium platy, with few parts weak medium subangular blocky; most plates are very hard and a few are strongly indurated; laterally there are zones of common strongly indurated plates that are relatively loose in the horizon; very few roots, some of which have channels up to 1/8-inch diameter and are lined with low-carbonate fines; effervesces strongly; clear wavy boundary.

K23 (C3ca) 20828 155 to 178 cm. About equal amounts of light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) heavy clay loam in an intricate pattern with common fine and medium white (7.5YR 9/1 dry, 8/2 moist) carbonate nodules; weak medium subangular blocky; hard and very hard; some nodules strongly indurated; a few fine tubular pores with yellowish-red linings; clear wavy boundary.

K24 (C4ca) 20829 178 to 216 cm. Dominantly white (10YR 9/2 dry) or very pale brown (10YR 8/3 moist) with few parts brown (7.5YR 5.5/4 moist) clay loam; weak medium subangular blocky, with few cylindroids; very hard; few fine pebbles; effervesces strongly; clear wavy boundary.

K3 (C5ca) 20830 216 to 254 cm. Light brown (7.5YR 6.5/4 moist) or brown (7.5YR 5.5/4 dry) sandy clay loam; weak medium subangular blocky; hard; very few fine roots; few fine pebbles; few to common carbonate nodules; effervesces strongly; clear wavy boundary.

C1ca (C6ca) 20831 254 to 284 cm. Light reddish-brown (6YR 6/4 dry) or reddish-brown (6YR 4.5/4 moist) heavy fine sandy loam; weak medium subangular blocky; slightly hard; few carbonate nodules and few fine pebbles; effervesces strongly; clear wavy boundary.

IIC2 (C7) 20832 284 to 305 cm. Yellowish-brown (10YR 5/4 dry) or dark yellowish-brown (10YR 4/4 moist) sand; massive; soft; no roots; a few mud balls, not sampled; scattered fine pebbles of mixed lithology; noncalcareous.

Remarks: Thin sections of the B1t and the B22t show that there are no clay skins on ped surfaces, and that there is abundant oriented clay within the peds, both as oriented coatings on sand grains and as linear bodies.

Micromorphology, Method 4Elb. The B22t was examined in thin section. The matrix is continuous and the skeletal grains are widely separated. Large voids are mostly linear. Zones of clay that show preferred orientation are associated with some of the larger planar voids, but coatings of oriented clay are absent. Most sand grains are partly to wholly surrounded by a zone of clay showing weak preferred orientation. The clay in the matrix between sand grains shows variable preferred orientation from place to place. Quartz and feldspar predominate. Ferromagnesian grains of minerals are scarce; pyroxene and amphibole are the principal minerals. Opaque or nearly opaque grains and masses are fairly common; mostly the discrete bodies are less than 10 microns across. Some are elongate. A relatively few skeletal grains have patchy, relatively thick coatings of oriented clay; these coatings may be inherited. Fragments of fine grain volcanic rocks are present, some of which contain laths of intermediate to high calcium plagioclase. Parts of the periphery of some of these rock fragments appear quite weathered or possibly infiltrated by reddish-brown material. The discrete ferromagnesian grains range from fresh to somewhat weathered.

Clay Mineralogy, Method 7A2. B2lt, K22 horizons. The clay from the B2lt contains a moderate amount of mica (or illite) and a small amount of kaolinite, both well ordered, plus a small amount of a very poorly ordered montmorillonite mineral and a trace of calcite. The clay mineralogy is mixed. The clay from the K22 contains a small amount of mica and a small amount of kaolinite and trace amounts of chlorite and montmorillonite. Additional 2:1 layer silicates are present, most likely an interlayer mineral involving the mica and chlorite. The mica and chlorite are fairly well ordered. No indication of sepiolite. The clay mineralogy is mixed.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Bucklebar SOIL Nos. S60(65)NMex-7-22 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13253-13260, 20833-20834

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)													3A1			2A2 Coarse fragments i/		
		Total			Sand					Silt					3Alb Fine Clay <0.002	Vol. 250-2	Wt. 3B1			
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	<0.074			76-2	19-2		
Pct. of < 2 mm																				
		Carbonate Removed a/																		
0-13	C	82.2	9.0	8.8	3.5	7.9	7.8	34.0	29.0	7.6	1.4	58.8	53.2		2.5	5	9	9		
13-25	A2	73.3	13.8	12.9	2.4	11.9	9.4	27.8	21.8	8.4	5.4	46.7	51.5		3.9	1	1	1		
25-43	B21t	63.0	12.6	24.4	7.3	12.2	7.2	20.0	16.3	6.6	6.0	34.4	46.7		9.7	4	7	7		
43-66	B22t	60.4	15.6	24.0	8.9	11.4	7.1	17.7	15.3	8.4	7.2	34.0	45.1		8.8	3	6	6		
66-79	B23tca	58.8	16.5	24.7	7.8	9.4	5.2	18.2	18.2	10.0	6.5	39.3	40.6		11.7	3	6	6		
79-102	IB21tca	52.1	12.0	35.9	7.7	8.2	5.8	16.8	13.6	7.3	4.7	30.6	38.5		20.5	4	7	7		
102-124	IB22tca	51.4	12.8	35.8	10.6	11.4	4.1	13.3	12.0	7.1	5.7	26.7	39.4		20.0	2	4	4		
124-142	IIK2b	61.1	13.9	25.0	13.8	13.4	5.3	15.6	13.0	6.7	7.2	28.3	48.1		11.9	4	8	8		
142-163	IIK31b	79.1	6.9	14.0	13.8	17.2	11.7	22.9	13.5	4.9	2.0	31.6	65.6	27.6	10	14	14	14		
163-178	IIK32b	80.4	7.1	12.5	17.4	16.3	10.4	23.0	13.3	3.8	3.3	30.7	67.1	25.8	10	16	16	16		
		Carbonate Not Removed																		
79-102	IB21tca	52.8	12.7	34.5	9.6	8.8	5.9	16.0	12.5	5.5	7.2	26.9	40.3							
102-124	IB22tca	47.1	17.8	35.1	8.0	10.7	5.6	12.8	10.0	6.2	11.6	23.2	37.1							
124-142	IIK2b	51.5	21.4	27.1	10.8	11.3	6.0	13.3	10.1	9.1	12.3	26.3	41.4							
Depth (cm.)	6A1a Organic carbon b/ d/ Pct.	Nitrogen Pct.	5A1a CEC NH ₄ OAc s/ me./ 100g.	6C2a Ext. Iron s/as Fe Pct.	Carbonate as CaCO ₃		Bulk density			Water content			Composition Whole Material c/							
					6E1a 6E1b 6E1c <2mm. Pct.	3A1a <0.002 mm. Pct.	g/cc	g/cc	g/cc	4A1b Air-Dry g/cc	NONCARBONATE			Carbonate as CaCO ₃						
							Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.				
0-13	0.12		6.1		2		1.3						9	73	8	8	2			
13-25	0.18		8.1		tr		1.6						1	72	14	13	tr			
25-43	0.24		13.6		tr		1.5		1.61				7	59	12	22	tr			
43-66	0.21		13.0	0.9	tr		1.5		1.61				6	56	15	23	tr			
66-79	0.18		13.5		1		1.6						6	55	15	23	1			
79-102	0.22		19.8	1.0	4	tr	1.6		1.69				7	46	11	32	4			
102-124	0.14		21.6		16	6	1.6		1.66				3	41	11	29	16			
124-142	0.08		16.3		21	9	1.6		1.67				6	45	10	19	20			
142-163					8		1.6						13	63	6	11	7			
163-178					13		1.6						14	61	5	10	10			

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- c/ Inclusive of coarse fragments, carbonate, and gypsum.
- d/ 3.0 kg/m² to 102 cm (Method 6A).
- e/ Assumed bulk densities of moist fine-earth fabric for calculations.
- f/ Volume on carbonate-containing basis and weight on carbonate-free basis.

60-22

Soil: Bucklebar Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic
 Soil Nos.: S60(65)NMex-7-22
 Location: NW 1/4 Sec. 31, T21S, R2E; north side of east-west gully following old road between Organ and Dona Ana; Dona Ana County, New Mexico.
 Geomorphic Surface: Organ. Land Form: Coalescent fan piedmont sloping 1 percent to west.
 Parent Material: Monzonitic alluvium (see Remarks). Elevation: 4,400 feet
 Vegetation: Patches of black grama and tobosa; scattered Yucca elata, Mormon tea, snakeweed and creosotebush.

Collected by: 1960 - L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, April 22, 1960.

1965 - L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, September 29, 1965.

Described by: 1960 - L. H. Gile and F. F. Peterson; 1965 - L. H. Gile and R. B. Grossman.

C 13253 0 to 13 cm. Reddish-brown (5YR 5/5 dry, 3.5/5 moist) loamy sand; weak to moderate thin to medium platy; slightly hard; some roots; few lenses of coarse sand and fine gravel; effervesces weakly to strongly; abrupt smooth boundary.

A2 13254 13 to 25 cm. Reddish-brown (5YR-7.5YR 5/4 dry) or dark reddish-brown (5YR-7.5YR 2.5/4 moist) fine sandy loam; massive breaking to weak very fine granular; slightly hard; few roots; sand grains have fines adhering; noncalcareous; abrupt smooth boundary.

B21t 13255 25 to 43 cm. Reddish-brown (5YR-2.5YR 4.5/4 dry) or dark reddish-brown (5YR-2.5YR 3/4 moist) sandy clay loam; very weak medium subangular blocky; hard; few roots; sand grains partially reddish-stained; some discontinuous smoothness of ped faces; noncalcareous; clear smooth boundary.

B22t 13256 43 to 66 cm. Reddish-brown (5YR 5/4 dry) or dark reddish-brown (5YR-2.5YR 3/4 moist) sandy clay loam; weak medium subangular blocky; hard; very few roots; sand grains stained reddish with possible clay coatings; noncalcareous; clear smooth boundary.

B23tca 13257 66 to 79 cm. Reddish-brown (5YR 5/4 dry) or dark reddish-brown (5YR 3.5/5 moist) sandy clay loam; massive breaking out as weak coarse subangular blocky; hard; very few roots; a line of 1/2 to 1 inch monzonite pebbles is visible along gully face at boundary to underlying horizon; many fine (less than 1 mm.) pores, with many of the noncapillary-size pores lined with carbonate filaments; possible patchy clay films on walls of larger noncapillary-size pores; effervesces strongly and weakly; abrupt to clear boundary.

IIB21tcab 13258 79 to 102 cm. Red (2.5YR 5/5 dry) or dark red (2.5YR 3/6 moist) sandy clay; weak medium prismatic and moderate medium subangular blocky; very few roots; ped surfaces smooth and reflective; discontinuous clay films on sand grains; few fine carbonate nodules; common carbonate filaments; effervesces weakly to strongly; clear boundary.

IIB22tcab 13259 102 to 124 cm. Dominantly reddish-brown (5YR 5/5 dry) or yellowish-red (5YR 4/6 moist) sandy clay loam with some red (2.5YR 4/6); weak medium to fine subangular blocky; hard and very hard; no roots; many pink (5YR 8/3 dry) or light reddish-brown (5YR 6/3 moist) indurated carbonate cylindroids about 1/2-inch diameter, covering about 30 percent of face; effervesces strongly; clear smooth boundary.

IIB2b (IIC1cab) 13260 124 to 142 cm. Reddish-brown (5YR 5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) sandy clay loam; weak medium subangular; hard; no roots; many fine vesicles; carbonate occurs throughout peds with about 50 to 70 percent of a freshly cut surface whitish in color from carbonate accumulations; ped surfaces are generally carbonate rich with pinkish-white (7.5YR 8/2 dry) or light brown (7.5YR 6/4 moist) colors; some poorly defined carbonate cylindroids; effervesces strongly; clear wavy boundary.

IIB31b (IIC2cab) 20833 142 to 163 cm. Dominantly pink (7.5YR 7/4 dry) or light brown (7.5YR 5.5/4 moist) with 20 to 30 percent pinkish-white (7.5YR 8/2 dry) or pink (7.5YR 7/4 moist) coarse sandy loam; hard; very few fine roots; few fine tubular pores; effervesces strongly; clear wavy boundary.

IIB32b (IIC3cab) 20834 163 to 178 cm. About equal amounts of the above two colors and a third, light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) coarse sandy loam; hard and slightly hard; very few fine roots; few fine tubular pores; effervesces strongly.

Remarks: Materials in the upper 13 cm are probably the result of sedimentation in historic time. Materials from 13 cm to 79 cm are designated Organ alluvium. Underlying deposits are associated with a buried Jornada II surface.

SOIL CLASSIFICATION: Ustollic Haplargid; loamy-skeletal, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Caralampi SOIL Nos. S60-NMex-7-23 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 13261-13262

GENERAL METHODS: 1A1, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)												3A1			2A2 Coarse fragments c/		
		Total				Sand					Silt			Int. II (2-0.1)	Vol.	Wt.	3B1		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. III (0.02-0.002)	Int. II (0.2-0.02)	250-2					76-2	19-2
Pct. of < 2 mm																			
		Carbonate Removed a/																	
0-13	A	61.9	25.9	12.2	11.0	7.2	4.0	16.6	23.1	15.7	10.2	49.6	38.8		55	70	54		
13-28	B1t	56.8	23.6	19.6	11.8	7.6	3.3	13.6	20.5	15.4	8.4	44.7	36.3		65	72	57		
Depth (cm.)	6A1a Organic carbon a/ e/ Pct.	Nitrogen a/ Pct.	C/N	5A1a CEC NH ₄ OAc a/ me./ 100g.	Carbonate as CaCO ₃ 6E2a <2mm. Pct.	Bulk density d/			Water content			Composition Whole Material b/							
						<0.002 mm. Pct.	g/cc	g/cc	g/cc	Pct.	Pct.	Pct.	NONCARBONATE				Carbonate as CaCO ₃ Pct.		
													> 2mm. Pct.	Sand Pct.	Silt Pct.	Clay Pct.			
0-13	0.91	0.066	14	9.2	tr (s)		1.3												
13-28	0.98	0.089	11	12.2	tr (s)		1.3								69	19	8	4	tr
															71	16	7	6	tr

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ Inclusive of < 76 mm, carbonate, and gypsum.
- c/ No > 250 mm and at most a small percentage > 76 mm.
- d/ Assumed bulk density for moist fine-earth fabric.
- e/ 1.6 kg/m² to 28 cm (Method 6A).

60-23

Soil: Caralampi

Soil Classification: Ustollic Haplargid; loamy-skeletal, mixed, thermic

Soil Nos.: S60NMex-7-23

Location: NE 1/4 SW 1/4, Sec. 13, T23S, R3E, in Soledad Canyon about 500 yards northeast and about 100 feet higher than S60NMex-7-12, Dona Ana County, New Mexico. Geomorphic Surface: Jornada I.

Land Form: Alluvial fan sloping 8 percent to the west. Pit in the center of a rounded, elongate remnant of an old, dissected alluvial fan with 1 to 2 percent transverse longitudinal slopes. No apparent rills or drainage ways within 30 feet. Elevation: About 5,700 feet.

Parent Material: Jornada I fan alluvium derived from rhyolite.

Vegetation: Snakeweed dominant, occurring 2 to 5 feet apart; black grama spaced 4 to 10 inches apart and grazed heavily; scattered juniper; Yucca baccata; and Lippia Wrightii (4 inches high) 1 to 4 feet apart.

Collected by: R. B. Grossman and F. F. Peterson, April 23, 1960.

Described by: F. F. Peterson and R. B. Grossman.

Soil Surface. About 90 percent covered with fine angular rhyolite gravel and with common, angular rhyolite cobbles 6 to 12 inches in diameter.A 13261 0 to 13 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/2 moist) very gravelly sandy loam; massive breaking to weak very fine granular; friable, slightly hard; many fine roots; noncalcareous; clear irregular boundary.B1t 13262 13 to 28 cm. Reddish-brown (5YR 4/4 dry) or dark reddish-brown (5YR 3/4 moist) very gravelly loam; weak medium subangular blocky breaking to moderate very fine granular; friable, slightly hard; many fine roots; slightly sticky; noncalcareous; clear wavy boundary to B2t horizon.

Remarks: These two horizons were sampled for comparison of organic carbon and nitrogen to nearby soils in Soledad Canyon on the Organ geomorphic surface (S60NMex-7-12) and on the Jornada I geomorphic surface (S59NMex-7-14).

SOIL CLASSIFICATION: Typic Calciorthid; coarse-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Algerita, partially indurated variant SOIL Nos. S61NMex-7-1 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14925-14935, 71L085

GENERAL METHODS: 1A, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1			2A2 Coarse fragments ¹		
		Total			Sand					Silt			3B1	Vol. 250-2	Wt. 76-2	3B1 19-2		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)					(2-0.1)	
Pct. of < 2 mm														%<250	%<76	%<19		
Carbonate Removed ^{a, b}																		
8-13	A	79.5	10.2	10.3	0.9	17.8	17.5	27.7	15.6	7.5	2.7	37.8	63.9		2	2	2	
13-20	B1	79.4	8.8	11.8	1.3	27.0	17.7	21.6	11.8	5.6	3.2	28.4	67.6		-	-	-	
20-33	B21	81.7	9.1	9.2	1.3	20.1	16.6	25.6	18.1	6.9	2.2	38.7	63.6		1	1	1	
33-46	B22ca	76.0	12.6	11.4	3.4	18.9	13.0	22.1	18.6	9.1	3.5	39.9	57.4		4	8	8	
46-69	K1	60.6	23.3	16.1	3.7	12.8	9.3	18.6	16.2	18.2	5.1	45.0	44.4		-	-	-	
69-81	K21	65.8	14.2	20.0	2.2	10.2	8.9	23.9	20.6	9.4	4.8	44.5	45.2		-	-	-	
81-112	K22	62.3	13.9	23.8	3.1	11.6	9.8	21.6	16.2	8.5	5.4	37.5	46.1		-	-	-	
112-132	K31	58.4	22.3	19.3	1.7	13.1	10.0	18.5	15.1	13.6	8.7	39.0	43.3		-	-	-	
132-145	K32	59.6	19.4	21.0	1.2	13.6	10.3	19.3	15.2	12.1	7.3	38.1	44.4		-	-	-	
145-173	K33	55.3	16.0	28.7	2.7	11.1	9.3	19.2	13.0	8.4	7.6	33.1	42.3		-	-	-	
173-196	K34	28.2	43.2	28.6	2.9	6.2	3.0	7.6	8.5	17.5	25.7	30.1	19.7		-	-	-	
69-81	F/	64.7	13.9	21.4	tr	3.7	10.8	29.7	20.5	8.6	5.3	46.7	44.2		-	-	-	
Depth (cm.)	6A1a Organic carbon C, %	6B1a Nitrogen %	C/N	6C1a Ext. Iron as Fe Pct.	Carbonate as CaCO ₃ Pct.	5A1a CEC as NH ₄ OAc me./100g.	Bulk density			Water content			Composition Whole Material ^{a/}					
							h		4A1b Air-Dry g/cc	4B2		NONCARBONATE				Carbonate as CaCO ₃ Pct.		
							g/cc	g/cc	g/cc	Pct.	Pct.	Pct.	>2mm. Pct.	Sand Pct.	Silt Pct.		Clay Pct.	
8-13	0.27	0.026	10		6	7.4		1.3			4.3	2	74	9	6			
13-20	0.34	0.027	13		7	7.6		1.5	1.50		5.5	-	74	8	11	7		
20-33	0.36	0.034	10		7	7.2		1.5	1.48		4.9	1	76	8	8	7		
33-46	0.27	0.027	10	0.6	13	8.8		1.4	1.42		7.4	7	61	11	9	12		
46-69	0.30	0.021	14		41	13.9		1.5			8.2	-	36	14	9	41		
69-81	0.22	0.016	14	0.6	56	13.8		1.6			-	-	29	6	9	56		
81-112	0.14	0.010	14		69	12.0		1.6	1.59		8.0	-	20	4	7	69		
112-132					43	12.7		1.6	1.56		12.8	-	33	13	11	43		
132-145					45	16.7		1.6			12.8	-	33	10	12	45		
145-173					32			1.6			-	-	34	10	17	32		
173-196					29	26.9		1.6			-	-	12	19	12	29		
69-81	0.11	0.029	16	0.7	78	12.8		1.6	2.18		-	-	14	3	5	78		
Depth (cm.)	Extractable bases				5B1a 6Q2a	Cat. Exch. Cap.		Water extract from saturated paste										
	6O2a		6P2a			5A2a NaOAc	5A1a NH ₄ OAc	6A1				8A1						
	Ca	Mg	Na	K		Ca	Mg	Na	K	CO ₃	HCO ₃	Cl	SO ₄	8A1a Electrical conductivity mmho/cm				
8-13		1.3	tr	0.7		8.1	7.2									0.45		
13-20		0.9	tr	0.4		8.7	7.3									0.49		
20-33		1.0	0.2	0.3		8.7	7.0									0.38		
33-46		1.7	0.4	0.3		9.9	9.2			2.0	0.1					0.44		
46-69		1.9	0.2	0.3		10.8	9.0			1.1	0.1					0.68		
69-81		1.6	0.2	0.2		6.5	4.7			2.6	0.1					1.71		
81-112		2.6	1.1	0.1		5.0	3.8			17.8	0.2		1.0	27.3	14.6	4.50		
112-132		6.1	2.6	0.3		11.7	10.6			31.0	0.4		1.5	33.7	51.2	7.2		
132-145		6.2	2.6	0.3		10.8	10.9			30.0	0.4		1.3	34.2	50.8	7.3		
145-173																		
173-196						18.4	-			31.8	0.6		1.0	39.7	49.9	7.7		
69-81																		
Depth (cm.)	8A1 Water at Saturation Pct.	5D1 Exchangeable Na Pct.	6F1a Gypsum Pct.															
	Pct.	Pct.	Pct.	Pct.														
8-13																		
13-20																		
20-33																		
33-46	26	4		tr														
46-69	33	1		tr														
69-81	29	2		tr														
81-112	38	8		tr														
112-132	51	9		1														
132-145	49	10		tr														
145-173				6														
173-196	67			30														
69-81																		

- a. Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b. < 2 mm. in contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation. Explanation
- c. Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- d. Inclusive of coarse fragments, carbonate, and gypsum.
- e. Determination on whole material by Method 6E1a and 6E1c and calculated as a percentage of the < 2 mm. by Method 1B4.
- f. Larger, better expressed plates from K21.
- g. 3.8 kg/m² 8 to 112 cm (Method 6A).
- h. Assumed bulk density of moist fine-earth fabric for calculations
- i. Volume on carbonate-containing basis and weight on carbonate-free basis.

61-1

Soil: Algerita, partially indurated variant Soil Classification: Typic Calciorthid; coarse-loamy, mixed, thermic
 Soil Nos.: S61NMex-7-1
 Location: SW 1/4 NW 1/4, Sec. 3, T21S, R2E, 1/2 mile east of Jornada road and 1 1/2 miles southeast of South Well,
Dona Ana County, New Mexico. Geomorphic Surface: Jornada and La Mesa. Elevation: 4,310 feet.
 Parent Material: Upper Camp Rice basin fill, sand and a few rounded pebbles of mixed composition.
 Land Form: Very slight ridge of the nearly level basin floor.
 Vegetation: Snakeweed, tarbush, scattered tobosa grass bunches, scattered burro grass, a few Mormon tea and
Yucca elata.
 Collected by: F. J. Carlisle, L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, May 1, 1961.
 Described by: L. H. Gile, R. B. Grossman, and F. F. Peterson.

Soil Surface. About 50 to 75 percent of soil surface covered with 2 to 3 inches of eolian medium and fine sand in 3- to 6-foot wide patches which are barren except for annual plants. The slightly depressional areas between sand patches are thinly crusted and have scattered pebbles of indurated K-fabric on the surface.

C 0 to 8 cm. Loose eolian sand, not sampled.

A 14925 8 to 13 cm. Light brown (7.5YR 6/3 dry) or brown (7.5YR 4/4 moist) sandy loam with a light brownish-gray (10YR 6/2 dry) or dark grayish-brown (7.5YR to 10YR 4/2 moist) fragile, 3 to 8 mm. thick surficial crust; very weak coarse platy breaking to single grain and very weak very fine crumb; very slightly hard, friable; few fine roots; effervesces strongly; abrupt smooth boundary. (Sampled from offset 15 yards north.)

B1 14926 13 to 20 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) heavy sandy loam; massive; slightly hard, friable; few weak carbonate filaments, roots common; many filled and some open termite burrows; effervesces strongly; clear wavy boundary.

B21 14927 20 to 33 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) light sandy clay loam; very weak medium and fine subangular blocky; slightly hard, friable; surfaces of very weak peds somewhat grayish and lightly powdered with carbonate; few roots; common filled and open termite burrows commonly 1- to 2-mm. diameter, some 2 to 3 cm. wide by 2 to 3 mm. high; effervesces strongly; clear wavy boundary.

B22ca 14928 33 to 46 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) sandy clay loam; weak medium and fine subangular blocky; hard; few roots; common filled and open termite burrows; some thin carbonate flakes and thin coatings on fine gravel and sand grains; effervesces strongly; clear wavy boundary.

K1 (B3ca) 14929 46 to 69 cm. About 80 percent by volume of white (7.5YR 8/0 dry) or pink (7.5YR 8/3 moist) very hard to extremely hard carbonate nodules, 0.5 to 2.0 cm. diameter, with interstices filled with light brown (7.5YR 6/3 dry) or brown (7.5YR 5/4 moist) sandy clay loam; nodules mostly very strongly indurated, a few nonindurated; fines adhere to nodules and also break out as very weak fine subangular blocky "peds," "ped" shape largely controlled by nodules; common roots; many to some termite burrows; horizon ranges from 2 to 8 inches in thickness with tongues extending to 40-inch depth; effervesces strongly; abrupt irregular boundary.

K21 (C1ca) 14930, 14935 69 to 81 cm. White (10YR 8/2 dry) or pale brown (10YR 6/3 moist) very strongly indurated plates of carbonate-cemented material 1 to 4 inches thick (commonly 2 inches) and 4 to 8 inches long; surfaces of plates highly irregular pustulose; deep pits and irregular channels through plates; plates occur stacked 2 to 3 in a group to singly; stacked plates free of each other; plates occur at lateral intervals of 2 to 12 inches from each other; internally plates of variegated white (10YR 8/0 dry, 8/2 moist) and very pale brown (10YR 8/3 dry, 6/3 moist) material in 2 to 4 mm. wide blebs and of scattered pale yellow (2.5Y 7/3 dry, 7/4 moist) 1 to 3 mm. wide blebs of denser, vitreous-appearing material; between plates are tongues and lenses of nodular K1 material; a few medium roots between plates; effervesces strongly; abrupt irregular to discontinuous boundary.

K22 (C2ca) 14931 81 to 112 cm. White (7.5YR 8/1 dry) or pinkish-gray (7.5YR 7/3 moist) clay loam; massive; hard and very hard; very few roots; effervesces strongly; clear wavy boundary.

K31 (C3ca) 14932 112 to 132 cm. Pinkish-gray (7.5YR 7/2 dry) or light brown (7.5YR 6/4 moist) clay loam; massive; with about 50 percent by volume, of white (10YR 8/0, dry and moist) nonindurated, irregularly shaped, 1 to 3-mm diameter, clay loam, carbonate-cemented nodules; very few roots; common fine pores; effervesces strongly; clear wavy boundary.

K32 (C4ca) 14933 132 to 145 cm. Pink (7.5YR 7/3 dry) or light brown (7.5YR 5.5/4 moist) clay loam; massive; hard; very few roots; carbonate nodules common; effervesces weakly to strongly; clear wavy boundary.

K33 (C5ca) 711085 145 to 173 cm. Dominantly pink (7.5YR 7/4 dry) or brown (7.5YR 5.5/4 dry) with lesser amounts of white (10YR 9/1 dry, 10YR 8/1 moist); clay loam; massive; slightly hard and hard; no roots; common carbonate nodules; a few gypsum crystals, most about 1-2 mm diameter but a very few about 1 cm thick and up to 3 cm across; effervesces strongly; clear wavy boundary.

K34 (C6ca) 14934 173 to 196 cm. Dominantly pink (7.5YR 7/4 dry) or brown (7.5YR 5.5/4 moist) clay loam; massive; hard; no roots; pockets and discontinuous lenses of gypsum, 5 to 20 cm in diameter, occur in parts of the horizon, increasing with depth and occurring nearly continuously just below this horizon; some gypsum crystals occur singly and others as clusters a few cm in diameter; a few carbonate nodules; fine earth effervesces strongly.

Remarks: The topsides of the carbonate nodules in the K1 are somewhat pitted and have adhering light brown fines; the bottoms of the nodules are white with coatings of sugary to flaky carbonate. Indurated plates in the K21 horizon can be readily removed with fingers or knife. Since cementation is not continuous, the K21 horizon is not petrocalcic.

Mineralogy. The sands from the particle size analyses contained abundant whitish nodules that appear similar to those in the middle of the K of pedon S61NMex-7-7. It was thought, based on the work on pedon S61NMex-7-7 (Vanden Heuvel, R. C., Clays and Clay Minerals, 13th Conf. 1964, pp. 193-207, Pergamon Press, New York) that sepiolite-attapulgite might be present. Samples were sent to Vanden Heuvel, Beltsville Soil Survey Laboratory. He wrote: "I have not been able as yet to identify the cementing material in the abundant aggregates in these samples. Montmorillonite is the major crystalline component and sample 14933 (K31) contains fluorite both in the clay and in the coarser separates. The clay extracted from sample 14933 (buffer treated) is pink and that from 14934 (K32) is white, corresponding to the color of the aggregates. Total analysis of both clays shows no major difference in composition. Both are high in Mg O (14.4, 12.6 percent). Extraction in 0.5N NaOH yields only about 3 percent SiO₂ in both cases."

SOIL CLASSIFICATION: Typic Calciorthid; coarse-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Algerita SOIL Nos. S51RMex-7-2 LOCATION Dona Ana County, New Mexico
SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14936-14946 August, 1967
General Methods: 1A, 1E1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1											Coarse fragments 2A2				
		Total			Sand					Silt			Vol. %	Wt. %			
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)		(2-0.1)	2	76-2	19-2
Pct. of < 2 mm																	
Carbonate Removed a/ b/																	
8-13	A	73.7	10.4	15.9	2.7	19.2	14.3	24.7	12.8	5.8	4.6	31.2	60.9			2	2
13-28	K1ca	76.6	10.9	12.5	4.0	18.8	13.5	25.5	14.8	7.7	3.2	35.7	61.8			2	2
28-38	K2ca	70.4	13.6	16.0	5.5	19.7	12.9	20.8	11.5	7.9	5.7	29.7	58.9			2	2
38-56	K1	73.5	10.8	15.7	3.8	15.0	13.1	26.3	15.3	7.5	3.3	35.8	58.2			3	3
56-76	K21 g/	82.3	7.7	10.0	7.0	22.8	13.8	26.1	12.6	3.6	4.1	29.1	69.7			4	4
76-112	K22	79.5	13.1	7.4	3.6	14.1	14.5	30.3	17.0	9.9	3.2	42.3	62.5			2	2
112-124	K23cs	74.6	11.1	14.3	2.8	12.9	13.2	29.6	16.1	7.2	3.9	39.1	58.5			-	-
124-142	K3cs	77.0	11.0	12.0	3.5	13.4	13.7	30.5	15.9	7.2	3.8	39.5	61.1			-	-
142-165	G1cs	80.0	9.8	10.2	3.7	16.0	15.3	30.5	14.5	6.4	3.4	36.0	65.5			-	-
165-185	G2cs	81.5	8.4	10.1	3.3	11.9	13.8	37.1	15.4	5.7	2.7	41.0	66.1			-	-
38-56	f	76.0	8.8	15.2	1.8	14.2	14.2	29.8	16.0	5.4	3.4	37.0	60.0			-	-
Depth (cm.)	Organic carbon	Nitrogen	C/N	Ext. Iron as Fe Pct.	Carbonate as CaCO ₃ e/ Pct.	Bulk density			Water content			COMPOSITION WHOLE MATERIAL d/					
						g/cc	g/cc	g/cc	4B2	4B2	4B2	NONCARBONATE			Carbonate as CaCO ₃		
8-13	0.57				8	13.0		1.4			7.4	2	67	9	14	8	
13-28	0.36			0.6	9	11.6		1.5	1.52		6.1	2	68	10	11	9	
28-38	0.35				10	11.9		1.4	1.46			2	62	12	14	10	
38-56	0.26				25	11.5		1.3	1.33		8.0	2	54	8	12	24	
56-76	0.12				34g	8.0		1.7	1.76			3	53	5	6	33	
76-112					37	10.8		1.8	1.82		6.8	1	48	6	8	37	
112-124					31	7.3		1.7					38	6	7	31	
124-142					11	8.7		1.6	1.63				42	6	7	11	
142-165					8	7.8		1.6					57	7	7	8	
165-185					6	6.8		1.6					53	6	7	6	
38-56					36	13.3							48	6	10	36	
Depth (cm.)	Extractable bases 5E1a				Cat. Borch. Cap.		Water extract from saturated paste 8A1										
	Ca	Mg	Na	K	5A2a Na OAc	5A1a NH ₄ OAc	Ca	Mg	Na	K	CO ₃	HCO ₃	Cl	SO ₄	Electrical conductivity		
8-13																	
13-28																	
28-38		1.4	0.1	0.4			10.5	9.6			0.3	0.1			0.46		
38-56		2.3	0.1	0.3			10.2	9.1			0.5	0.1			0.49		
56-76		2.5	0.4	0.2			8.4	7.4			2.7	0.1			0.68		
76-112		2.0	1.3	0.2			7.5	7.0			15.5	0.1			2.48		
112-124		16.7	1.8	0.1			7.3	6.9			27.2	0.2	0.8	6.4	53.1		
124-142		17.1	1.4	0.2			6.8	5.8			23.5	0.3	0.5	6.4	51.8		
142-165		17.7	1.5	0.2			7.2	6.3			26.4	0.4	0.5	6.7	58.7		
165-185		3.6	1.8	0.2			9.3	5.9			35.0	0.5	0.8	5.7	69.2		
38-56															6.5		
Depth (cm.)	8A1	5M1	6F1a														
	Water at Saturation	Exchangeable Na	Gypsum														
8-13																	
13-28																	
28-38	26																
38-56	32																
56-76	31	4															
76-112	32	11															
112-124	44	8		18													
124-142	43	6		34													
142-165	37	7		21													
165-185	38	7		28													
38-56	38	5		28													

a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
 b/ < 2 mm. in contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
 c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
 d/ Inclusive of coarse fragments, carbonate, and gypsum.
 e/ Determination on whole material by Method 6E1a and 6E1c and calculated as a percentage of the < 2 mm. by Method 1B4.
 f/ Carbonate nodules from the K1 (LSL 14946).
 g/ Without carbonate removal, the sample analyses 28 percent total clay and 16 percent carbonate clay (Method 3A1a).
 h/ 2.7 kg/m² 8 to 76 cm (Method 6A).
 i/ Assumed bulk density of moist fine-earth fabric for calculations.

Soil: Algerita
 Soil Classification: Typic Calciorthid; coarse-loamy, mixed, thermic
 Pedon No.: S61NMex-7-2
 Location: The SE 1/4 SE 1/4, Sec. 28, T20S, R2E, about 0.5 mile east of South Well, just south of road, Dona Ana
 Geomorphic Surface: Jornada and La Mesa Elevation: 4,310 feet. County, N. M.
 Land Form: Very slight ridge on the nearly level basin floor.
 Parent Material: Upper Camp Rice basin fill, sand and a few rounded pebbles of mixed composition.

Vegetation: Snakeweed, *Yucca elata*, burro grass, tarbush, and mesquite.

Collected by: F. J. Carlisle, L. H. Gile, R. B. Grossman, J. L. Millet, F. F. Peterson, May 2, 1961.

Described by: L. H. Gile, R. B. Grossman, and F. F. Peterson.

C 0 to 8 cm. Loose eolian sand, not sampled.

A 14936 8 to 13 cm. Pinkish-gray (7.5YR 7/2, dry) or brown (7.5YR 4.5/4, moist) sandy loam; weak coarse platy; slightly hard; scattered lenses and blebs of reddish-brown sandy material; few roots; microscopic powdery carbonate; coarse sand grains fairly clean; many termite burrows; effervesces strongly; abrupt smooth boundary.

B1ca 14937 13 to 28 cm. Light reddish-brown (6YR 6/4, dry) or reddish-brown (6YR 4.5/4, moist) sandy loam; massive; slightly hard; few roots; many termite burrows; few carbonate filaments; effervesces strongly; clear wavy boundary.

B2ca 14938 28 to 38 cm. Light reddish-brown (6YR 6/4, dry) or reddish-brown (6YR 4.5/4, moist) sandy clay loam; weak medium and fine subangular blocky; ped surfaces smooth, but not coated-appearing; slightly hard and hard; few roots; few to common carbonate filaments; thin carbonate coatings on fine gravel and coarse sand grains; many termite burrows (2-3 mm. diameter) with smooth linings; effervesces strongly; smooth clear boundary.

K1 (B3ca) 14939 38 to 56 cm. About 40 to 60 percent by volume of white (7.5YR 8/1, dry) or pink (7.5YR 7/4, moist) nonindurated, hard, irregularly shaped, 0.5 to 1.0 cm. diameter carbonate-cemented nodules; remainder light brown (7.5YR 6.5/4, dry) or brown (7.5YR 5/4, moist) clay loam; structure largely nodular-controlled; internodular material mainly massive, some weak subangular blocky; common termite burrows and fillings (material in burrows 10YR 4/2, dry), generally few roots, with fine roots common in some burrow fillings; some reddish-brown (5YR to 2.5YR) blebs associated with fine root channels; effervesces strongly; clear smooth boundary. Carbonate nodules analyzed under LSL 14946.

K21 (C1ca) 14940 56 to 76 cm. White (7.5YR 8/0 to 8/2, dry) or light brown (7.5YR 8/2 to 6/4, moist) clay loam; weak medium and coarse subangular blocky, with structure generally controlled by carbonate-cemented cylindroids; very hard; a few roots; about 10 percent light brown (7.5YR 6/4, dry) or brown (7.5YR 5/4, moist) with some blebs and cylindroidal fillings of reddish-brown (5YR 5/4, dry); a few insect burrows and fillings; effervesces strongly; clear wavy boundary.

K22 (C2ca) 14941 76 to 112 cm. Dominantly pinkish-white (7.5YR 8/2, dry) or pink (7.5YR 7/3, moist) clay loam; weak medium and coarse subangular blocky, with structure generally controlled by carbonate-cemented cylindroids; hard and very hard; very few roots; cylindroids range from white (7.5YR 9/2, dry) to reddish-brown (5YR 5/4 to 5/6, dry); few insect burrows; some empty and some filled with dark material; effervesces strongly; clear wavy boundary.

K23cs (C3ca-cs) 14942 112 to 124 cm. White (10YR 8/2, dry) or very pale brown (10YR 7/3, moist) sandy clay loam; massive; hard; very few roots; a few faintly outlined white cylindroids; a few cylindroids of reddish-brown (5YR 5/4, dry); common small gypsum crystals; a few insect burrows filled with dark material; effervesces strongly; clear wavy boundary.

K3cs (C4ca-cs) 14943 124 to 142 cm. Pinkish-white (7.5YR 8/2, dry) or light brown (7.5YR 6/4, moist) sandy clay loam; massive; hard; very few roots; common small gypsum crystals; very few insect burrows; effervesces strongly; clear wavy boundary.

C1cs (C5cs) 14944 142 to 165 cm. Light brown (7.5YR 6.5/4, dry) or brown (7.5YR 5/4, moist) light sandy clay loam; massive; firm; very few roots; very few insect burrows; common small gypsum crystals; effervesces strongly; clear wavy boundary.

C2cs (C6cs) 14945 165 to 185 cm. Light brown (7.5YR 6.5/4, dry) or brown (7.5YR 5/4, moist) sandy loam; massive; firm; very few roots; very few fine pebbles; very few insect burrows; common small gypsum crystals; effervesces weakly.

SOIL CLASSIFICATION: Ustollic Haplargid; fine, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Stellar SOIL Nos. S61(65)Mex-7-3 LOCATION Dona Ana County, New Mexico
SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14947-14955, 20837-20838 August, 1967
General Methods: 1A, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1b Fine Clay 0.0002	Coarse fragment 2A2			
		3A1												Wt. 3B1			
		Total		Sand					Silt					Clay		76-2	19-2
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)				
Pct. of < 2 mm																	
Carbonate Removed a/, b/																	
0-8	A2	29.0	38.6	32.4	0.9	3.6	3.2	9.5	11.8	10.4	28.2	28.0	17.2	3.8	1	1	
8-18	B21t	33.6	25.2	41.2	1.0	4.1	4.2	12.8	11.5	4.8	20.4	23.9	22.1	9.6	1	1	
18-36	B22t	27.4	28.3	44.3	1.4	3.3	2.9	9.0	10.8	8.7	19.6	25.1	16.6	17.1	1	1	
36-48	B23t	24.8	29.6	45.6	1.1	2.7	2.3	7.9	10.8	10.9	18.7	26.7	14.0	21.3	1	1	
48-58	B24tca	23.8	28.9	47.3	0.9	2.7	2.3	7.7	10.2	10.1	18.8	25.2	13.6	22.0	1	1	
58-71	K1	29.0	18.1	52.9	2.0	3.7	3.0	9.2	11.1	7.8	10.3	24.6	17.9	34.5	1	1	
71-94	K21	44.6	19.4	36.0	3.4	5.8	4.3	14.4	16.7	9.7	9.7	35.5	27.9	15.9	1	1	
94-124	K22	47.2	20.0	32.8	5.0	7.2	5.0	15.1	14.9	11.6	8.4	35.7	32.3	16.2	1	1	
124-150	K23	46.8	18.2	35.0	0.6	5.3	5.0	17.7	18.2	9.5	8.7	39.0	28.6	22.1	1	1	
150-198	K3	48.1	16.1	35.8	1.1	4.1	5.1	19.3	18.5	7.6	8.5	38.7	29.6	21.9	tr	tr	
198-221	Bca?	33.3	27.3	39.4	0.6	3.6	3.7	11.8	13.6	13.0	14.3	34.1	19.7	20.9	tr	tr	
Carbonate Not Removed b/																	
0-8	A2	29.7	40.5	29.8	1.0	3.8	3.4	9.6	11.9	10.3	30.2	27.8	17.8				
8-18	B21t	35.5	24.5	40.0	1.6	4.7	4.2	13.2	11.8	5.5	19.0	25.2	23.7				
18-36	B22t	27.4	27.7	44.9	1.3	3.1	2.8	9.2	11.0	8.5	19.2	25.2	16.4				
36-48	B23t	24.6	31.4	44.0	1.3	2.5	2.4	7.7	10.7	11.1	20.3	26.7	13.9				
48-58	B24tca	22.1	25.6	52.3	1.6	3.0	2.2	6.7	8.6	7.6	18.0	20.3	13.5				
58-71	K1	21.4	26.2	52.4	1.5	3.0	2.2	6.8	7.9	6.2	20.0	18.2	13.5				
71-94	K21	27.1	32.6	40.3	2.6	3.9	2.6	8.3	9.7	7.2	25.4	22.1	17.4				
94-124	K22	39.9	26.3	33.8	5.4	6.0	4.1	12.0	12.4	8.5	17.8	28.1	27.5				
124-150	K23	34.5	31.8	33.7	5.5	5.9	3.9	10.0	9.2	6.3	25.5	21.3	25.3				
Depth (cm.)	Organic carbon C/h/ Pct.	Nitrogen Pct.	C/N	6C1a Ext. Iron as Fe a/ Pct.	6E1b 6E1c Carbon- ate as CaCO ₃ Pct.	5A1a CEC meq/100g. Pct.	Bulk density			Water content			COMPOSITION WHOLE MATERIAL d/				
							4A1c 30-cm. g/cc	4A1b Air- Dry g/cc		4B3 30-cm. Pct.	4B2 15- Bar Pct.	4C1 33-to- 15-Bar Pct.	NONCARBONATE			Carbon- ate as CaCO ₃ Pct.	
													Sand	Silt	Clay		
0-8	1.78			1.1	0.9	27.4	1.41	1.62		19.3	11.5	0.12	1	29	38	31	1
8-18	0.68				0.1	22.4	1.48	1.62		24.0	13.7	0.15	1	33	25	41	tr
18-36	0.54				0.1	21.7	1.49	1.70		24.0	13.7	0.15	1	27	28	44	tr
36-48	0.46				3	22.0	1.52	1.74		24.3	13.2	0.17	1	23	29	44	3
48-58	0.21			1.0	7	26.4	1.41	1.60		25.8	16.5	0.13	1	22	27	43	7
58-71	0.26				37	27.4	1.41	1.45					1	18	11	33	37
71-94	0.10				42	19.8	1.51	1.56					1	26	11	21	41
94-124					38	18.8	1.51						1	29	12	20	38
124-150					68	19.6	1.54	1.57					tr	15	6	11	68
150-198					49		1.52	1.64		16.4	9.5	0.11	tr	25	8	18	49
198-221					21		1.38	1.53		23.7	14.0	0.13	tr	26	22	31	21
Depth (cm.)	Extractable bases				5E1a	Cat. Exch. Cap.			Water extract from saturated paste					8A1a Electrical conductivity mmho/cm			
	Ca	Mg	Na	K		5A2a NaOAc	5A1a NH ₄ OAc	Ca	Mg	Na	K	CO ₃	HCO ₃		Cl	SO ₄	
	meq/100 g								meq/liter								
0-8																	
8-18		3.8	tr	2.7				23.1									
18-36		4.3	tr	2.6				22.1									
36-48																	
48-58		6.5	0.2	3.0				25.0	23.9		0.3	0.6					0.35
58-71																	
71-94		4.4	0.2	1.5				15.7	11.1		0.9	0.8					0.60
94-124								12.6	11.4		1.2	0.7					0.64
124-150								7.1	5.8		1.4	0.6					0.60
150-198																	
198-221																	
Depth (cm.)	8A Water at Saturation Pct.	a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated. b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation. Not oven dried; weight obtained on a duplicate sample. c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis. d/ Inclusive of coarse fragments, carbonate, and gypsum. Carbonate measured directly by Methods 6E1b and 6E1c. e/ 1/3-bar (Method 4A1d). f/ 1/3-bar (Method 4B1). g/ 30-cm in place of 1/3-bar moisture. h/ 6.4 kg/m ² to 94 cm (Method 6A). i/ Estimated for calculation purposes.															
0-8																	
8-18																	
18-36																	
36-48																	
48-58	52																
58-71																	
71-94	36																
94-124	33																
124-150																	
150-198																	
198-221																	

Soil: Stellar Soil Classification: Ustollic Haplargid; fine, mixed, thermic
 Soil Nos.: S61(65)NMex-7-3
 Location: SE 1/4 SW 1/4, Sec. 4, T21S, R2E; 400 feet west of Jornada road, Dona Ana County, New Mexico.
 Land Form: Transition from toe of piedmont slope to floor of Jornada del Muerto Basin; one-half percent slope to east.
 Parent Material: Jornada I basin-fill alluvium; derived mainly from monzonite, andesite, rhyolite and latite.

Vegetation: Strips of tobosa grass alternating with barren strips and discontinuous strips of burro grass; strips generally occur at right angles to slope; scattered snakeweed and *Yucca elata* mainly in the tobosa strips. Soil sampled in tobosa grass. Geomorphic Surface: Jornada I. Elevation: 4,320 feet.

Collected by: F. J. Carlisle, L. H. Gile, R. B. Grossman, and J. L. Millet, May 3, 1961. L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, September 29, 1965.

Described by: L. H. Gile, F. J. Carlisle, and R. B. Grossman in 1961; L. H. Gile and R. B. Grossman in 1965.

Soil Surface: Between tobosa clumps the surface is cracked into polygons ranging from 3 to 7 cm in diameter.
 A2 14947 0 to 8 cm. Pinkish gray (7.5YR 6/2.5 dry) or dark brown (7.5YR 4/3 moist) clay loam; desiccation cracks 1/4 to 1/8 inch wide at the surface becoming narrower with depth and forming 3- to 4-inch diameter prisms; prisms are moderate medium platy in upper part grading to weak coarse platy in lower part; slightly hard and brittle, friable; many roots; common vesicles less than 1-mm. diameter; a few tubular insect burrows approximately 2-mm. diameter; effervesces weakly; abrupt smooth boundary.

B21t 14948 8 to 18 cm. Reddish-brown (5YR 5/3.5 dry, 3.5/4 moist) clay; weak medium subangular blocky; slightly hard but distinctly harder than A2; many roots; sand grains coated with silicate clay; faintly reflective surfaces, 1 to 2 mm. wide, on ped surfaces and in some tubular pores; few tubular insect burrows 2 mm. in diameter; uppermost inch is light reddish-brown (5YR 6/3.5 dry, 3/3.5 moist), with moderate medium subangular blocky structure; noncalcareous; clear wavy boundary.

B22t 14949 18 to 36 cm. Reddish-brown (5YR 4/4.5 dry) or dark reddish-brown (5YR 3/4.5 moist) clay; moderate medium prismatic breaking to weak medium and coarse subangular blocky; very hard; many roots; sand grains coated with silicate clay; reflective surfaces as in B21t; few tubular insect burrows 1 to 2-mm. diameter; noncalcareous; clear wavy boundary.

B23t 14950 36 to 48 cm. Reddish-brown (5YR 5/5 dry, 4/4.5 moist) clay; moderate medium prismatic breaking to weak medium subangular blocky; very hard; a few roots; sand grains coated with silicate clay; reflective surfaces, 2- to 3-mm. wide, on peds; a very few fine (less than 1 mm.) carbonate nodules; effervesces weakly; clear wavy boundary.

B24tca 14951 48 to 58 cm. Reddish-brown (5YR 5/4 dry, 4/4.5 moist) clay with small blebs of slightly redder hue; moderate medium prismatic breaking to weak medium subangular blocky; very hard; few roots; sand grains coated with silicate clay; reflective surfaces as in B23t; few pink (7.5YR 8/3 dry, 6/4 moist) carbonate nodules mainly less than 2-mm. diameter; effervesces strongly; clear wavy boundary.

K1 (B25ca) 14952 58 to 71 cm. About 30 to 40 percent pinkish-white (7.5YR 8/2 dry) or pink (7.5YR 7/4 moist) carbonate nodules, 30 to 40 percent light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 4/4 moist) clay loam, and 20 to 30 percent light brown (7.5YR 6/4 dry) or brown (7.5YR 4/4 moist) clay loam; weak medium and fine subangular blocky; slightly hard to hard (a few carbonate nodules are very hard); few roots; effervesces strongly; clear wavy boundary.

K21 (C1ca) 14953 71 to 94 cm. About 40 percent by volume of pink (7.5YR 8/4 dry) or light brown (7.5YR 6/4 moist) carbonate nodules; about 60 percent of light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5.5/4 moist) clay loam matrix; matrix very weak fine subangular blocky and angular blocky; carbonate nodules hard; very few roots; effervesces strongly; clear wavy boundary.

K22 (C2ca) 14954 94 to 124 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist) sandy clay loam; massive; hard to very hard; very few roots; common very strongly indurated carbonate nodules less than 1- to 1/2-inch diameter; nodules have hard surface laminae less than 1 mm. thick, and pinkish-white (7.5YR 8/2 dry, 7/4 moist) exteriors; a few fine tubular pores; at one end of the sample pit there are very strongly indurated plates of carbonate-cemented material about 2 to 3 cm thick and 5 to 10 cm wide; effervesces strongly; abrupt boundary.

K23 (C3ca) 14955 124 to 150 cm. Pinkish-white (7.5YR 8/2 dry) or pink (7.5YR 7.5/4 moist) sandy clay loam; massive; hard; no roots; a few fine strongly indurated carbonate nodules; common fine tubular pores; effervesces strongly; clear wavy boundary.

K3 (C4ca) 20837 150 to 198 cm. About equal parts of pink (7.5YR 7/3 dry) or pinkish-gray (7.5YR 6/3 moist) and white (higher value than 7.5YR 8/2 dry) or pinkish-white (7.5YR 8/2 moist) clay loam; weak medium subangular blocky, with some nodular forms; firm; no roots; very few very fine tubular pores, some empty and some with dark linings; effervesces strongly; clear wavy boundary.

Bbca(?) 20838 198 to 221 cm. Dominantly reddish-brown (6YR 5.5/4 dry, 4/4 moist) with few carbonate nodules that are pinkish-white (5YR 8/2 dry) or pinkish-gray (5YR 7/2 moist); weak medium subangular blocky; firm; no roots; reflective surfaces on some peds; few fine tubular pores; effervesces weakly to strongly.

Remarks: In the K22 horizon at one end of the sample pit there are very strongly indurated plates of carbonate-cemented material about 2 to 3 cm. thick and 5 to 10 cm. wide.

Mineralogy (Method 7A2). The B21t and B23t horizons (8-18, 36-48 cm) contain small to moderate amounts of mica, small amounts of kaolinite and small amounts of a poorly ordered smectite-like mineral that contains considerable interlayering. Clay mineralogy and family mineralogy are mixed.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Dona Ana SOIL Nos. S61NMex-7-4 LOCATION Dona Ana County, New Mexico
SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14956-14964
GENERAL METHODS: 1A, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1											2A2 Coarse fragments $\frac{g}{g}$				
		Total			Sand					Silt			Vol. 250-2	Wt. 76-2	3B1 19-2		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)				(2-0.1)	
Pct. of < 2 mm														%K250	%K76	%K19	
Carbonate Removed a/, b/																	
0-5	A2	70.4	12.7	16.9	7.0	13.2	6.5	23.2	20.5	7.0	5.7	42.3	49.9	5	12	12	
5-15	B2ltca	65.2	13.0	21.8	6.8	11.7	5.9	21.8	19.0	6.4	6.6	39.3	46.2	5	15	15	
15-33	B2tca	43.9	21.9	34.2	5.2	8.2	3.9	13.7	12.9	11.6	10.3	33.1	31.0	10	20	20	
33-51	IIK1	49.6	15.3	35.1	20.8	6.9	2.9	8.8	10.2	8.9	6.4	24.7	39.4	35	63	63	
51-81	IIK21	73.7	11.1	15.2	22.3	22.8	4.4	13.0	11.2	7.5	3.6	26.8	62.5	35	63	63	
81-97	IIK22	72.0	18.6	9.4	28.6	14.9	3.6	12.7	12.2	15.5	3.1	36.1	59.8	40	66	66	
97-107	IIIB1ca	63.8	18.1	18.1	7.5	9.1	5.7	20.2	21.3	12.4	5.7	47.3	42.5	5	13	13	
107-119	IIIB2ca	52.1	17.7	30.2	4.7	7.3	4.6	16.5	19.0	12.1	5.6	42.1	33.1	3	7	7	
119-142	IIIK2b	51.9	17.7	30.4	5.8	6.7	4.1	16.3	19.0	11.1	6.6	41.3	32.9	4	10	10	
Depth (cm.)	6A1a	6E1a	C/N	6C1a	Carbonate as CaCO ₃ e/	5A1a	Bulk density g/cc	4A1c	5A1b	Water content Pct.	4B1c	4B2	Composition Whole Material d/				Carbonate as CaCO ₃ Pct.
	Organic carbon c/, f/ Pct.	Nitrogen c/ Pct.		Ext. Iron a/as Fe Pct.		CEC NH ₄ OAc a/ me./ 100g.		30-cm. g/cc	Air-Dry g/cc		30-cm. Pct.	15-Bar Pct.	NONCARBONATE				
													>2mm. Pct.	Sand Pct.	Silt Pct.	Clay Pct.	
0-5	0.31	0.024	13		0.7	12.0	1.4h					7.9	12	61	11	15	1
5-15	0.45	0.042	10		3.4	15.3	1.4h	1.50					14	54	11	18	3
15-33	0.58	0.051	11	0.9	13	23.0	1.30	1.41			25.0		18	32	15	24	11
33-51	0.51	0.038	13		37	24.0	1.4h						53	15	4	10	18
51-81	0.16				37	11.9	1.4h	1.42					52	22	3	5	18
81-97	0.08				29	9.3	1.5h						58	23	3	4	12
97-107	0.22				11	14.0	1.5h						12	50	14	14	10
107-119	0.16			0.9	21	19.7	1.5h						6	39	13	22	20
119-142	0.12				44	20.2	1.6h						6	27	10	16	41
Depth (cm.)	Extractable bases 5H1a				8A H ₂ O at Sat.	Cat. Exch. Cap.		Water extract from saturated paste 8A1						8A1a Electrical conductivity mmho/cm			
	Ca	Mg	Na	K		5A2a NaOAc	5A1a NH ₄ OAc	Ca	Mg	Na	K	CO ₃	HCO ₃		Cl	SO ₄	
	meq/100 g							meq/liter									
0-5	1.7			1.0		13.9	12.0										0.52
5-15	1.3			1.0		16.0	14.5										0.34
15-33	3.5	0.1		1.1	43	21.4	20.6			0.5	0.3						0.54
33-51	3.7			1.5		18.5	20.9										0.89
51-81	2.9	0.3		0.5	30	14.3	10.3			2.6	0.3						1.50
81-97	3.2	0.3		0.4		9.4	8.7										0.78
97-107	4.8	0.4		0.5		12.7	12.2										0.71
107-119	6.4	0.6		0.7	40	20.5	16.0			2.5	0.1						0.74
119-142	5.1	0.5		0.5	39	12.9	11.9			2.9	0.2						0.89

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation. Sample not oven dried; weight obtained on a duplicate.
- c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- d/ Inclusive of coarse fragments, carbonate, and gypsum.
- e/ Determination on whole material by Methods 6E1b and 6E1c and calculated as a percentage of the < 2 mm.
- f/ 3.4 kg/m² to 97 cm (Method 6A).
- g/ Volume on carbonate-containing basis, and weight on carbonate-free basis.
- h/ Estimated for calculations.

Soil: Dona Ana Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic
 Soil Nos.: S61NMex-7-4
 Location: NE 1/4 NE 1/4, Sec. 8, T21S, R2E, 250 feet west of pipeline, Dona Ana County, New Mexico.
 Land Form: Coalescent fan piedmont sloping about 1 percent to east.
 Geomorphic Surface: Jornada II. Elevation: 4,340 feet.
 Parent Material: Alluvial fan sediments from monzonite, rhyolite, andesite, latite (see Remarks).
 Vegetation: Tarbush, desert thorn, few Mormon tea; a very few scattered clumps of tobosa grass.
 Collected by: R. B. Grossman, J. L. Millet, May 3, 1961.
 Described by: L. H. Gile, F. J. Carlisle, R. B. Grossman.

Soil Surface. Desert pavement of fine rhyolite, monzonite, and andesite gravel from 0 to 1/4-inch thick with about 1/8 inch of loose reddish-brown sand under and between pebbles; abrupt smooth boundary.

A 2 0 to 5 cm. Pinkish-gray (7.5YR 6/2 dry) or brown (7.5YR 4/3 moist) heavy fine sandy loam; weak fine platy, plates becoming weaker and thicker with depth; very few roots; lenses of loose sand, 1 to 2 mm. thick, between many plates; uppermost plates with common fine vesicles; effervesces weakly; abrupt smooth boundary. (Desert pavement included in sample.)

B21tca 5 to 15 cm. Reddish-brown (5YR 5/4 dry, 3.5/4 moist) sandy clay loam; weak medium subangular blocky; slightly hard to hard; few roots; a few insect burrows 2 to 3 mm. diameter; 10 to 20 percent fine pebbles concentrated in the lower 1/3 of horizon (this stratum continuous along 3 feet of pit face where sampled, but absent as a distinct zone in other parts of pit); silicate clay coatings occur discontinuously on sand grains and pebbles; few carbonate filaments; discontinuous soft carbonate coatings mostly on pebble undersides; effervesces strongly; clear wavy boundary.

B22tca 14958 15 to 33 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) heavy sandy clay loam variegated with slightly redder material in a fine pattern; very weak medium subangular blocky; hard; roots common; few to common fine tubular pores; discontinuous coatings of silicate clay on sand grains and pebbles; carbonate filaments common; thin, soft, continuous carbonate coatings on pebbles; effervesces strongly; clear wavy boundary.

IIK1 (IIB23ca) 14959 33 to 51 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) very gravelly medium sandy clay loam; weak fine and very fine crumb structure in interstitial material; soft and loose; roots common; a few horizontal insect burrows 2 to 3-mm. diameter containing dark fine material; thin continuous carbonate coatings on pebbles; carbonate coatings are whiter on the bottom than on top of pebbles; reddish brown fines adhere to bottoms of pebbles but not to tops; effervesces strongly; clear wavy boundary.

IIK21 (IIC1ca) 14960 51 to 81 cm. Variegated pinkish-white (7.5YR 8/2 dry, 8/4 moist) and light brown (7.5YR 6/4.5 dry, 5.5/4 moist) very gravelly sandy clay loam; massive; hard; very few roots; units in pattern 1 to 2 cm. across; lighter colored material relatively rich in carbonate; common fine tubular pores; continuous, hard, 1-mm. thick carbonate coatings on pebbles; effervesces strongly; clear wavy boundary.

IIK22 (IIC2ca) 14961 81 to 97 cm. Pink (7.5YR 8/3 dry) or light brown (7.5YR 6.5/4 moist) very gravelly sandy loam; massive; very hard to hard; interstitial material hard; very few roots; thin, mostly continuous carbonate coatings on pebbles; effervesces strongly; clear wavy boundary.

IIIB1tcab 14962 97 to 107 cm. Light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 4/4 moist) light sandy clay loam with a few blebs of slightly redder material; massive; hard; very few roots; common fine tubular pores; a few light colored carbonate filaments; thin continuous carbonate coatings on pebbles; effervesces strongly; clear wavy boundary.

IIIB2tcab 14963 107 to 119 cm. Pattern of red (3.5YR 4/6 dry, 3.5/6 moist) sandy clay loam units, 0.5 to 1-cm. diameter, each surrounded by 1- to 3-mm. wide zone of light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) sandy clay loam; massive; hard; very few roots; common fine tubular pores; few white carbonate filaments; few pink (7.5YR 7/4 moist), carbonate nodules; thin patchy clay films in red material; effervesces strongly; clear wavy boundary.

IIK2b (IIICcab) 14964 119 to 142 cm. Pink (5YR 7.5/3 dry) or light reddish-brown (5YR 6/4 moist) variegated with lesser amounts of pink (7.5YR 7/3 dry) or brown (7.5YR 5/4 moist) sandy clay loam; very weak medium angular and subangular blocky; very hard; no roots; common fine tubular pores with reddish-brown linings; effervesces strongly.

Remarks: Materials in the upper 97 cm are associated with the Jornada II surface. Underlying alluvium is Jornada I.

SOIL CLASSIFICATION: Typic Haplargid; coarse-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Onite, gravelly variant SOIL Nos. S61NMex-7-5 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14965-14973

GENERAL METHODS: 1A, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											Coarse fragments f/			
		Total		Sand					Silt		Clay		Vol. 250-2	Wt.		
		Sand (2-0.05)	Silt (0.05-0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)		76-2	19-2	
Pct. of < 2 mm																
Carbonate Removed a/, b/																
0-8	A2	64.4	23.9	11.7	1.8	5.1	7.4	25.1	25.0	17.5	6.4	59.6	39.4	5	13	13
8-15	B21t	64.4	19.2	16.4	5.7	9.3	6.1	21.9	21.4	14.0	5.2	50.2	43.0	15	29	28
15-23	B22t	68.3	17.5	14.2	9.3	12.6	6.2	20.8	19.4	13.2	4.8	46.3	48.9	15	29	26
23-36	C1ca	68.6	19.1	12.3	9.2	10.7	5.3	20.8	22.6	14.9	4.5	51.5	46.0	20	31	26
36-61	C2ca	70.4	16.8	12.8	15.4	16.8	4.4	16.3	17.5	12.4	4.9	40.5	52.9	25	38	31
61-86	C3ca	79.9	10.4	9.7	27.2	16.7	4.9	17.0	14.1	7.8	3.6	32.2	55.8	45	61	57
86-112	II B2t cab	65.0	14.8	20.2	13.1	17.4	5.6	13.5	15.4	11.5	3.8	35.1	49.6	40	56	48
112-124	III B2t cab	51.2	24.7	24.1	5.3	7.6	3.4	14.9	20.0	17.4	7.4	48.1	31.2	10	17	15
124-145+	II I K b	54.1	21.2	24.7	10.7	6.8	3.8	15.2	17.6	14.1	7.9	41.8	31.5	20	38	34

Depth (cm.)	6A1a Organic carbon c/, g/ Pct.	6B1a Nitrogen c/ Pct.	C/N	6C2a Ext. Iron as Fe Pct.	Carbonate as CaCO ₃ Pct.	5A1a CEC NH ₄ OAc a/ me./ 100g.	Bulk density			Water content			Composition Whole Material d/				
							h/		5A1b Air-Dry g/cc	Pct.	Pct.	4B2 15- Bar Pct.	NONCARBONATE				Carbonate as CaCO ₃ Pct.
							g/cc	g/cc					2mm.	Sand	Silt	Clay	
0-8	0.27	0.041	6	0.9	0.3	11.3		1.3				13	57	20	10	tr	
8-15	0.24	0.034	7	1.0	-	12.0		1.3	1.33			29	47	12	12	tr	
15-23	0.20			0.9	0.6	10.2		1.4	1.40		5.7	29	50	11	10	tr	
23-36	0.19			0.8	3	10.1		1.5	1.50			30	47	12	9	2	
36-61	0.16			1.0	3	9.4		1.5				37	44	11	6	2	
61-86	0.10			1.0	3	7.1		1.5				60	31	5	3	1	
86-112	0.09			1.0	tr	12.8		1.6				55	30	7	8	tr	
112-124	0.06			0.8	2	16.0		1.6				17	41	22	18	2	
124-145+	0.04				25	15.3		1.6				32	29	12	10	17	

Depth (cm.)	Extractable bases 5B1a				Cat. Exch. Cap 5A1a NH ₄ OAc	Water extract from saturated paste 8A1									
	6O2a		6P2a			6Q1a		6Q1a		8A1					
	Ca	Mg	Na	K		Ca	Mg	Na	K	CO ₃	HCO ₃	Cl	SO ₄	8A1a Electrical conductivity mmho/cm	
0-8		1.9	tr	1.6											0.45
8-15		2.1	tr	1.6											0.49
15-23		1.2		0.9											0.50
23-36		2.3	0.1	0.3					10.5		0.4	0.8			0.91
36-61			0.1						7.9		1.1	0.5			1.60
61-86			0.4	0.3					7.6		7.0	0.3			3.43
86-112			1.1	0.5					12.8		14.6	0.3			6.0
112-124		4.6	1.4	0.6					17.7		12.4	0.2			4.50
124-145+															

Depth (cm.)	8A Water at Saturation	Exchangeable Na	Gypsum
	Pct.		
0-8			
8-15			
15-23			
23-36	25		tr
36-61	24		
61-86	22		
86-112	29		
112-124	38		
124-145+			

a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
 b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation. Sample not oven dried; weight obtained on a duplicate sample.
 c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
 d/ Inclusive of coarse fragments, carbonate, and gypsum.
 e/ Determination on whole material by Method 6E1a and 6E1c and calculated as a percentage of the < 2 mm. by Method 1B4.
 f/ Volume on carbonate-containing basis and weight on carbonate-free basis.
 g/ 1.8 kg/m² to 112 cm (Method 6A).
 h/ Assumed bulk densities of moist fine-earth fabric for calculations.

Soil: Onite, gravelly variant
 Soil Classification: Typic Haplargid; coarse-loamy, mixed, thermic
 Soil Nos.: S61NMex-7-5
 Location: NE 1/4 SW 1/4, Sec. 8, T21S, R2E, Dona Ana County, New Mexico. Elevation: 4,400 feet.
 Geomorphic Surface: Organ.
 Land Form: Coalescent fan piedmont sloping about 4 percent to the east-northeast.
 Parent Material: Sediments of rhyolite, andesite, latite and some monzonite (see Remarks).
 Vegetation: Creosotebush dominant; scattered Mormon tea, tarbush, snakeweed; sample taken from an area which is relatively shrub free and undissected.

Collected by: F. J. Carlisle, L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, May 4, 1961.
 Described by: F. J. Carlisle and F. F. Peterson.

Soil Surface. About half covered with fine gravel pavement; where pavement absent, surface has thin, fragile crust.

A2 14965 0 to 8 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/3 moist) fine sandy loam; weak medium platy grading to weak coarse platy in lower part; very surface of plates light brownish-gray (10YR 6/2 dry); slightly hard; a few fine roots; occasional tubular insect burrows; few fine vesicles; noncalcareous; abrupt smooth boundary. (Desert pavement included in sample.)

B21t 14966 8 to 15 cm. Reddish-brown (6YR 5/4 to 4/4 dry) or dark reddish-brown (6YR 3/3 moist) gravelly sandy loam; massive to very weak fine subangular blocky; slightly hard; common roots; pebbles and sand grains thinly coated with silicate clay; a few 2- to 4-mm. diameter insect burrows; noncalcareous; clear smooth boundary.

B22t 14967 15 to 23 cm. Reddish-brown (5YR 5/4 dry, 3.5/4 moist) gravelly sandy loam; weak fine to medium subangular blocky; slightly hard; common roots; pebbles and sand grains thinly coated with silicate clay; a few insect burrows; generally noncalcareous, with very weak effervescence in a few spots; clear smooth boundary.

C1ca 14968 23 to 36 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3/4 moist) gravelly sandy loam; weak fine to medium subangular blocky; few roots; occasional insect burrows; pebbles have discontinuous adhering fines on top and thin, continuous flaky, white carbonate coatings on bottom; strong effervescence; clear wavy boundary.

C2ca 14969 36 to 61 cm. Brown (7.5YR 5/4 dry) or dark brown (5YR 3.5/4 moist) gravelly sandy loam; very weak subangular blocky; slightly hard; few roots; occasional insect burrows; pebbles have discontinuous adhering fines on top and thin continuous flaky white carbonate on bottoms or entirely around some pebbles; effervesces strongly; clear wavy boundary.

C3ca 14970 61 to 86 cm. Reddish-brown (5YR 5/4 dry) or dark reddish-brown (5YR 3/4 moist) very gravelly sandy loam; interstitial fines very weak subangular blocky; thin discontinuous carbonate coatings and discontinuous adhering fines on pebbles; effervesces strongly; clear smooth boundary.

T1B2tcab 14971 86 to 112 cm. Reddish-brown (5YR 4.5/4 dry, 4/4 moist) gravelly sandy clay loam; moderate fine and medium subangular blocky with "ped" shapes controlled by pebbles; hard; no roots; scattered carbonate filaments; discontinuous adhering fines on pebbles; ped surfaces smooth and reflective; thin patchy clay films in pores and on some pebbles; mostly noncalcareous; some parts effervesce weakly; clear smooth boundary.

T1TR2tcab 14972 112 to 124 cm. Brown (7.5YR 5/4 dry) or reddish-brown (5YR 4/4 moist) gravelly clay loam to sandy clay loam; moderate medium and coarse subangular blocky; hard, friable; no roots; pebbles and some ped faces have scattered weak carbonate filaments; ped surfaces smooth, with a few thin patchy clay films; common fine tubular pores; noncalcareous and weak effervescence; clear smooth boundary.

IIIKb 14973 124 to 145 cm. plus. (Upper 8 inches of this horizon.) Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) gravelly loam matrix with white (7.5YR 8/0 and 9/2 dry) or light brown (7.5YR 6/4 moist) nonindurated carbonate nodules 2- to 8-mm. diameter; massive; hard; friable; no roots; common fine tubular pores; effervesces strongly.

Remarks: Organ fan-piedmont alluvium comprises the upper 86 cm. Underlying sediments are associated with the Jornada II surface.

61-6

Soil: Arizo Soil Classification: Typic Torriorthent; sandy-skeletal, mixed, thermic
 Soil Nos.: S61NMex-7-6
 Location: NW 1/4 NW 1/4, Sec. 17, T21S, R2E, Dona Ana County, New Mexico. Elevation: 4,450 feet.
 Geomorphic Surface: Organ (late phase). Land Form: Coalescent fan piedmont, sloping 4 percent to the east.
 Parent Material: Mixed rhyolite, andesite, latite and monzonite angular alluvial fan gravel.
 Vegetation: Creosotebush dominant; scattered large mesquite, Mormon tea, and sumac.

Collected by: F. J. Carlisle, L. H. Gile, R. B. Grossman, J. L. Millet, and F. F. Peterson, May 4, 1961.
 Described by: L. H. Gile and F. F. Peterson.

Soil Surface. Seventy percent covered with fine angular gravel pavement; very thin crust between pebbles.

A 14974 0 to 8 cm. Pinkish-gray (7.5YR 6/2 dry) or brown (7.5YR 4/3 moist) gravelly sandy loam; weak medium platy with thin layers of reddish-brown sand between some plates; very slightly hard and brittle; common fine roots; pebbles mostly without carbonate coatings, a few with thin coatings on undersides; effervesces weakly; abrupt smooth boundary. (Desert pavement included in sample.)

Clca 14975 8 to 33 cm. Light brown (7.5YR 6/3 dry) or brown (7.5YR 4/3 moist) very gravelly sandy loam (gravel somewhat bedded); massive; slightly hard; gravelly lenses loose; common fine roots; pebbles with thin discontinuous carbonate coatings, coatings more continuous on undersides; some weakly adhering fines on pebble tops; effervesces strongly; clear smooth boundary.

IIC2ca 14976 33 to 56 cm. Brown (7.5YR 5.5/3 dry) or dark brown (7.5YR 4/2 moist) gravelly sandy loam; massive and single grain; loose; soft; few roots; thin discontinuous carbonate coatings on pebbles; effervesces strongly; clear smooth boundary.

IIIC3ca 14977 56 to 74 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/4 moist) gravelly loamy sand; massive and single grain; loose; soft; few roots; pebbles with thin discontinuous carbonate coatings, particularly on bottoms; some weakly adhering fines on pebble tops; effervesces strongly; clear smooth boundary.

IVC4ca 14978 74 to 112 cm. Very gravelly loamy coarse sand; massive and single grain; loose; a few roots; thin discontinuous carbonate coatings on pebbles; effervesces strongly.

SOIL CLASSIFICATION: Petrocalcic Paleargid; loamy, mixed, thermic, shallow

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Cruces SOIL Nos. 561Nex-7-7 LOCATION Dona Ana County, New Mexico
SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14979-14992, 15115 August, 1967
General Methods: 1A, 1E1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											Coarse fragments 2A2				
		3A											> 2	19-2			
		Total	Sand					Silt							Pct. of < 2 mm		
	Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	Pct. of < 19 mm				
		Carbonate Removed - 3A3											a, f				
0-5	A	85.0	5.3	9.7	3.3	10.8	13.1	42.8	15.0	3.6	1.7	41.3	70.0		tr		
5-18	E1t	86.9	3.8	9.3	1.6	8.9	16.6	47.1	12.7	2.5	1.3	38.7	74.2		tr		
18-25	E1t	81.8	5.6	12.6	1.6	9.4	15.3	43.2	12.3	4.1	1.5	37.8	69.5		1		
25-36	E21t	80.0	5.2	14.8	3.4	11.9	16.4	38.7	9.6	3.1	2.1	30.6	70.4		1		
36-48	E22tca	77.4	5.9	16.7	4.6	10.8	14.6	36.7	10.7	3.6	2.3	31.8	66.7		2		
48-74	E22m	68.2	8.7	23.1	2.8	5.1	9.1	35.4	15.8	4.8	3.9	40.5	52.4		1		
74-102	E22m	71.4	10.8	17.8	1.2	7.3	15.0	32.1	15.8	5.9	4.9	38.5	55.6		1		
102-150	E23m	75.0	6.1	18.9	2.6	9.2	14.2	35.4	13.6	3.2	2.9	35.0	61.4		1		
150-185	K31														2		
185-236	K32														2		
236-272	G1ca	88.6	6.1	5.3	1.5	11.1	19.1	46.1	10.8	2.7	3.4	34.8	77.8		1		
272-353	G2	91.4	4.1	4.5	4.8	20.3	24.6	36.0	5.7	2.2	1.9	22.1	89.7		1		
48-74	14991e	46.4	17.5	36.1	0.1	1.7	4.2	22.4	18.0	10.7	6.8	42.9	28.4		-		
48-74	14992e	64.6	9.0	26.4	0.4	6.5	9.2	34.5	14.0	4.5	4.5	55.1	50.6		-		
48-74	15115e	29.5	25.4	45.1	0.1	0.6	1.1	9.6	18.1	13.1	2.3	38.0	11.4		-		
Depth (cm.)	6A1a Organic Carbon		C/N	6C1a Ext. Iron as Fe a	6E1b Carbonate as CaCO3	5A1a CaO/CaCO3	Bulk density			g Infiltration	g UCS Dry	Water Content	COMPOSITION WHOLE MATERIAL a/				
	b, i	a					i	kAlb Air-Dry	g Infiltration				psi	15-Bar	> 2 mm.	Sand	SILT
0-5	0.25	0.25		0.6		7.0		1.4					tr	85	5	10	
5-18	0.13	0.13				6.5		1.8	1.86	5.9	175		tr	87	4	9	
18-25	0.17	0.17				8.8		1.7	1.78			4.6	1	80	6	13	
25-36	0.14	0.14		0.7	1	10.4		1.6	1.70				1	78	5	15	1
36-48	0.24	0.29		0.7	16	11.5		1.5	1.53	4.9	85		2	63	5	14	16
48-74	0.15	0.58			75	14.5		2.0	k	0.05h	7880h		tr	17	2	6	75
74-102	0.05	0.15			65	12.6		1.7	1.68	0.5	1070		tr	25	4	6	65
102-150	0.06	0.12			51	8.1		1.7	1.66				1	36	3	9	51
150-185					52			1.7									
185-236					41			1.7	1.73								
236-272					13	4.4		1.7					1	77	5	4	13
272-353					2	4.7		1.7	1.66					84	4	4	2
48-74	0.09	0.82			89	23.1							-	5	2	4	89
48-74	0.07	0.29			75	11.1							-	16	2	7	75
48-74	0.11	1.28			91	32.5							-	3	2	4	91

- Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated. The K31 and K32 horizons contain abundant sepiolite and attapulgite. These minerals are partially dissolved by the treatment to remove carbonate; the samples after carbonate removal contain abundant whitish aggregates.
- Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- Determination on whole material and calculated as a percentage of the < 2 mm.
- Inclusive of coarse fragments, carbonate, and gypsum.
- Large strong plates from the K22m were separated in the field. The laminar part was removed in the laboratory with a diamond saw. The laminar part was given the number 14991 and the non-laminar lower part of the plates the number 14992. A subsample of 14991 was further separated into the "brown" and "not so brown" parts. The "brown" part was analyzed under number 15115.
- In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation. Evidence that this treatment dissolves the sepiolite and attapulgite found in this soil.
- Infiltration and unconfined compressive strength (UCS) from Gile, L. H. A classification of Ca horizons in soils of a desert region, Dona Ana County, New Mexico, 1961. Soil Sci. Soc. Amer. Proc. 25:52-61. Pedon 1 meter west of 61-7.
- Laminar part. The non-laminar part has an UCS of 3290 psi. i. 1.4 kg/m² to 48 cm (Method 6A).
- Assumed bulk densities of moist fine-earth fabric for calculations.
- Laminar part 2.22 and nonlaminar 1.93 g/cc for pedon in reference given in footnote g.

Radiocarbon Dates

Sample Description ^a	C-14 Ages, kyrs	
	Inorganic	Organic
The K22m contains 3 subunits. Each subunit consists of a laminar upper portion attached to a massive portion. The hard part of the laminar zone of the middle subunit was analyzed.		
Upper half (20853-top; I-2131, I-2779)	29,300 ± 1400 - 1100	20,700 ± 440b/
Lower half (20853-bottom; I-2224, I-2780)	30,000 ± 1500 - 1300	20,800 ± 400b/
K22m, upper part (691474; I-4414)	28,450 ± 1150a/	

- Samples 34-38 in Soil Monograph.
- 0.52 and 0.37 percent organic carbon for upper and lower halves, on carbonate-free basis (Method 6A1a).
- C-13, -5.5.

Soil Classification: Petrocalcic Paleargid; loamy, mixed, thermic, shallow

Soil: Cruces

Soil Nos.: S51RMex-7-7

Location: The NE 1/4, Sec. 23, T23S, R1W, south bank of trench, Las Cruces Municipal Airport. Dona Ana County

Geomorphic Surface: La Mesa (upper). Elevation: 4,440 feet. New Mexico.

Land Form: Relict basin floor, nearly level.

Parent Material: Upper Camp Rice basin fill, noncalcareous sand and a few rounded pebbles of mixed composition.

Vegetation: Snakeweed, mesquite, and *Yucca elata*.

Described by: R. B. Grossman and F. P. Peterson.

Soil Surface. Few pebbles of mixed lithology are scattered over the surface. There is a discontinuous layer of loose reddish sand up to several inches thick.

A (offset for sampling) 14979 0 to 5 cm. Reddish-brown (5YR 5/4, dry; 5YR 3.5/4, moist) light fine sandy loam; weak medium platy, with 1-2 mm. of loose reddish-brown sand between plates; soft and loose; few roots; non-calcareous; abrupt boundary.

B1t 14980 and 14981 5 to 25 cm. Reddish-brown (5YR 3.5/4, dry) or dark reddish-brown (5YR 3/4, moist) fine sandy loam; hard; friable; weak very coarse prismatic; noncalcareous; clear smooth boundary. (Split for sampling purposes.)

B2t 14982 25 to 36 cm. Reddish-brown (4YR 4/4, dry) or dark reddish-brown (4YR 3/4, moist) heavy fine sandy loam; weak very coarse prismatic; noncalcareous to weak and moderate effervescence; few carbonate filaments in lower part; clear wavy boundary.

B22ca 14983 36 to 48 cm. Brown (7.5YR 5/2, dry) and dark brown (7.5YR 4/4, moist) sandy clay loam; weak very coarse prismatic breaking to weak medium and coarse subangular blocky; slightly hard and hard; generally few roots; except for concentration on underlying M_a; common medium carbonate nodules and segmented cylindroids, (7.5YR 5/6, moist); common insect burrow fillings < 1 cm. diameter, (7.5YR 3/2, moist); scattered calcrete fragments in lower part rest on the M_a; effervesces strongly; abrupt wavy to irregular boundary.

K21a (C1cam) 14984 48 to 74 cm. A complex of several platy units, each of which consists of a laminar horizon in the upper half inch or so, underlain by and cemented to massive K fabric; the surface lamina ranges from white (7.5YR 8/1, dry) to pink (7.5YR 8/4, dry); subjacent laminae range from white (7.5YR 8/1, dry) to brown (7.5YR 5/4, dry); extremely hard; abrupt boundary to attached K2m, which ranges from about 2 to 6 inches in thickness; consists of (1) a matrix which ranges from pinkish-white (7.5YR 8/2, dry) to light brown (7.5YR 6/4, dry) and (2) inclusions of material which range from white (7.5YR 8/1, dry) to brown (7.5YR 5/4, dry) and which occur as coatings along cleavage planes or as fragments mainly 1-2 cm. diameter; no roots; sand grains separated by carbonate; horizon as a whole has weak very coarse prismatic structure, with prisms which range up to several feet in diameter and which extend vertically throughout the M_a; some prism faces coated with laminae; effervesces strongly; clear to abrupt wavy boundary.

K22m (C2cam) 14985 74 to 102 cm. White (10YR 9/2, dry) and light gray (10YR 7/2, moist) to pinkish-white (7.5YR 8/2, dry) and pinkish-gray (7.5YR 7/2, moist); carbonate-cemented material; very coarse prisms are massive or very coarse platy, breaking into medium and coarse subangular blocks; very hard; no roots; discontinuous carbonate coatings on blocks; sand grains are separated from each other by thick, coalescent carbonate coatings; effervesces strongly; gradual wavy to irregular boundary.

K23m (C3cam) 14986 102 to 150 cm. About 80 percent white (10YR 9/2, dry) and very pale brown (10YR 7/3, moist) carbonate nodules; coarse and very coarse subangular blocky; very hard and extremely hard; very few roots; nodules are irregularly pitted and pustulose appearing, and are essentially discrete except as fitted against and into each other; many nodules have smooth-appearing carbonate coatings; sand grains in nodules separated by carbonate; remaining 20 percent pinkish-white (7.5YR 8/2, dry) and light brown (7.5YR 6/3, moist) fine sandy loam occurs between nodules or clusters of nodules, is massive and single grain, soft and loose, and adheres weakly to nodules; effervesces strongly; clear wavy boundary.

K31 (C4ca) 14987 150 to 185 cm. About 60 percent indurated white (10YR 9/2, dry) or very pale brown (10YR 7/3, moist) 1-10 cm. diameter nodules; sand grains in nodules appear separated by carbonate; nodule interiors massive; nodules irregularly shaped with pustulose appearing, and are essentially discrete except as fitted against and into each other; many nodules have smooth-appearing carbonate coatings; and about 40 percent pinkish-gray (7.5YR 7/2, dry) or brown (7.5YR 5/3, moist), loamy fine sand-fine sandy loam; massive and single grain; loose; very few roots; effervesces strongly; gradual undulating boundary.

K32 (C5ca) 14988 185 to 236 cm. About 50 percent white (10YR 9/2, dry) or light gray (10YR 7/2, moist), indurated, 1/2 to 3/4 inch diameter (ranging to 6 inch diameter) carbonate nodules similar to those in K31; very and extremely hard; very few roots; and about 50 percent white (10YR 8/2, dry) or pale brown (10YR 6/3, moist) loamy fine sand-fine sandy loam; effervesces strongly; clear wavy boundary.

C1ca (C6ca) 14989 236 to 272 cm. Light gray (10YR 7/2, dry) or yellowish-brown (10YR 5/4, moist) sand; massive; firm; no roots; few white indurated carbonate nodules, 1/2 to 2 inch diameter with very thin or no carbonate coatings; most sand grains in matrix are fairly clean-appearing and are in contact with each other; effervesces weakly to strongly; gradual boundary.

C2 14990 272 to 353 cm. Light gray (10YR 6.5/2, dry) or brown (10YR 4.5/3, moist) sand; massive and single grain; soft and loose; no roots; effervesces weakly.

Cementation (Hodgson, 1974). 10 pieces about 3 cm across were tested by subjecting to impact energy when air dry and after submergence in water for one hour.

Horizon	Dry		Saturated	
	Median	Range	Median	Range
	←-----Joules-----→			
K22m	0.6	0.3-0.75	0.45	0.15-0.6
K23m	0.45	0.45-0.75	0.45	0.3-0.6

(Continued)

Cruces 61-7, continued

61-7 (cont.)

Micromorphology, Method 4Elb. Thin sections of the B22tca (36 to 48 cm.) show that prominent coatings of oriented clay occur on sand grains in reddish-brown volumes, and that the grains are carbonate-coated in the nodular zones, with no oriented clay visible; there are no clay skins on ped faces. Thin sections of the K21m (48 to 74 cm.) show that sand grains are widely separated by carbonate. Vanden Heuvel (see clay mineralogy for reference) writes: "Sepiolite and attapulgite were identified in the thin sections by their optical properties and by comparisons with fine sand and coarse silt-size aggregates separated from both the buffer-treated soil and the mineralogical specimens. The observed refractive index of the sepiolite was about 1.52 and of the attapulgite, about 1.53. The birefringence of the sepiolite was greater than that of the attapulgite. Both sepiolite and attapulgite occur in several different forms. The most conspicuous are the sepiolite aggregates of coarse-silt or fine-sand size. The edges are brighter (in polarized light) than the center because of the orientation of the individual particles near the surface of the aggregate. These aggregates, as well as coatings on mineral grains occur in what appear to be former solution channels in the calcrete (cemented caliche). These solution channels, most conspicuous in the K31 horizon, are sharply separated from the calcrete matrix by a sepiolite lining on the channel wall. The channels are conspicuous in thin sections because they contain a concentration of large mineral grains (mostly quartz, some feldspar and rhyolite fragments). Also, unlike the calcrete matrix, the structure is open and loose; i.e. the grains and aggregates are not cemented solidly together by the carbonate. The channels do contain an abundant number of calcite grains, however, which occur as aggregates and coatings and penetrate the sepiolite aggregates. Before the buffer treatment was given to the thin section, the sepiolite aggregates could hardly be observed because of the interpenetrating calcite grains, some of which still remain after the buffer treatment.

In addition to that occurring in the solution channels, which make up only about one-tenth or less of the volume of the calcrete nodules examined from the lower part of the calcareous zone, the sepiolite could be observed as a network of fiberlike particles (many of them clay-size) in the calcrete matrix after the calcite was dissolved by the buffer. These fibers show low birefringence and are generally distributed throughout the matrix, although there is some tendency for them to concentrate around the edges of calcite aggregates (now dissolved except for some large calcite grains around the edges of these aggregates).

The attapulgite also occurs as aggregates and as individual networks of fibers. The most conspicuous aggregates in the upper calcrete zone appear as bright rings with crossed nicols often arranged loosely around mineral grains. As in the case of the sepiolite aggregates, the brighter interference colors at the edges are due to orientation effects. In addition to these more or less well-organized aggregates, there are smaller particles of attapulgite distributed throughout the calcrete matrix of the upper calcareous zone, some of which are concentrated into what appear to be very loose aggregates. In the Clca horizon, the attapulgite is organized into thick coatings on mineral grains in addition to tightly formed aggregates. The somewhat higher birefringence of the coatings in certain places is probably due to montmorillonite mixed with the attapulgite."

Clay Mineralogy, Methods 7A2, 7A3. Vanden Heuvel, R. C. The occurrence of sepiolite and attapulgite in the calcareous zone of a soil near Las Cruces, New Mexico. Clays and Clay Minerals, 13th Conf., Pergamon Press, 1966.

Horizon	Clay Minerals ^{a/}				
	Mont.	Mica	Kaol.	Sep.	Att.
A	xx	xx	x		
B1t	xx	xx	x		
B21t	xx	xx	x		
B22tca	xx	xx	x		
K21m laminar	xx	d?	x		xx
K21m nonlaminar	xx		x		xxx
K22m	x		x		xxxx
K23m	x	d?	x	xxx	xx
K31	x		d	xxxx	x
K32	x		d	xxxx	x
Clca	xx		x		xx
C2	xxx		xx		x

^{a/} Clay extracted without prior carbonate removal and then treated for one hour with pH 5 NH₄OAc at room temperature. xxx = dominant, xxx = abundant, xx = moderate, x = small, d = detected.

Sand Mineralogy, Method 7B1. A count of 300 grains was made on the carbonate-free fine sand (0.25-0.1 mm.) from the B21t and Clca horizons:

Minerals	B21t %	Clca %
Quartz (trace chert)	41	38
Orthoclase (trace micro-line)	16	13
Microcrystalline aggregates	8	25
Plagioclase		
Twinned, IR near 1.550 (oligoclase, andesine)	9	tr
Nontwinned, IR near 1.550 (oligoclase, andesine)	10	4
IR < 1.550 (albite)	14	19
IR > 1.550 (calcium > andesine)	tr	--
Ferromagnesian	tr	tr
Nonweatherable	40	40
Weatherable	60	60

Total Analyses (Method 7C2)^a

Oxide	A	B1t	B1t	B21t	B22tca	K21m (Whole)	K21m (Laminar)	K21m (Nonlaminar)	K22m	K23m	K31	K32	Clca	C2
SiO ₂	79.9	78.7	78.2	77.2	65.7	16.9	8.06	19.1	29.6	36.4	41.9	46.4	74.9	81.0
Al ₂ O ₃	8.84	9.35	9.82	9.82	9.10	2.13	1.34	2.20	2.84	3.01	3.47	3.85	6.99	7.56
Fe ₂ O ₃	2.81	2.97	2.98	3.05	2.60	0.65	0.56	0.67	0.67	0.68	0.79	0.85	1.47	1.59
TiO ₂	0.49	0.51	0.48	0.49	0.39	0.09	0.07	0.06	0.11	0.11	0.13	0.13	0.27	0.28
CaO	0.92	0.97	0.97	1.39	7.89	44.2	49.5	42.1	34.9	28.7	25.3	21.9	6.22	2.51
K ₂ O	2.59	2.62	2.63	2.64	2.11	0.48	0.25	0.48	0.72	0.73	0.86	0.93	1.95	2.22
MgO	0.44	0.38	0.48	0.49	0.76	0.64	0.32	0.73	1.37	3.95	4.29	5.41	1.20	0.85
Ign. loss	2.10	2.02	2.27	2.83	8.58	35.50	39.73	34.63	29.60	25.93	22.69	20.56	5.99	2.56
Total	98.1	97.5	97.8	97.9	97.1	100.7	99.8	100.0	99.8	99.5	99.3	99.9	99.0	98.6

a. Vanden Heuvel, R. C. The occurrence of sepiolite and attapulgite in the calcareous zone of a soil near Las Cruces, New Mexico. Clays and Clay Minerals, 13th Conf., Pergamon Press, 1966.

SOIL CLASSIFICATION: Typic Haplargid; coarse-loamy, mixed, thermic

SOIL Onite, deep petrocalcic phase SOIL No. S61(65)Mex-7-8 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 14993-15002, 20839-20845

GENERAL METHODS: 1A, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1			2A2 Coarse fragments		
		Total				Sand				Silt			Clay (<0.074)	Vol. 250-2	Wt. 76-2	3B1 19-2		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.2-0.02)	Int. I (2-0.1)					Vol. <250	Wt. <76
Carbonate Removed - 3A3 a, b																		
0-5	A	87.1	4.5	8.4	2.9	12.6	19.0	40.7	11.9	3.7	0.8	34.6	75.2					
5-13	A3	86.6	5.1	8.3	1.1	10.6	17.8	43.0	14.1	4.4	0.7	39.1	72.5					
13-23	B1t	84.9	4.9	10.2	1.5	13.6	20.9	38.6	10.3	3.6	1.3	31.1	74.6					
23-41	B21tca	79.7	5.3	15.0	3.1	11.9	17.6	36.5	10.6	4.0	1.3	31.6	69.1					
41-56	B22tca	81.7	4.3	14.0	2.1	9.7	17.8	41.1	11.0	3.3	1.0	33.9	70.7					
56-71	B22tca	82.4	3.9	13.7	1.8	12.5	19.9	39.2	9.0	2.9	1.0	29.6	73.4					
71-99	B1t	83.7	3.9	12.4	1.7	6.6	16.0	47.5	11.9	2.7	1.2	36.5	71.8					
99-117	B1t	85.0	4.8	10.2	3.5	8.2	16.1	45.3	11.9	2.7	2.1	37.7	73.1					
117-145	B1t	80.0	6.9	13.1	4.5	9.0	14.6	38.2	13.7	4.5	2.4	37.4	66.3					
145-170	B1t	79.5	7.2	13.3	4.8	9.2	14.3	37.2	14.0	4.2	3.0	36.7	65.5					
170-203	B1t	72.0	6.5	21.5	3.8	10.8	16.3	31.1	10.0	2.5	4.0	28.3	62.0	32.1				
203-236	B1t	74.4	8.8	16.8	2.5	11.0	17.3	33.3	10.3	2.7	6.1	29.4	64.1	29.9				
236-267	B1t	72.5	10.1	17.4	2.9	10.8	17.2	30.8	10.8	3.3	6.8	29.5	61.7	32.3				
267-287	B1t	77.7	7.6	14.7	6.9	14.6	18.3	28.9	9.0	3.8	3.8	26.5	68.7	26.3				
287-318	B1t	83.9	6.4	9.7	10.7	16.7	21.1	27.5	7.9	3.2	3.2	23.9	76.0	19.5				
318-340	B1t	96.3	1.3	2.4	15.4	29.5	30.6	19.1	1.7	0.8	0.5	7.6	94.6	4.4				

Depth (cm.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C1a Ext. Iron	Carbonate as CaCO ₃ %	Bulk density			Water content			Composition Whole Material d/					
						4A1c 30-cm.	4A1b Air-Dry	4B3 30-cm.	4B2 15-Bar	NONCARBONATE					Carbonate as CaCO ₃		
										>2mm.	Sand	Silt	Clay	Carbonate as CaCO ₃			
0-5	0.20	0.022	9		2.1	6.9	1.41	1.55			15.0	4.6	5	82	4	7	2
5-13	0.18	0.020	8		2.7	7.8	1.52	1.55			15.0	4.6	1	83	5	8	3
13-23	0.19	0.021	9		4	9.2	1.51	1.54			14.5	4.2	2	80	5	9	4
23-41	0.21			0.5	12	10.4	1.46	1.52			15.5	8.0	2	69	4	13	12
41-56	0.16				12	10.0	1.61	1.63					3	70	3	12	12
56-71	0.09			0.4	10	9.0	1.61	1.63					3	71	4	12	10
71-99	0.08				11	7.1	1.61	1.68					3	73	3	10	11
99-117	0.05				15	7.3	1.61	1.68					8	66	4	8	14
117-145	0.07				40	7.5	1.61	1.68					18	40	3	6	33
145-170	0.05				51	7.7	1.65f	1.66f			15.4f		9	36	3	6	46
170-203					44		1.61						11.7	3	38	4	43
203-236					41		1.61						13.7	1	43	5	41
236-267					31		1.61						14.5	2	48	7	31
267-287					19		1.51						9.9	30	43	4	15
287-318					11		1.51						6.9	39	46	4	6
318-340					2		1.51						1.5	37	59	1	1

Depth (cm.)	Extractable Iron				4A1c, 4A1b, 4B3, 4B2				Water extract from subsampled parts					6A1a Electrical conductivity			
	602a		6P2a		5A1a NH ₄ OAc		Ca Mg Na K		CO ₂ HCO ₃ Cl SO ₄								
	Ca	Mg	Na	K	Ca	Mg	Na	K	CO ₂	HCO ₃	Cl	SO ₄					
0-5																	0.44
5-13																	0.38
13-23																	0.47
23-41																	0.72
41-56																	1.53
56-71																	6.4
71-99																	7.3
99-117																	8.7
117-145																	8.7
145-170																	8.0
170-203																	
203-236																	
236-267																	
267-287																	
287-318																	
318-340																	

Depth (cm.)	Water at Saturation	Exchangeable Na	SAR	6F1a Gypsum	a. Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
0-5					b. In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
5-13					c. Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
13-23					d. Inclusive of coarse fragments, carbonate, and gypsum. Carbonate measured directly by Method 6E1b.
23-41					e. Determination on whole material by Method 6E1a and 6E1c and calculated as a percentage of the < 2 mm. by Method 1B4. Carbonate measured directly on < 2 mm. by Method 6E1b for 20843-20845.
41-56	34.9	13	12	tr	f. By Methods 4A1c, 4A1b, and 4B1c.
56-71					g. On whole material ground to pass 2 mm.
71-99	40.0	15	15		h. 2.2 kg/m ² to 99 cm (Method 6A)
99-117					i. Assumed bulk density for calculations.
117-145					
145-170	39.4	29	24	tr	

Soil: Orite, deep petrocalcic phase. Soil Classification: Typic Haplargid, coarse-loamy, mixed, thermic.
 Soil Nos.: S61(65)NMex-7-8
 Location: SE 1/4 NW 1/4 Sec. 31, T23S, R1E, Dona Ana County, New Mexico
 Geomorphic Surface: La Mesa (lower). Land Form: Relict basin-fill plain.
 Parent Material: Upper Camp Rice--sand, rounded gravel of mixed lithology, subrounded rhyolite and andesite gravel.
 Vegetation: Mesquite in coppice dunes.

Elevation: 4,200 feet.

Collected by: 1961 - L. H. Gile, R. B. Grossman, and F. F. Peterson, May 8, 1961;

1965 - L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, October 5, 1965.

Described by: 1961 - L. H. Gile and F. F. Peterson; 1965 - L. H. Gile and R. B. Grossman.

Soil Surface. About 20 percent covered with fine and medium gravel, mainly rhyolite, andesite, granite, quartz, and chert; between pebbles there is a discontinuous layer, 1 to 2 mm. thick, of coarse sand.

A 14993 0 to 5 cm. Reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) loamy sand; very weak medium to coarse platy and massive; soft; few roots; termite burrow fillings, 2 to 3 mm. diameter, are apparent on drying and exposure; very few carbonate filaments; effervesces strongly; abrupt smooth boundary.

A3 14994 5 to 13 cm. Reddish-brown (5YR 5/4 dry; 5YR 4/4 moist) loamy sand; very weak medium subangular blocky; slightly hard; common termite workings; few roots; effervesces strongly; clear smooth boundary.

B1t 14995 13 to 23 cm. Reddish-brown (5YR 5.5/4 dry, 5YR 4/4 moist) fine sandy loam; very weak medium subangular blocky; slightly hard; few roots; sand grains thinly coated with silicate clay; common termite workings; very few carbonate filaments; effervesces strongly; clear wavy boundary.

B2tca 14996 23 to 41 cm. Reddish-brown (6YR 5.5/4 dry, 6YR 4/4 moist) sandy clay loam; compound weak very coarse prismatic and weak medium subangular blocky; slightly hard matrix with 30 to 40 percent very hard, indurated, pink (7.5YR 8/4 dry, 7.5YR 6.5/4 moist) broken carbonate nodules; few roots; sand grains of reddish-brown material have thin coatings of silicate clay and there are bridges between some grains; common insect burrows (1/8-inch to 1/4-inch diameter) that are filled or partly filled with fine earth; effervesces strongly; clear wavy boundary.

B2tca 14997 (41 to 56 cm.), **14998** (56 to 71 cm.). About 70 percent light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) in an irregular pattern; about 20 percent reddish-brown (5YR 5/4 dry, 5YR 4/5 moist) irregular parts (3 to 5 mm. diameter); and about 10 percent nonindurated pink (7.5YR 8/3 dry, 7.5YR 7/4 moist) nodules; with depth amount of reddish-brown material decreases, light brown material occupies about the same volume, and pink carbonate aggregates increase; sandy clay loam; compound weak very coarse prismatic weak medium subangular blocky; internal structure of prisms in part controlled by carbonate nodules; very hard; very few roots; sand grains of reddish-brown material have thin coatings of silicate clay and there are bridges between some grains; few insect burrows; effervesces strongly; clear gradual wavy boundary. (Horizon split for sampling.)

K11 (C1ca) 14999 71 to 99 cm. Pink (7.5YR 8/3 dry) or light brown (7.5YR 6.5/4 moist) sandy clay loam, with slightly less clay than above and containing 30 to 50 percent of 1/4- to 1/2-inch diameter reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) nodules; very weak coarse subangular blocky; hard; very few roots; reddish-brown nodules less hard than pink matrix; some reddish-brown parts noncalcareous, most effervesce only weakly; pink material effervesces strongly; clear wavy boundary.

K12 (C2ca) 15000 99 to 117 cm. Pink (7.5YR 8/3 dry) or light brown (7.5YR 6.5/4 moist) sandy clay loam; scattered fine pebbles; weak to moderate medium subangular blocky; very hard; few roots; blocky peds with 0.5 to 1 mm. thick pinkish-white (7.5YR 8/2 dry, 7.5YR 7/2 moist) powdery carbonate coatings; effervesces strongly; horizon discontinuous laterally; abrupt wavy boundary.

IKK21 (C3ca) 15001 117 to 145 cm. White (7.5YR 8/1 dry) or pink (7.5YR 7.5/4 moist) carbonate-cemented material weak platy in upper 1 to 2 inches, remainder massive; weak, very coarse prisms extend downward from this horizon through the Ka and range from about a foot to several feet in diameter; very hard; few roots; some small channels (1/8-inch diameter) and thin lenses (1/8 inch thick) of friable brownish loamy material; sand grains separated by carbonate; about 30 percent of horizon is slightly darker (7.5YR 7/2 dry, 7.5YR 6.5/4 moist), has more sand grains in contact and apparently contains less carbonate; noticeably more fine gravel and coarse sand than above horizons (15 to 20 percent fine pebbles) effervesces strongly; gradual wavy boundary.

IKK2m (C4cam) 15002 145 to 170 cm. White (7.5YR 8/1 dry) or light gray (7.5YR 7/2 moist) carbonate-cemented material; massive to very weak medium subangular blocky; very hard; no roots; peds have discontinuous thin white coatings; about same amount of rounded gravel as above horizon; effervesces strongly; clear wavy boundary.

IKK23 (C5ca) 20840 170 to 203 cm. About 90 percent white (10YR 9/2 dry) or very pale brown (10YR 7.5/3 moist) carbonate-cemented material which is less strongly indurated than above; breaks into fine and medium subangular blocks; some of blocks have smooth carbonate coatings; very hard; very few roots; sand grains widely separated by carbonate; a few fine, rounded pebbles of mixed origin scattered throughout; remainder is loose, internodular material, pinkish-white (higher value than 7.5YR 8/2 dry) and pink (7.5YR 7.5/4 moist) fine sandy loam; effervesces strongly; clear wavy boundary.

IKK3L (C6ca) 20841 203 to 236 cm. About 70 to 80 percent white (10YR 9/2 dry, 8/2 moist) carbonate-cemented nodules, commonly 1/2 to 2 inches diameter but in places in clusters a few inches in diameter; most nodules are readily removed from the horizon but are very and extremely hard; very few roots; nodules commonly carbonate-coated; some nodules have pustular surfaces, with pustule amplitude of several mm.; internodular material is pinkish-white (higher value than 8YR 8/2 dry) or pink (8YR 7.5/4 moist) fine sandy loam; single grain; loose; many sand grains are carbonate-coated; a few pebbles scattered throughout, some of which are cemented in the nodules; effervesces strongly; clear wavy boundary.

IKK3E (C7ca) 20842 236 to 267 cm. About 40 to 50 percent carbonate nodules that are white (10YR 9/2 dry, 8/2 moist); interpebble fine earth is pinkish-gray (7.5YR 7/3 dry) or light brown (7.5YR 6/4 moist) and white (higher value than 10YR 8/2 dry, 8/2 moist) gravelly sandy loam; some interpebble fine earth is loose; very few roots; most pebbles coated with carbonate and some are cemented together in clusters; effervesces strongly; clear wavy boundary.

III1C1ca (C8ca) 20843 267 to 287 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) gravelly sandy loam; massive; soft; very few roots; 5 to 10 percent nodules that are white (higher value than 7.5YR 8/2 dry) or pinkish-white (7.5YR 8/2 moist) and that are hard or very hard; thin, continuous and discontinuous carbonate coatings on pebbles; effervesces strongly; clear wavy boundary.

III2C2ca (C9ca) 20844 287 to 318 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist) gravelly light sandy loam; massive and single grain; soft and loose; very few roots; very few hard carbonate nodules; pebbles have thin, discontinuous carbonate coatings; effervesces strongly; clear wavy boundary.

III3C3 (C10) 20845 318 to 340 cm. Loose gravel and sand; single grain; most pebbles have no or very little carbonate as coatings; effervesces weakly or is noncalcareous.

Micromorphology, Method 4E1b. The B2tca horizon was examined in thin section. Parts free of carbonate are skelsepic. The plasma commonly is in clumps with large nonplanar voids quite common. The free grain argillans have moderate internal orientation. Parts high in carbonate have aseptic organization; free grain argillans exhibit weak expression. Quartz and feldspar predominate; the grains mostly are quite angular. The feldspar suite is diverse. Besides discrete grains of potassium feldspar and plagioclase, there are fragments of rock groundmass that appear to originate from rocks ranging from rhyolite to basalt. Ferromagnesian minerals are very scarce. Pyroxene, amphibole are present; no mica was observed. Black opaques are common as are also small, earthy, reddish-brown volumes rich in iron oxides. Stubby black opaque cutans occur discontinuously on macrosurfaces of voids and skeletal grains. The minerals are generally fresh. Some feldspar grains show weathering along edges and inward along twinning planes. Pyroxene and the other ferromagnesian minerals show moderate to weak peripheral weathering; the grains overall are little altered, but the surfaces and planes of weakness have been altered. Feldspar grains with inclusions of biotite(?) are present. Some of the biotite(?) appears quite altered.

SOIL CLASSIFICATION: Typic Camborthid; coarse-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Pajarito SOIL Nos. S61Mex-7-9 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 15003-15011

GENERAL METHODS: 1A, 1B1a, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1			2A2 Coarse fragments																					
		Total			Sand				Silt				Int. II (0.2-0.02)	(2-0.1)			Vol. - 2	Wt. 76-2	3B1 19-2																		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)																										
Pct. of < 2 mm																																					
																			Carbonate Removed		a/,	b/															
0-5	A	80.9	10.1	9.0	1.1	10.0	11.7	33.3	24.8	7.6	2.5	52.2	56.1						5	5																	
5-15	A3ca	78.9	11.4	9.7	1.4	8.5	10.3	31.7	27.0	8.5	2.9	54.8	51.9						2	2																	
15-28	B1ca	78.2	11.6	10.2	0.8	8.8	10.8	31.2	26.6	8.1	3.5	53.3	51.6						2	2																	
28-43	B21ca	80.8	8.7	10.5	0.9	7.7	10.7	34.1	27.4	6.3	2.4	54.1	53.4						2	2																	
43-64	B22ca	86.7	9.0	4.3	tr	3.6	13.5	41.8	27.8	5.4	3.6	57.9	58.9						4	4																	
64-84	B3ca	85.9	7.3	6.8	0.8	7.0	10.7	38.8	28.6	5.2	2.1	57.3	57.3						4	4																	
84-104	C	87.8	6.8	5.4	0.8	7.2	12.2	40.6	27.0	5.4	1.4	56.3	60.8						2	2																	
104-127	IIK1b	87.3	7.8	4.9	0.6	7.9	14.6	38.8	25.4	5.7	2.1	52.4	61.9						1	1																	
127-152	IIK2b	64.7	25.7	9.6	0.4	3.5	7.6	24.5	28.7	18.0	7.7	61.1	36.0						1	1																	

Depth (cm.)	6A1a		Nitrogen	C/N	6E1b 6E1c Carbonate as CaCO ₃	5A1a CEC NH ₄ OAc me./100g.	Bulk density			Water content			Composition Whole Material d/				
	Organic carbon c/, e/ Pct.	Pct.					4A1c 30-cm. g/cc	4A1b Air-Dry g/cc	4B3 30-cm. Pct.	4B2 15-Bar Pct.	NONCARBONATE				Carbonate as CaCO ₃		
											>2mm.	Sand	Silt	Clay		Pct.	Pct.
0-5	0.17				3.2	7.8	1.5f	1.88			5	74	9	9	3		
5-15	0.19				4	8.7	1.82	1.66			15.2	4.5	1	75	10	4	
15-28	0.21				5	9.2	1.61	1.66			19.0	5.1	2	73	11	5	
28-43	0.14				6	8.4	1.53	1.59			16.6	4.7	2	75	8	6	
43-64	0.18				5	7.1	1.56	1.64			17.6	4.1	4	77	8	5	
64-84	0.10				2.8	6.6	1.6f	1.65					4	80	7	3	
84-104	0.07				0.8	5.4	1.6f	1.65					2	85	7	1	
104-127	0.07				7	4.9	1.6f						1	80	7	7	
127-152	0.08				20	9.6	1.6f						1	50	21	20	

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- b/ In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
- c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- d/ Inclusive of coarse fragments, carbonate, and gypsum.
- e/ 2.4 kg/m² to 104 cm (Method 6A).
- f/ Assumed bulk densities for calculations.

61-9

Soil: Pajarito Soil Classification: Typic Camborthid; coarse-loamy, mixed, thermic
 Soil Nos.: S61NMex-7-9
 Location: NE 1/4 NW 1/4, Sec. 14, T21S, R1W, approximately 0.4 mile northeast of Ft. Selden ruins, Dona Ana County, New Mexico. Geomorphic Surface: Leasburg. Land Form: Terrace. Elevation: 4,000 feet.
 Parent Material: Terrace veneer of mixed composition and uncertain origin.
 Vegetation: Creosotebush, a few snakeweed.
 Collected by: L. H. Gile and R. B. Grossman, May 9, 1961.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Five to 10 percent covered by rounded pebbles of mixed lithology.

A 15003 0 to 5 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) sandy loam; moderate thin and very thin platy; soft; very few roots; effervesces strongly; abrupt smooth boundary.

A3ca 15004 5 to 15 cm. Light brown (7.5YR 6.5/3 dry) or brown (7.5YR 5/3 moist) fine sandy loam; massive; hard; few roots; very few carbonate filaments; effervesces strongly; clear wavy boundary.

B1ca 15005 15 to 28 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist) fine sandy loam; massive; slightly hard to hard; few roots; very few carbonate filaments; effervesces strongly; clear wavy boundary.

B21ca 15006 28 to 43 cm. Light brown (6.5YR 6.5/4 dry) or brown (6.5YR 5/4 moist) fine sandy loam; very weak medium subangular blocky; slightly hard; few roots; about 5 percent of small light reddish-brown blebs (5YR hue) in random pattern, and with about 5 percent of medium, hard and slightly hard, pink (7.5YR 8/3 dry, 6/4 moist) carbonate nodules; few carbonate filaments; effervesces strongly; clear wavy boundary.

B22ca 15007 43 to 64 cm. Light brown (6.5YR 6.5/4 dry) or brown (6.5YR 5/4 moist) fine sandy loam; very weak medium subangular blocky; slightly hard; few roots; about 5 percent of reddish-brown blebs (5YR hue) in random pattern and with a few to common medium, hard and very hard, pink (7.5YR 8/4 dry, 6/4 moist) carbonate nodules and cylindroids; effervesces strongly; clear wavy boundary.

B3ca 15008 64 to 84 cm. Light brown (6.5YR 6.5/4 dry) or brown (6.5YR 4.5/4 moist) sandy loam; massive; hard; few roots; a few scattered small reddish-brown blebs (5YR hue), and with a few medium very hard, pinkish-white (7.5YR 8/2 dry, 6/3 moist) carbonate nodules and cylindroids; effervesces strongly; clear wavy boundary.

C 15009 84 to 104 cm. Light brown (8YR 6.5/4 dry) or brown (8YR 5/4 moist) loamy sand; massive; slightly hard; very few roots; effervesces weakly; clear wavy boundary.

I1K1b (I1C1cab) 15010 104 to 127 cm. Light gray (10YR 7/2 dry) or brown (10YR 5/3 moist) loamy sand; massive; hard and very hard; a few roots; a few carbonate filaments and nodules; transition zone, with respect to carbonate, to I1K2b; effervesces strongly; clear wavy boundary.

I1K2b (I1C2cab) 15011 127 to 152 cm. White (10YR 8/2 dry) or very pale brown (10YR 6.5/4 moist) very fine sandy loam with some pockets and stringers of very pale brown (10YR 7/3 dry, 5.5/3 moist) very fine sandy loam; massive; slightly hard to hard; very few roots; a few fine tubular pores; carbonate disseminated throughout white material; effervesces strongly.

Remarks: Local tracing shows that the I1K2b horizon is part of a buried soil that in places has a distinct argillic horizon above the K horizon.

61-10

Soil: Monterosa Soil Classification: Ustollic Paleorthid; loamy-skeletal, mixed, thermic, shallow
 Soil Nos.: S61NMex-7-10
 Location: SE 1/4 SW 1/4, Sec. 18, T23S, R3E, north bank of arroyo, 700 feet east of pipeline, 800 feet north of
 Dripping Springs Road, 28 yards east and 12 yards north of pedon S60NMex-7-10, Dona Ana County, New Mexico.
 Geomorphic Surface: Jornada. Elevation: 4,450 feet. Vegetation: Creosotebush and ratany.
 Land Form: Ridge remnant of a coalescent alluvial fan surface, sloping 2 percent westward.
 Parent Material: Jornada I alluvium derived mainly from rhyolite, with some andesite .

Collected by: F. J. Carlisle and R. B. Grossman.

Described by: F. J. Carlisle and R. B. Grossman, April 29, 1961; upper two horizons originally described April 16, 1960.

Soil Surface. One-half inch diameter rhyolite and andesite pebbles cover about 80 percent of the soil surface; pebbles are weakly stained reddish-brown.

Aca 13177 0 to 5 cm. Brown (7.5YR 5/2 dry, 4/2 moist) very gravelly sandy loam; weak coarse platy; soft; few roots; thin carbonate coatings on pebbles largely restricted to the undersides; effervesces strongly; abrupt smooth boundary. Sample includes desert pavement of pebbles.

Bca 13178 5 to 23 cm. Reddish-brown (5YR 5/3 dry) or brown (7.5YR to 5YR 4/4 moist) very gravelly light sandy loam; fillings between pebbles are weak very fine crumb and loose; roots common to few; pebbles have thick (1/8 inch) indurated, continuous carbonate coatings on the undersides and are largely free of carbonate on the upper sides; with depth the carbonate coatings on the undersides of the pebbles thicken; effervesces strongly; abrupt irregular boundary.

K2m (C2cam) 14922 23 to 36 cm. White (5YR 8/1 dry) or pinkish-gray (5YR 7.5/2 to 7/2 moist) very gravelly laminar and massive, carbonate-cemented material with a discontinuous smooth surface from which protrude pebbles without carbonate coatings; discontinuously cemented in the lower part with soft, loamy pockets, less than 1 inch across; thin carbonate coronas on pebbles fairly common; when broken does not fracture across pebbles; few fine roots concentrated in the loamy pockets; effervesces strongly; clear wavy boundary.

K31 (C3ca) 14923 36 to 56 cm. Pinkish-gray (5YR 7/2 dry) or light reddish-brown (5YR 6/3 moist) very gravelly loamy sand; majority single grain or weak very fine crumb and loose if disturbed; parts (about 20 percent by volume) are relatively high in carbonate and indurated with a tendency for arrangement in horizontal bands (bedded); all pebbles have carbonate coatings; in loose parts carbonate coatings are discontinuous; pockets up to 6 inches across occur that are similar to the majority of the subjacent horizon; few fine roots; effervesces weakly to strongly; clear smooth boundary.

K32 (C4ca) 14924 56 to 81 cm. Pink (5YR 7/3 dry) or reddish-brown (5YR 5.5/4 moist) very gravelly loamy sand; majority single grain and loose; about 30 percent higher in carbonate and hard, occurring in an irregular and discontinuous pattern; occasional yellowish-red blebs, less than 1/2-inch diameter; pebbles in weakly effervescent parts have patchy, flaky carbonate coatings on undersides and very weak or no carbonate coatings on upper sides with loamy sand adhering to upper sides; very few roots; effervesces weakly to strongly.

SOIL CLASSIFICATION: Typic Paleorthid; loamy-skeletal, carbonatic, thermic, shallow

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Tencee SOIL Nos. S62Nmex-7-1 LOCATION Dona Ana County, New Mexico
SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 17240-17248
GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1				
		Total		Sand					Silt				f/ Coarse fragments 2A2	Vol. 250-2	Wt. 76-2	3B1 19-2	
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)					(2-0.1)
Pct. of < 2 mm																	
Carbonate Removed a/, b/																	
0-3	A	64.2	24.8	11.0	1.4	5.9	8.1	28.7	20.1	15.8	9.0	54.0	44.1				
3-13	B21ca	63.6	23.0	13.4	1.2	5.8	8.0	28.8	19.8	13.6	9.4	51.6	43.8				
13-28	B22ca	64.8	23.2	12.0	1.5	5.9	8.0	29.3	20.1	15.8	7.4	54.3	44.7				
28-30	e/	46.8	33.2	20.0	7.4	13.0	8.4	9.7	8.3	13.5	19.7	27.2	38.5				
30-51	K23m	73.0	16.4	10.6	11.8	23.7	16.4	14.0	7.1	9.3	7.1	23.3	65.9				
51-66	K31	65.9	22.0	12.1	10.4	17.9	12.6	14.8	10.2	12.3	9.7	30.8	55.7				
66-86	K32	56.3	28.9	14.8	7.8	15.7	10.7	12.8	9.3	13.2	15.7	29.9	47.0				
86-107	Cca	62.8	23.4	13.8	7.0	19.2	12.3	15.2	9.1	8.4	15.0	25.8	53.7				
28-28½	K21m	30.2	41.8	28.0	3.7	6.9	4.4	6.6	8.6	18.3	23.5	30.9	21.6				
Carbonate Not Removed b/																	
0-3	A2	61.3	29.6	9.1	2.4	6.5	8.0	26.3	18.1	18.8	10.8	53.1	43.2		45		67
3-13	B21ca	62.7	26.7	10.6	2.9	8.3	8.0	26.2	17.3	15.6	11.1	48.9	45.4		50		64
13-28	B22ca	63.4	27.0	9.6	3.4	7.9	7.8	25.7	18.6	15.4	11.6	49.8	44.8		65		72
28-30	e/																58d
30-51	K23m	71.5	20.6	7.9	16.4	20.3	13.0	13.2	8.6	9.3	11.3	24.6	62.9		80	83	58
51-66	K31	67.1	23.9	9.0	11.8	17.5	11.3	15.3	11.2	11.7	12.2	31.2	55.9		75	79	40
66-86	K32	63.4	27.4	9.2	12.8	16.4	10.4	13.8	10.0	11.2	16.2	28.7	53.4		80	80	31
86-107	Cca	73.6	18.5	7.9	11.4	21.1	14.5	17.7	8.9	7.8	10.7	26.0	64.7		80	80	36

Depth (cm.)	Organic carbon c/, b/	Nitrogen	C/N	Carbonate as CaCO ₃				5A1a Bulk density		Water content			6F1a Gyp-sum	8A1a Elec. Cond. ombos/cm.
				6E1b Whole Material		3A1a <0.002 mm.		NH ₄ OAc		i/				
				Pct.	Pct.	Pct.	Pct.	g/cc	g/cc	Pct.	Pct.	Pct.		
0-3	0.36			41	15g	1	11.2							
3-13	0.46			36	20g	2	13.7							
13-28	0.41			53	24	3	13.9						tr	0.44
28-30	0.20			74			14.0							
30-51	0.20			72	40	4	9.4							
51-66	0.46			68	37	4	10.7						tr	2.20
66-86	0.33			74	41	4	11.2							
86-107	0.15			66	38g	2	8.2							
28-28½	0.36			75	75		23.5							

- a/ Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated. Samples 17243 and 17248 were treated with acidic buffer to remove carbonate before the < 2 mm was separated from the > 2 mm; for the other samples, the > 2 mm was first separated from the < 2 mm before the < 2 mm was treated to remove carbonate. Pedon contains primary allogenic carbonate. Acidic buffer treatment was continued until 90 percent of carbonate remaining consisted of primary allogenic carbonate. Majority of this remaining carbonate occurs in the coarser sand fractions and consists of fragments of calcareous sedimentary rock.
- b/ Pretreatment with 0.1N NaOH to aid disaggregation.
- c/ Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- d/ Treated to remove carbonate by Method 1B3. Some of primary allogenic > 2 mm carbonate dissolved.
- e/ K21m and K22m (see description).
- f/ No > 250 mm; visual estimates of volume 250-76 mm incorporated in calculation of volume percentages.
- g/ The very fine sand (0.1-0.05 mm) was examined under the microscope to determine the minimum proportion of grains that are fragments of limestone. Grains were considered fragments of limestone if the interference color rings were continuous over much of the grain.

	Other %	Carbonate	
		Limestone %	Other %
17240	94	1	5
17241	78	tr	22
17247	74	8	18

b/ 0.7 kg/m² to 28 cm (Method 6A).

i/ Assumed bulk densities of moist fine-earth fabric for calculations.

Soil: Tencee Soil Classification: Typic Paleorthid; loamy-skeletal, carbonatic, thermic, shallow
 Soil Nos.: S62NMex-7-1
 Location: NE 1/4 NE 1/4, Sec. 18, T22S, R1E, about 1/2 mile east of Robledo Mountains front, Dona Ana County, New Mexico. Geomorphic Surface: Picacho. Elevation: 4,075 feet.
 Land Form: Ridge top of dissected coalescent alluvial fan piedmont slopes 3 percent east; ridge top 56 yards wide north-south, transversely sloping 1 percent to southeast. cent; north slope straight, 55 percent.
 Parent Material: Picacho fan alluvium derived from gray limestone and reddish-brown calcareous sandstone, with scattered rhyolite.
 Vegetation: Creosotebush, 3 to 15 feet apart, 1 to 2 feet high; scattered ocotillo and mariola around ridge rim.
 Collected by: L. H. Gile, R. B. Grossman, and F. F. Peterson, July 11, 1962.
 Described by: L. H. Gile and F. F. Peterson.

Soil Surface. About 70 to 80 percent covered with 1/4 to 1-inch diameter pebbles with a few 3 to 6-inch diameter; some pebbles have pustulose carbonate coatings on bottoms; limestone pebbles commonly have etched and pitted tops.

A 17240 0 to 3 cm. Pinkish-gray (7.5YR 6/2 dry) or brown (7.5YR 4.5/4 moist) sandy loam; weak coarse platy; slightly hard and soft, friable; very few fine roots; many fine vesicles; effervesces strongly; abrupt smooth boundary.

B21ca 17241 3 to 13 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist) sandy loam; weak fine and medium subangular blocky; slightly hard, friable; few roots; some ped surfaces with slightly grayer color; a few carbonate filaments; pebbles with thin discontinuous carbonate coatings, some pebbles with clean tops and coatings on bottoms; effervesces strongly; clear wavy boundary.

B22ca 17242 13 to 28 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5.5/4 moist) very gravelly sandy loam; massive to weak pebble-controlled subangular blocky; soft and slightly hard; roots common; pebbles with thin discontinuous carbonate coatings; few filaments; effervesces strongly; very abrupt smooth to wavy boundary.

K21m (C1cam) 17248 28 to 28 1/2 cm. Upper laminae: White (10YR 9/2 dry) or light brownish-gray (10YR 6/2.5), lower laminae: very pale brown (9YR 8/4 dry) or light yellowish-brown (9YR 6/4 moist); laminae mostly 1 to 2 mm. thick, ranging to 6 mm.; upper laminae form smooth (slightly and finely roughened) surface, upper lamina can be scratched with fingernail, lower cannot, but can be scratched with knife; very and extremely hard; generally no roots, but some root concentration on top; this horizon present in all pedons but in some places discontinuous or very thin; upper lamina (thickness, 1 to 1.5 mm.) more continuous than lower; effervesces strongly; abrupt smooth and wavy boundary.

K22m (C2cam) 17243 1/ 28 1/2 to 30 cm. Very pale brown (10YR 8/3 dry) or light yellowish-brown (10YR 6/4 dry); carbonate-cemented material; pebble coatings white (10YR 9/1 dry, 8/2 moist); scattered blebs or coatings (1 to 3-mm. wide spots) olive brown (2.5Y 4/4 dry and moist); massive; very hard; no roots; horizon 1/4 to 1 inch thick with variable thickness laterally; pebbles separated by carbonate; effervesces strongly; abrupt wavy to irregular boundary.

K23m (C3cam) 17244 30 to 51 cm. Very pale brown (10YR 8/3 dry, 7/3 moist) carbonate-cemented material; coatings white (10YR 9/1 dry, 8/2 moist), and a few blebs or coatings of light olive brown (2.5Y 4.5/4 dry and moist); massive; hard and very hard; few roots; interstices filled where sampled; laterally grades to partially loose, but most of exposure cemented; all pebbles coated; thickness varies from 4 to 12 inches, commonly 8 inches; pebbles commonly separated by carbonate, some in contact; effervesces strongly; clear irregular boundary.

K31 17245 51 to 66 cm. Pink (7.5YR 7.5/4 dry) or light brown (7.5YR 5.5/4 moist) very gravelly light sandy loam; massive and loose with some fines weakly cemented to pebbles; few roots; pebbles have thin, commonly continuous carbonate coatings; effervesces strongly; clear wavy to irregular boundary.

K32 17246 66 to 86 cm. Pink (7.5YR 7.5/4 dry) or brown (7.5YR 5/4 moist) very gravelly sandy loam; single grain, loose; a few parts massive; common roots; thin discontinuous carbonate coatings on pebbles; effervesces strongly; clear wavy to irregular boundary.

Cca 17247 86 to 107 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist) very gravelly loamy sand; single grain and loose; few roots; very few patchy thin coatings of carbonate on pebble bottoms; effervesces strongly.

1/ 17243 consists of the whole 28- to 30-cm. zone, including both K21m and K22m.

SOIL CLASSIFICATION: Typic Haplargid; coarse-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Onite SOIL Nos. S62NMex-7-3 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 17250-17259

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1			2A2 Coarse fragments e		
		Total		Sand					Silt				3A1b Fine Clay <0.0002	Vol. 250-2	Wt. 76-2	3B1 19-2		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)					(2-0.1)	
Pct. of < 2 mm																		
						Carbonate Removed		a, b										
0-5	A2	77.1	15.6	7.3	6.9	10.6	8.5	25.0	26.1	11.2	4.4	53.7	51.0	3.0		5	8	8
5-8	B1t	71.4	16.2	12.4	11.2	14.3	8.2	19.9	17.8	10.2	6.0	40.6	53.6	5.9		5	12	12
8-20	B21t	72.2	14.1	13.7	20.0	16.8	7.1	14.4	13.9	9.8	4.3	32.7	58.3	8.7		10	15	15
20-30	B22t	67.5	18.4	14.1	10.2	13.8	7.2	17.0	19.3	13.4	5.0	43.8	48.2	8.3		10	19	19
30-43	IIC1ca	71.8	15.0	13.2	21.2	20.3	7.0	12.1	11.2	9.5	5.5	28.2	60.6	4.4		20	31	31
43-61	IIC2ca	72.7	16.4	10.9	6.6	10.1	9.2	25.9	20.9	12.1	4.3	49.3	51.8	5.1		5	10	10
61-76	IVC3ca	83.8	8.5	7.7	18.8	21.9	12.8	21.4	8.9	5.6	2.9	26.3	74.9	2.5		25	37	37
76-84	VB1b	54.5	26.7	18.8	4.9	10.0	7.3	17.4	14.9	16.7	10.0	18.8	39.6	6.0		1	2	2
84-102	VB21b	47.4	22.3	30.3	5.5	8.7	5.6	14.1	13.5	11.1	11.2	33.5	33.9	10.9		2	3	3
102-112	VB22b	49.3	19.3	31.4	5.8	7.7	5.8	16.0	14.0	11.7	7.6	35.7	35.3	13.5		2	3	3
Depth (cm.)	6A1a Organic carbon C Pct.	Nitrogen Pct.	6C2a Ext Iron as Fe Pct.	5A1a CEC NH ₄ OA me./ 100g. Pct.	6E1b 6E2a Carbo- ate as CaCO ₃ Pct.	6A1a Elec. Cond. mmhos/ cm. Pct.	Bulk density			6S1a Phos. Total Pct.	Water content			Composition Whole Material d				
							g/cc				Pct.	Pct.	Pct.	NONCARBONATE				Carbon ate as CaCO ₃ Pct.
							g	g	g					>2mm.	Sand	Silt	Clay	
0-5	0.25		0.9	6.4	tr(s)			1.4	0.033				8	71	15	6		
5-8	0.24		0.9	8.8	tr(s)			1.5	0.038				12	63	14	11		
8-20	0.27		0.9	10.0	tr(s)			1.5	0.033				15	61	12	12		
20-30	0.24		0.8	8.8	1			1.5	0.033				19	55	14	11	1	
30-43	0.23		0.7	9.1	5			1.5	0.045				29	48	10	9	4	
43-61	0.12			8.6	3	0.76		1.5					10	63	14	10	3	
61-76	0.10		1.1	5.5	3			1.5	0.033				36	52	5	5	2	
76-84	0.12		1.0	11.3	2			1.5	0.039				2	52	26	18	2	
84-102	0.16		1.1	15.6	1			1.6	0.034				3	46	21	29	1	
102-112	0.13		1.2	15.9		0.95		1.6					3	49	18	30	tr	

- Carbonate removed by Method 1B3 and the determination made on and reported for the sample so treated.
- In contact overnight with 0.1N NaOH in addition to regular treatments to aid disaggregation.
- Determination on sample treated by Method 1B3 to remove carbonate; values expressed on a carbonate-containing basis.
- Inclusive of coarse fragments, carbonate, and gypsum. Carbonate computed from determinations on < 2 mm.
- Volume on a carbonate-containing basis; weight on a carbonate-free basis.
- 2.4 kg/m² to 102 cm (Method 6A).
- Assumed bulk densities of moist fine-earth fabric for calculations.

Soil: Onite Soil Classification: Typic Haplargid; coarse-loamy, mixed, thermic
 Soil Nos.: S62NMex-7-3
 Location: NW 1/4 SE 1/4, Sec. 7, T22S, R3E, about C.1 mile west of dirt road, 1/2 mile north of Route 70, Dona Ana County, New Mexico. Geomorphic Surface: Organ. Elevation: 4,500 feet.
 Land Form: A slight ridge sloping 1 percent to the west; a very slight ridge of early Organ sediments deposited on the Jornada II surface. Parent Material: Monzonitic alluvium; sediments from 0 to 76 cm are Organ, and from 76 to 112 cm are Jornada II.
 Vegetation: Mainly snakeweed, with few *Yucca elata*.
 Collected by: L. H. Gile, July 24, 1962.
 Described by: L. H. Gile and F. F. Peterson.

Soil Surface. About 40 percent covered with fine monzonite gravel and coarse sand. A discontinuous layer (less than 2 mm. thick) of reddish fine sand rests on the A horizon; this gravel and sand was included in the A horizon sample.

A2 17250 0 to 5 cm. Brown (7.5YR 5/3 dry) or dark brown (7.5YR 3/4 moist) sandy loam; very weak fine platy and single grain; soft and loose; upper 1/2 inch is 7.5YR 6/2 dry, 7.5YR 4/3 moist, and is slightly hard; noncalcareous; abrupt smooth boundary.

E1t 17251 5 to 8 cm. Reddish-brown (6YR 5/4 dry) or dark reddish-brown (6YR 3/4 moist) sandy loam; weak coarse platy; slightly hard; very few roots; noncalcareous; abrupt smooth boundary.

E21t 17252 8 to 20 cm. Reddish-brown (5YR 5/4 dry, 3.5/4 moist) heavy sandy loam; slightly less red when crushed; massive; hard; very few roots; sand grains thinly stained with clay; noncalcareous; gradual smooth boundary.

E22t 17253 20 to 30 cm. Reddish-brown (5YR 5/4 dry, 3.5/4 moist) heavy sandy loam; massive; slightly hard; very few roots; sand grains thinly stained with clay; noncalcareous; clear smooth boundary.

IIC1ca 17254 30 to 43 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/4 moist) gravelly coarse sandy loam; massive; slightly hard; few roots; common carbonate filaments; discontinuous carbonate coatings on sand grains; few insect burrows; effervesces strongly; abrupt smooth boundary.

IIC2ca 17255 43 to 61 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/4 moist) sandy loam; massive; slightly hard; very few roots; few carbonate filaments; few discontinuous carbonate coatings on sand grains; effervesces strongly; abrupt smooth boundary.

IVC3ca 17256 61 to 76 cm. Reddish-brown (6YR 5.5/4 dry, 5YR 4/4 moist) gravelly coarse loamy sand; massive; soft; few roots; thin discontinuous carbonate coatings on pebbles; effervesces strongly; abrupt smooth boundary.

VB1b 17257 76 to 84 cm. Reddish-brown (5YR 5.5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) light sandy clay loam; massive to very weak subangular blocky; few fine pores; few very fine roots; effervesces weakly; friable; clear smooth boundary.

VB21b 17258 84 to 102 cm. Reddish-brown (5YR 5.5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) sandy clay loam; weak medium subangular blocky; firm; few fine pores; discontinuous reflective, smooth surfaces on peds; effervesces weakly; clear boundary.

VB22b 17259 102 to 112 cm. Reddish-brown (5YR 4/4 moist); crushed color yellowish-red (5YR 5/5 dry and 4.5/5 moist); heavy sandy clay loam; firm; few fine pores; discontinuous reflective surfaces on peds; effervesces weakly.

Micromorphology, Method 4E1b. Thin sections of the E21t (8 to 20 cm.) show distinct coatings of oriented clay on sand grains; practically all of the clay in the horizon occurs on the sand grains as oriented clay.

Sand Mineralogy, Method 7B1. The very fine and the fine sand from the E22t horizon were examined. These sands were obtained from the standard particle-size analysis. The very fine sand contains 30 percent quartz, 45 percent feldspar, 20 percent microcrystalline aggregates, 2 percent opaques, and one percent ferromagnesian minerals mostly pyroxene and hornblende. Only an occasional grain of biotite is present. The feldspar is mostly orthoclase and albite with about one-fourth plagioclase of intermediate calcium content, near oligoclase. The microcrystalline aggregates consist of small optical domains of feldspar. These composite grains range widely in apparent alteration. Some are reddish-brown and appear earthy. Some grains of discrete quartz and feldspar have patchy, relatively thick coatings of reddish-brown silicate clay, perhaps inherited from earlier cycles of soil development. An appreciable proportion of the feldspar and the ferromagnesian mineral grains are ragged and appear otherwise quite altered.

The mineralogical composition of the fine sand is very similar to that for the very fine sand. Percentages are not reported because the proportion of plagioclase of intermediate calcium content was not determined.

Clay Mineralogy, Method 7A2. The E22t horizon contains small amounts of mica, kaolinite, and montmorillonite. The montmorillonite is poorly ordered and contains some interlayer material. The IIC2ca horizon (carbonates removed, Method 3A1) is similar with small amounts of mica, kaolinite, and a poorly ordered montmorillonite. The VB22b horizon contains a moderate amount of mica, small to moderate amounts of kaolinite and montmorillonite. The montmorillonite is somewhat poorly ordered but has little, if any, interlayer material.

SOIL CLASSIFICATION: Ustollic Calciorthid; fine-silty, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Reagan SOIL Nos. S65NMex-7-1 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 20725-20737

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)														3A1 a			3A1b			2A2 Coarse fragments b								
		Total				Sand					Silt					3A1b	2A2	3B1	3B2	3B1	3B2									
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	<0.074	<0.0002							Vol.	Wt.	250-2	76-2	19-2				
		Pct. of < 2 mm														250	76	19												
		Carbonate Removed																												
0-5	A	41.2	43.7	15.1	0.1	0.3	0.6	9.2	31.0	30.4	13.3	68.9	10.2	80.2	4.5															
5-13	A	31.1	47.3	21.6	0.2	0.6	0.9	7.1	22.3	26.3	21.0	53.9	8.8	84.7	4.9															
13-23	B1	37.6	40.2	22.2	0.1	0.6	1.0	9.1	26.8	23.5	16.7	57.3	10.8	81.0	6.4															
23-38	B21ca	29.6	43.1	27.3	0.1	0.6	1.0	7.3	20.6	22.5	20.6	48.7	9.0	84.8	9.2															
38-66	B22ca	24.7	42.2	33.1	0.1	0.8	1.0	6.3	16.5	19.6	22.6	40.8	8.2	86.9	9.1															
66-94	B23ca	28.0	38.6	33.4	0.7	1.6	1.9	8.2	15.6	18.4	20.2	39.7	12.4	82.6	10.5															
94-114	B3ca	40.5	31.8	27.7	2.3	4.3	3.8	12.5	17.6	16.9	14.9	42.7	22.9	70.9	8.0															
114-132	C	50.4	25.1	24.5	3.7	6.8	5.3	15.8	18.8	14.1	11.0	43.2	31.6	60.9	7.8															
132-150	Btcab	61.8	18.9	19.3	7.3	7.5	5.9	19.2	21.9	12.7	6.2	47.4	39.9	50.8	10.1															
150-173	IIK2b	67.4	15.1	17.5	5.7	10.4	7.9	21.5	21.9	10.7	4.4	46.7	45.5	45.1	11.6															
173-190	IIK31b	66.4	16.9	16.7	8.5	12.6	8.2	18.5	18.6	5.3	6.1	41.2	47.8	44.4	9.6															
190-216	IIK32b	69.6	15.9	14.5	12.1	13.8	8.6	18.3	16.8	9.9	6.0	37.9	52.8	40.2	8.9															
216-241	IIK32b	73.3	14.3	12.4	17.2	14.5	7.1	18.1	16.4	9.1	5.2	36.7	56.9	36.0	7.3															
		Carbonate Not Removed																												
0-5	A	40.8	46.4	12.8	0.1	0.3	0.7	9.0	30.7	29.7	16.7	67.7	10.1	80.5		tr			tr											
5-13	A	29.0	55.2	15.8	0.2	0.6	0.9	6.6	20.7	28.4	26.8	54.1	8.3	85.8		tr			tr											
13-23	B1	35.3	46.7	18.0	0.1	0.8	1.3	8.9	24.2	23.6	23.1	54.4	11.1	81.1		tr			tr											
23-38	B21ca	26.0	48.4	25.6	0.1	0.7	1.0	6.3	17.9	22.3	26.1	44.9	8.1	86.7		tr			tr											
38-66	B22ca	21.6	49.0	29.4	0.2	0.8	1.1	5.6	13.9	16.5	32.5	34.5	7.7	88.1		tr			tr											
66-94	B23ca	24.8	47.1	28.1	0.6	1.6	1.8	7.0	13.8	18.5	28.6	37.2	11.0	84.7		tr			tr											
94-114	B3ca	40.7	38.1	25.2	2.1	3.9	3.5	11.0	16.2	17.9	20.2	41.5	20.5	73.7		2			4											
114-132	C	46.4	31.2	22.4	3.3	6.0	4.7	14.1	18.3	15.8	15.4	43.5	28.1	64.9		2			4											
132-150	Btcab	58.8	22.4	18.8	6.9	7.1	5.6	17.6	21.6	14.3	8.1	47.8	37.2	53.7		3			5											
150-173	IIK2b	53.3	24.5	22.2	11.1	9.7	5.8	13.3	13.4	9.1	15.4	31.0	39.9	54.3		3			6											
173-190	IIK31b	49.7	26.6	23.7	8.9	9.8	6.0	12.5	12.5	9.6	17.0	29.8	37.2	57.7		75	75		37											
190-216	IIK32b	53.7	22.6	23.7	12.3	12.0	6.6	12.0	10.8	8.8	13.8	26.9	42.9	52.6		60	70		45											
216-241	IIK32b	60.3	19.8	19.9	16.4	12.2	5.7	13.7	12.3	9.2	10.6	30.0	48.0	46.7		60	75		52											
		6A1a Carbonate as CaCO ₃														4D1 Bulk density			Water content			Composition Whole Soil d								
Depth (cm.)	Organic carbon f/	c				4A1d				4A1h				4B1c			4B2			4C1			NONCARBONATE			Carbonate as CaCO ₃				
		19-2	6E1b	3A1a	3A1a	3A1a	1/3-Bar	1/3-Bar	1/3-Bar	1/3-Bar	15-Bar	15-Bar	15-Bar	15-Bar	15-Bar	15-Bar	15-Bar	>2mm.	Sand	Silt	Clay	Pct.	Pct.	Pct.	Pct.		Pct.			
		Pct. 19-2 mm. < 2-mm. Pct.														g/cc			g/cc			Pct.			Pct.			Pct.		
0-5	0.83	12			tr					1.2g					8.1					tr	36	39	13	12						
5-13	1.09	13			tr					1.25	1.24				10.6					tr	27	41	19	13						
13-23	0.67	13			2					1.34	1.36	0.003			10.3					tr	33	35	19	13						
23-38	0.70	15	11	2						1.39	1.43	0.010			12.1					tr	25	37	23	15						
38-66	0.58	17	13	5	2					1.40	1.44	0.010			12.9					tr	21	35	27	17						
66-94	0.45	16		4	2					1.33	1.38	0.014			12.1					tr	24	32	28	16						
94-114	0.29	12		4						1.43	1.45	0.003			10.7					3	34	27	23	13						
114-132		8	6	2						1.4g					8.7					3	44	22	22	9						
132-150		5		2						1.50	1.53	0.007			7.8					3	56	17	17	7						
150-173		43		13	7					1.5g					8.5					4	36	8	9	43						
173-190		41		14	8					1.5g					7.2					50	10	5	tr	35						
190-216		41		15	9					1.5g					7.1					35	10	5	tr	45						
216-241		52	37	11	8					1.5g					6.1					35	15	tr	tr	50						
Depth (cm.)	Ratio 15-Bar Water to Clay																													
	8D1	8D2	e																											
0-5	0.63	0.63	0.61																											
5-13	0.67	0.67	0.56																											
13-23	0.47	0.64	0.53																											
23-38	0.47	0.51	0.52																											
38-66	0.44	0.53	0.47																											
66-94	0.43	0.50	0.43																											
94-114	0.42	0.50	0.44																											
114-132	0.39	0.43	0.39																											
132-150	0.41	0.46	0.43																											
150-173	0.38	0.92	0.85																											
173-190	0.30	0.74	0.73																											
190-216	0.30	0.82	0.83																											
216-241	0.31	0.69	0.78																											

- a. Pretreatment with 0.1N NaOH.
- b. No > 250 mm. Visual estimates of 250-76 mm. and 76-19 mm. incorporated for 20735-20737. 19-2 mm. as percent < 19 mm. measured on laboratory samples for all horizons.
- c. Computed from carbonate measured on < 19 mm. and on < 2 mm., plus respective percentages of 19-2 mm.
- d. Includes coarse fragments, carbonate, and gypsum. Carbonate measured on < 19 mm. and computed to a basis inclusive of > 19 mm. on the assumption that the > 19 mm. has the same carbonate percentage as the 19-2 mm. The carbonate for the 19-2 mm. calculated as described in footnote c.
- e. Clay after carbonate removal and calculated to a carbonate-containing basis.
- f. 7.9 kg/m² to 94 cm (Method 6A).
- g. Assumed bulk density for calculations.

Soil: Reagan Soil Classification: Ustollic Calciorthid; fine-silty, mixed, thermic
 Soil Nos.: S65NMex-7-1
 Location: SE 1/4 NW 1/4, Sec. 3, T21S, R3E, about 1,500 feet west of pipeline road, Dona Ana County, New Mexico.
 Geomorphic Surface: Organ. Land Form: Alluvial fan sloping 2 percent west. Elevation: 4,675 feet.
 Parent Material: Alluvial fan sediments mainly from limestone, calcareous sandstone, siltstone, and shale, with small amount of rhyolite (see Remarks).
 Vegetation: Mainly burrograss, with a few creosotebush and tarbush.
 Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, September 29, 1965.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Slightly crusted, generally smooth and bare between shrubs and grass clumps.

A 20725 0 to 5 cm. Light brownish-gray (10YR 6/2 dry) or dark brown (10YR 4/3 moist) loam; weak fine platy and weak fine crumb, with small amounts of loose reddish sand between plates; soft and loose; few roots; effervesces strongly; abrupt smooth boundary.

A 20726 5 to 13 cm. Grayish-brown (10YR 5.5/2 moist) or dark brown (10YR 4/3 dry) heavy loam; weak coarse platy with some loose sand between plates; soft and loose; roots common; effervesces strongly; abrupt boundary.

B1 20727 13 to 23 cm. Brown (9YR 5/3 dry) or dark brown (9YR 3.5/3 moist) clay loam; weak medium subangular blocky; slightly hard; roots common; few insect burrows that are empty or only partly filled with fines; effervesces strongly; clear wavy boundary.

B21ca 20728 23 to 38 cm. Brown (9YR 5/3 dry) or dark brown (9YR 3.5/3 moist) heavy clay loam; weak medium prismatic breaking to weak medium subangular blocky; hard; roots common; very few carbonate filaments on ped faces; few very fine tubular pores; surfaces of some peds are formed by cylindroidal, apparent insect-burrow fillings; very few empty and partially-filled burrows; effervesces strongly; clear wavy boundary.

B22ca 20729 38 to 66 cm. Brown (9YR 5/3 dry) or dark brown (9YR 4/3 moist) clay loam; weak medium prismatic breaking to moderate medium subangular blocky; hard and very hard; few very fine tubular pores; common carbonate filaments on ped faces and in pores; surfaces of some peds are formed by cylindroidal, apparent insect-burrow fillings; very few empty and partially-filled burrows; effervesces strongly; clear wavy boundary.

B23ca 20730 66 to 94 cm. Brown (9YR 5/3 dry) or dark brown (10YR 4/3 moist) clay loam; weak coarse prismatic breaking to moderate medium subangular blocky; hard; very few fine roots; few carbonate filaments; few very fine tubular pores; effervesces strongly; clear wavy boundary.

B3ca 20731 94 to 114 cm. Brown (9YR 5/3 dry) or dark brown (10YR 3.5/3 moist) sandy clay loam; weak medium subangular blocky, with some massive parts; hard; very few roots; few carbonate filaments; about 2 percent fine pebbles, with thin, discontinuous carbonate coatings; effervesces strongly; clear wavy boundary.

C 20732 114 to 132 cm. Brown (7.5YR 5/4 moist) or dark brown (7.5YR 3.5/4 moist) sandy clay loam; massive; slightly hard; very few roots; very few carbonate filaments; few fine tubular pores; about 2 percent fine pebbles with thin, discontinuous carbonate coatings; effervesces strongly; clear wavy boundary.

Btcab 20733 132 to 150 cm. Yellowish-red (5YR 5/6 dry) or yellowish-red (5YR 3.5/6 moist) sandy clay loam; massive, with few parts subangular blocky; slightly hard and hard; few parts of lower chroma; few fine tubular pores, some of which are faintly lined with carbonate; effervesces strongly; abrupt smooth boundary

IIK2b(C1cab) 20734 150 to 173 cm. Dominantly pink (7.5YR 8/4 dry, 7/4 moist) with smaller parts pink (7.5YR 7/4 dry) or light brown (7.5YR 6/4 moist) sandy clay loam; weak medium and coarse platy; very and extremely hard with some parts that are strongly indurated; very few roots; 2 to 3 percent fine pebbles; few vertical channels, 1/8- to 1/4-inch diameter, extend vertically through the horizon, and contain the very few roots in the horizon; some channels are filled with loose or soft brownish material and contain no roots; effervesces strongly; clear wavy boundary.

IIK31b(C2cab) 20735 173 to 190 cm. Dominantly pinkish-white (higher value than 7.5YR 8/2 dry) or pink (7.5YR 8/4 moist), few parts pale brown (10YR 6.5/3 dry) or brown (10YR 5/3 moist) very gravelly sandy clay loam; massive; hard; very few fine roots; about 20 percent greater than 3-inch diameter; 50 percent 3- to 3/4-inch diameter; carbonate-cemented aggregates of coarse sand and fine pebbles adhering to bottoms of many large pebbles; pebbles coated with carbonate, some interpebble fine earth cemented into clusters; effervesces strongly; clear wavy boundary.

IIK32b:(Cca) 20736, 20737 190 to 241 cm. Brown (7.5YR 5.5/4 dry, 4.5/4 moist) very gravelly heavy sandy loam; massive and single grain; soft and loose; discontinuous carbonate coatings on pebbles; estimated 5 percent greater than 3 inches, 25 to 35 percent 3- to 3/4-inch; effervesces strongly. (Split for sampling purposes.)

Remarks: The upper two horizons may be formed in a younger deposit, as suggested by the distinct platiness. This interpretation is supported by the discontinuous occurrence of a stone line at one side of the pit, at 5- to 6-inch depth. However, the deposit has been emplaced long enough for the growth of well-formed clumps of burrograss. Locally, the plates have been warped or almost wholly displaced by roots and insects.

Alluvial parent material in the upper 132 cm is Organ alluvium. Underlying fan alluvium appears to be associated with a buried Jornada II surface.

Clay Mineralogy, Method 7A2. A (20726), B22ca, Btcab, and IIK31b. Clay mineral suite similar in the four horizons studied: trace to small amounts of kaolinite, and small amounts of mica and an interlayer complex involving montmorillonite, mica, and chloritic interlayers. Minerals are poorly ordered. Amounts and degree of crystallinity increase slightly with depth.

SOIL CLASSIFICATION: Typic Torrifluent; loamy-skeletal, mixed, calcareous, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Anthony, loamy-skeletal variant SOIL Nos. S65Mex-7-2 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 20738-20752

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)														3A1 a			2A2 Coarse fragments b																		
		Total				Sand				Silt						3A1 a	3A1 a	3A1 a	3B2 Vol.	3B1 Mt.																	
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	0.02-0.002	Int. III (0.2-0.02)	Int. II (2-0.1)	<0.074	<250						<75	<19-2															
Pct. of < 2 mm																																					
Carbonate Removed																																					
0-3	Aca	69.4	20.2	10.4	3.3	8.5	8.0	21.1	28.5	15.6	4.6	57.6	40.9	48.3																							
3-8	Bca	68.5	20.6	10.9	3.7	7.0	7.5	21.5	28.8	15.8	4.8	58.5	39.7	49.8																							
8-28	IIC1ca	67.2	20.2	12.6	6.3	8.3	7.3	20.6	24.7	15.2	5.0	53.0	42.5	47.7																							
28-41	IIC2ca	75.4	14.5	10.1	9.8	11.4	9.7	23.6	20.9	10.3	4.2	45.5	54.5	36.4																							
41-64	IIC3	85.2	7.8	7.0	17.8	25.9	15.7	17.2	8.6	4.5	3.3	21.5	76.6	19.4																							
64-89	IIC4	69.1	17.5	13.4	9.6	16.8	11.2	17.7	13.8	11.0	6.5	34.5	55.3	39.1																							
89-97	IVC5	80.7	10.5	8.8	15.5	26.1	14.2	16.1	8.8	5.9	4.6	22.7	71.9	24.3																							
97-107	VC6	59.8	24.5	15.7	5.4	9.6	8.1	16.5	20.2	15.5	9.0	45.7	39.6	53.0																							
107-117	VAb	46.6	35.8	17.6	1.0	2.6	2.9	14.1	26.0	22.9	12.9	58.0	20.6	70.2																							
117-130	VB1b	42.7	37.7	19.6	0.1	0.5	1.6	13.6	26.9	24.2	13.5	61.0	15.8	75.1																							
130-150	VB21cab	41.1	38.1	20.8	0.3	0.8	1.2	11.3	27.5	24.5	13.6	60.6	13.6	77.3																							
150-180	VB22cab	43.5	35.6	20.2	0.5	1.5	1.9	12.2	27.4	23.1	12.5	59.6	16.1	74.5																							
180-216	VB3b	45.0	34.0	21.0	1.3	2.2	2.9	13.6	25.0	21.6	12.4	55.9	20.0	71.5																							
216-259	VC1b	43.4	33.6	23.0	0.4	1.8	3.2	14.7	23.3	20.5	13.1	53.9	20.1	71.8																							
259-287	VC2b	49.3	31.5	19.2	0.1	1.3	2.5	15.1	30.3	21.0	10.5	62.5	19.0	69.9																							
Carbonate Not Removed																																					
0-3	Aca	70.2	21.9	7.9	4.5	8.7	8.4	20.0	28.6	16.1	5.8	57.5	41.6	48.0			20	35	16																		
3-8	Bca	68.3	22.9	8.8	5.1	8.1	7.4	20.1	27.6	16.7	6.2	57.0	40.7	49.3			20	35	16																		
8-28	IIC1ca	64.5	23.4	12.1	7.4	8.2	7.2	18.8	22.9	14.9	8.5	49.5	41.6	49.8			50	65	37																		
28-41	IIC2ca	75.1	16.1	8.8	14.1	12.8	9.9	20.8	17.5	9.6	6.5	39.3	57.6	24.9			50	65	39																		
41-64	IIC3	84.0	9.8	6.2	17.1	23.1	15.7	18.8	9.3	5.2	4.6	23.9	74.7	20.9			45	70	63																		
64-89	IIC4	67.5	21.7	10.8	11.3	16.7	11.1	16.1	12.3	10.4	11.3	31.3	55.2	40.0			15	30	23																		
89-97	IVC5	82.9	9.5	7.6	19.0	28.9	14.9	13.4	6.7	4.3	3.2	17.5	76.2	20.8			30	50	32																		
97-107	VC6	59.7	27.2	13.1	5.7	11.4	8.9	15.8	17.9	15.4	11.8	42.8	41.8	51.4			4	7	7																		
107-117	VAb	45.4	39.7	14.9	1.2	2.5	3.0	13.5	25.2	23.1	16.6	57.9	20.2	71.1			1	2	2																		
117-130	VB1b	41.5	41.8	16.7	0.2	0.7	1.7	12.8	26.1	23.3	18.5	58.8	15.4	75.9			tr	tr	tr																		
130-150	VB21cab	39.1	42.3	18.6	0.2	0.7	1.2	10.5	26.5	23.9	18.4	58.5	12.6	78.6			tr	tr	tr																		
150-180	VB22cab	40.2	40.1	19.7	0.7	1.5	1.8	10.8	25.4	22.4	17.7	55.9	14.8	76.3			1	2	2																		
180-216	VB3b	41.8	39.2	19.0	0.7	2.2	3.0	12.1	23.8	22.5	16.7	54.8	18.0	74.3			2	4	4																		
216-259	VC1b	40.9	39.0	20.1	0.6	1.7	3.0	13.1	22.5	20.2	18.8	51.8	18.4	73.6			1	2	2																		
259-287	VC2b	47.3	37.9	14.8	0.4	1.4	2.5	14.1	28.9	20.7	17.2	60.0	18.4	71.1			1	2	2																		
Depth (cm.)	Organic carbon %	Carbonate as CaCO ₃					Bulk density		4D1		Water content					Composition Whole Soil %																					
		19-2 Pct. C	6E1b Total	3A1a <0.02	3A1a <0.002	3A1a <0.001	4A1d 1/3-Bar	4A1h Oven-Dry	COLE	4B1c 1/3-Bar	4B2 15-Bar	4C1 1/3-to 15-Bar	NONCARBONATE			Carbonate as CaCO ₃																					
	Pct.																																				
0-3	0.57	27	8		tr							5.2	25	45	10	5	15																				
3-8	0.57	22	9		1							5.1	25	45	10	5	15																				
8-28	0.79	37	15	6	4	1						7.2	40	20	5	5	30																				
28-41	0.41	37	16	3	1							5.1	40	20	5	5	30																				
41-64	0.33	37	16		1							4.2	45	25	tr	tr	30																				
64-89	0.25	26	17		3							6.2	20	40	10	10	20																				
89-97	0.16	32	16		tr							4.6	35	30	5	5	25																				
97-107	0.28		15		1							6.5	5	48	19	12	16																				
107-117	0.35		18		2			1.25	1.25			8.0	2	37	29	14	18																				
117-130	0.36		16		2			1.27	1.26			18.8	8.8	0.13	tr	36	32	16	16																		
130-150	0.47		15		3			1.39	1.38			17.6	9.3	0.12	tr	35	32	18	15																		
150-180	0.44		16		4	1		1.46	1.48	0.003		16.8	8.7	0.12	2	36	29	17	16																		
180-216	0.34		17		3			1.32	1.35	0.007		21.6	8.3	0.18	3	35	27	17	18																		
216-259	0.34		17		4	2		1.26	1.25	-		21.5	8.9	0.16	2	35	27	19	17																		
259-287	0.26		17		3			1.31	1.32	0.002		23.6	8.6	0.16	tr	41	26	16	17																		
Depth (cm.)	Ratio 15-Bar Water to Clay																																				
	8D1	8D2	e																																		
0-3	0.66	0.66	0.54																																		
3-8	0.58	0.65	0.51																																		
8-28	0.60	0.89	0.67																																		
28-41	0.58	0.65	0.60																																		
41-64	0.68	0.81	0.71																																		
64-89	0.57	0.79	0.56																																		
89-97	0.61	0.61	0.62																																		
97-107	0.50	0.54	0.49																																		
107-117	0.54	0.62	0.55																																		
117-130	0.53	0.60	0.53																																		
130-150	0.50	0.60	0.53																																		
150-180	0.44	0.55	0.50																																		
180-216	0.44	0.52	0.48																																		
216-259	0.44	0.55	0.47																																		
259-287	0.57	0.71	0.53																																		

- a. Pretreatment with 0.1N NaOH.
- b. > 76 mm. less than 5 percent by volume throughout; 76-19 mm. from visual volume estimate; 19-2 mm. as percent < 19 mm. from laboratory sample.
- c. Computed from carbonate measured on < 19 mm. and on < 2 mm., plus, respective percentages of 19-2 and < 2 mm.
- d. Inclusive of coarse fragments, carbonate, and gypsum. Carbonate computed. Assumed 19-2 mm. for 20745 to 20752 contains 30 percent carbonate. Sand, silt, and clay computed from values obtained by Method 3A3.
- e. Clay after carbonate removal and calculated to a carbonate-containing basis.
- f. 3.4 kg/m² to 97 cm (Method 6A).
- g. Assumed for calculations.

Carbonate Radiocarbon Dates (see description for charcoal date)
 A C-14 age of 2,730 ± 110 yrs. B.P. (J-4412; 67L935) was obtained for the carbonate in the < 0.05 mm. removed from the > 9 mm. pebbles of the IIC2ca horizon. The C-13 is -3.6. The C-14 age has not been corrected for the C-13 value. Notes follow on the proportion of the sample and its composition: The field sample 100 lbs. > 9 mm. was first cleaned with an air jet and then placed overnight in distilled water. Larger pebbles sorbed with nylon-bristle vegetable brush; smaller pebbles only agitated in water. Passed suspension through 300 mesh sieve. Dried the < 0.05 mm. Total weight 95 g. Contains 45 percent total carbonate; 21 percent 0.02-0.002 mm. carbonate; and 17 percent < 0.002 mm. The organic carbon percentage is 1.67 percent. The methods are the same as those used for the regular data. Morphology consistent with a pedogenic origin. Pebbles consist of dark limestone, sandstone and siltstone, with appreciable component of pebbles of K fabric. Treatment removed loose carbonate coatings but harder coatings remained. Elected not to remove harder coatings because of uncertainty whether the carbonate authigenic to present cycle soil development. This is sample number 1 in the Soil Monograph.

Soil Classification: Typic Torrifluent; loamy-skeletal, mixed, calcareous, thermic

Soil: Anthony, loamy-skeletal variant

Soil Nos.: S65RMex-7-2

Location: SE 1/4 NW 1/4, Sec. 2, T21S, R3E, north bank of Gardner Spring Arroyo, about 400 feet west of asphalt road, Dona Ana County, New Mexico. Geomorphic Surface: Organ. Elevation: 4,760 feet.

Land Form: Alluvial terrace sloping 2 percent to west; relict interfan valley-fill surface. The fill is inset below remnants of Jornada I fans and is partly dissected by arroyo channels. Vegetation: Mainly creosotebush, few tarbush.

Parent Material: Organ terrace alluvium derived primarily from limestone, calcareous sandstone, siltstone, and shale, with some rhyolite and quartzite.

Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, October 1, 1965.

Described by: L. H. Gile.

Soil Surface. Thirty to 40 percent covered with limestone, calcareous sandstone, quartzite and rhyolite pebbles. A discontinuous layer of loose sand, 1 to 2 mm. thick, occurs between pebbles. Most pebbles are less than about 1 inch in diameter, and some have discontinuous coatings of alloegenic carbonate.

Aca 20738 0 to 3 cm. Brown (9YR 5/3 dry, 4/3 moist) and light brownish-gray (9YR 6/2 dry) or dark grayish-brown (9YR 4/2 moist) gravelly sandy loam; weak fine crumb and single grain; soft and loose; few roots; pebbles either not carbonate-coated or are faintly and discontinuously coated, primarily on undersides; effervesces strongly; abrupt smooth boundary.

Bca 20739 3 to 8 cm. Brown (10YR 5.5/3 dry, 4/3 moist) gravelly sandy loam; massive; soft, but harder in place than above; roots few to common; some pebbles have very thin, discontinuous carbonate coatings, but less continuous and prominent than in IIC2ca; effervesces strongly; clear smooth boundary.

IIC1ca 20740 8 to 28 cm. Brown (9YR 5.5/3 dry, 4/3 moist) very gravelly sandy loam; fine earth is massive to weak subangular blocky; soft; few roots; distinct carbonate pebble coatings; many of which are continuous or nearly so; effervesces strongly; clear wavy boundary.

IIC2ca 20741 28 to 41 cm. Brown (9YR 5.5/3 dry, 4/3 moist) very gravelly sandy loam; massive; soft; few roots; pebbles contain small amount of authigenic carbonate but less than IIC2ca; very thin, discontinuous carbonate coatings on pebbles; effervesces strongly; clear wavy boundary.

IIC3 20742 41 to 64 cm. Brown (9YR 5.5/3 dry, 4/3 moist) very gravelly loamy sand; massive and single grain; soft and loose; very few roots; commonly pebbles have faint, very discontinuous carbonate coatings; effervesces strongly; abrupt wavy boundary.

IIC4 20743 64 to 89 cm. Pale brown (10YR 6/3 dry) or brown (10YR 4/3 moist) sandy loam, with scattered discontinuous gravelly lenses an inch or so thick; massive; slightly hard; very few roots; the horizon commonly coarsens with depth to a loamy sand or light sandy loam; at the base of the horizon there is a discontinuous gravel layer which rests abruptly on the underlying horizon; effervesces strongly; abrupt wavy boundary.

IVC5 20744 89 to 97 cm. Light yellowish-brown (9YR 6.5/4 dry, 5/4 moist) gravelly sandy loam; massive; soft; few roots; stone line at base with pebbles up to 3-inch diameter; pebbles have thin carbonate coatings; effervesces strongly; abrupt wavy boundary.

VC6 20745 97 to 107 cm. Brown (9YR 5.5/3 dry, 4/3 moist) heavy sandy loam with several strata, 1 to 2 mm. thick, that are heavy loam texture; massive; slightly hard; very few roots; very few pebbles, which have faint filamentous discontinuous coatings; effervesces strongly; abrupt smooth boundary.

VAb 20746 107 to 117 cm. Brown (10YR 5.5/3 dry, 4/3.5 moist) fine sandy loam; generally massive, with weak tendency toward subangular blocky; weak prisms from underlying B horizon extend faintly through the horizon; slightly hard; very few roots; in places this horizon has insect burrows, some of which are empty; some channels are of cylindrical shape and about 1/4- to 1/2-inch diameter; effervesces strongly; clear smooth boundary.

VB1b 20747 117 to 130 cm. Brown (9YR 5.5/3 dry, 4/3 moist) heavy loam; weak very coarse prismatic, breaking to coarse and medium prisms; prisms are weak medium and fine subangular blocky internally; slightly hard to hard; very few roots; few fine tubular pores; very few faint carbonate filaments; effervesces strongly; clear wavy boundary.

VB21cab 20748 130 to 150 cm. Brown (9YR 5.5/3 dry, 4/3 moist) heavy loam; compound very coarse to medium prismatic and weak subangular blocky; hard and very hard; firmer in place than overlying horizons; very few roots; some of edges of structural units are formed by cylindrical insect burrow fillings; few fine tubular pores; a few faint fine carbonate filaments; effervesces strongly; clear wavy boundary.

VB22cab 20749 150 to 180 cm. Pale brown (9YR 6/3 dry) or brown (9YR 4.5/3 moist) heavy loam; compound weak very coarse to medium prismatic and weak medium subangular blocky; hard and very hard; few roots; faces of some peds are formed by cylindrical insect burrow fillings; some empty burrows, of cylindrical shape and 1/4- to 1/2-inch diameter, with smooth walls; few carbonate filaments; few very fine tubular pores; effervesces strongly; clear wavy boundary.

VB3b 20750 180 to 216 cm. Pale brown (9YR 6/3 dry) or brown (9YR 4/3 moist) loam; compound weak, very coarse to medium prismatic and weak medium subangular blocky; hard; very few roots; fewer insect burrow fillings than above; very few fine tubular pores; very few faint carbonate filaments; effervesces strongly; clear wavy boundary.

VC1b 20751 216 to 259 cm. Pale brown (9YR 6/5 dry) or brown (9YR 4/3 moist) loam; massive to weak medium subangular blocky; hard; very few roots; few very fine tubular pores; prisms from overlying B extend weakly into this horizon; there is practically no evidence of insect mixing and burrow fillings; very few faint carbonate filaments; effervesces strongly; clear wavy boundary.

VC2b 20752 259 to 287 cm. Light brown (8YR 6/4 dry) or brown (8YR 4.5/4 moist) light loam; generally massive, with few subangular blocky parts; slightly hard; very few roots; very few carbonate filaments; effervesces strongly.

Remarks: The IIC2ca horizon contains the carbonate bulge as evidenced by the morphology (pebble coatings). The VC7 is a transitional horizon, not always present, that is finer than the overlying sediments, but is weakly stratified and looser than the underlying paleosol. The paleosol was sampled 10 feet east of the overlying horizons at a more typical place.

Alluvial parent materials in the upper 107 cm. (42 inches) are designated Organ II alluvium by Gile and Hawley (1968). Underlying valley fill is associated with the Organ I surface.

A charcoal horizon occurring just above the paleosol was dated at 2,200 ± 95 years. The charcoal horizon occurred at depths of about 75 to 110 cm. and was about 60 cm. wide. It occurred in the lateral analogue of horizons IIC5 and IVC6.

SOIL CLASSIFICATION: Typic Torrifuvent; coarse-loamy, mixed, calcareous, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Anthony SOIL Nos. S65NMex-7-3 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 20753-20761

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1 a/			2A2 Coarse fragments b/			
		Total				Sand				Silt			Int. III (0.05-0.02)	Int. II (0.02-0.02)	(2-0.1)	<0.074	3B2 Vol. 250-2	Wt. 3B1	
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.02-0.02)	(2-0.1)						<0.074	76-2
Pct. of < 2 mm																	%<250	%<76	%<19
Carbonate Removed a/																			
0-5	A	74.8	16.2	9.0	0.8	3.3	5.3	27.3	38.1	13.3	2.9	70.6	36.7	47.5					
5-13	A	66.9	21.1	12.0	1.2	4.8	6.0	22.4	32.5	15.5	5.6	63.4	34.4	52.5					
13-18	IIA	73.1	16.1	10.8	2.2	11.8	14.8	23.9	20.4	11.2	4.9	45.2	52.7	38.6					
18-38	IIIA	60.4	25.2	14.4	1.7	5.1	6.3	19.5	27.8	17.1	8.1	57.6	32.6	57.0					
38-43	IVC1	69.5	19.2	11.3	1.1	4.0	8.8	27.1	28.5	13.4	5.8	58.4	41.0	47.1					
43-64	VC2	62.6	25.1	12.3	2.4	4.6	5.4	18.6	31.6	18.3	6.8	62.4	31.0	57.3					
64-81	VC3	77.8	13.5	8.7	9.3	17.0	13.2	22.4	15.9	8.7	4.8	37.1	61.9	31.1					
81-119	VIC4	81.7	11.5	6.8	15.5	23.0	13.5	18.4	11.3	7.3	4.2	28.3	70.4	24.5					
119-152	VIIIC5	68.6	20.1	11.3	5.8	17.4	9.5	20.1	21.8	12.8	7.3	46.9	46.8	44.6					
Carbonate Not Removed																			
0-5	A	74.3	18.9	6.8	0.7	3.8	6.1	26.8	36.9	13.4	5.5	68.9	37.4	46.4	1	2	2		
5-13	A	65.7	24.6	9.7	1.5	5.2	6.1	21.4	31.5	16.3	8.3	62.3	34.2	53.3	2	4	4		
13-18	IIA	72.6	18.4	9.0	3.8	12.7	14.3	22.7	19.1	11.1	7.3	42.5	53.5	38.6	2	4	4		
18-38	IIIA	58.1	29.3	12.6	2.0	6.0	6.9	18.3	24.9	17.4	11.9	53.8	33.2	57.4	2	3	3		
38-43	IVC1	69.1	20.4	10.5	0.9	5.1	10.3	27.4	25.4	12.6	7.8	54.0	43.7	45.4	1	2	2		
43-64	VC2	62.4	26.7	10.9	3.3	5.4	6.2	18.3	29.2	17.5	9.2	58.6	33.2	55.9	4	7	7		
64-81	VC3	74.9	16.8	8.3	7.0	14.5	12.7	23.3	17.4	9.6	7.2	40.0	57.5	34.9	10	21	21		
81-119	VIC4	83.1	10.5	6.4	26.6	22.8	11.5	14.1	8.1	5.4	5.1	20.8	75.0	21.4	70	80	60		
119-152	VIIIC5	68.3	21.3	10.4	8.4	12.8	9.7	18.5	18.9	12.2	9.1	42.2	49.4	43.0	15	28	28		
Depth (cm.)	6A1a Organic carbon f/ Pct.	Carbonate as CaCO ₃				Bulk density			4D1 COLE	Water content			Composition Whole Soil d/						
		e/ 19-2	6E1b Total	3A1a <0.02	3A1a <0.002	3A1a <0.001	4A1d 1/3- Bar	4A1h Oven Dry		4B1c 1/3- Bar	4B2 15- Bar	4C1 1/3-to 15-Bar	NONCARBONATE			Carbonate as CaCO ₃			
		Pct.	< 2-mm. Pct.				g/cc	g/cc		g/cc	Pct.	Pct.	in./in.	Pct.	Pct.		Pct.	Pct.	
0-5	0.66	8		tr		1.3g			4.4	4.4	0.20	1	67	15	8		9		
5-13	0.71	13		tr		1.45	1.43	-	19.5	5.9	0.20	2	56	18	10	14			
13-18	0.49	16	3	tr		1.4g			5.2	5.2		2	59	13	9	17			
18-38	0.54	14	7	2		1.34	1.32	-	16.5	6.8	0.13	2	50	21	12	15			
38-43	0.33	14	5	1		1.3g			5.8	5.8		1	59	16	10	14			
43-64	0.41	14		1		1.35	1.33	-	18.4	6.0	0.17	4	50	20	10	16			
64-81	0.19	20		tr		1.3g			4.9	4.9		20	50	10	5	15			
81-119	0.24	36		1		1.3g			3.9	3.9		50	20	tr	tr	30			
119-152	0.24	28		1		1.3g			5.6	5.6		20	13	12	7	18			
Depth (cm.)	Ratio 15-Bar Water to Clay			e/															
	8D1	8D2																	
0-5	0.65	0.65	0.53																
5-13	0.61	0.61	0.57																
13-18	0.58	0.58	0.57																
18-38	0.54	0.64	0.55																
38-43	0.55	0.61	0.60																
43-64	0.55	0.61	0.57																
64-81	0.59	0.59	0.65																
81-119	0.61	0.72	0.68																
119-152	0.54	0.60	0.58																

a/ Pretreatment with 0.1N NaOH.
 b/ Little > 76 mm except in 20760. Visual estimates of volume 76-19 mm for 20759, 20760.
 c/ Computed from carbonate measured on < 19 mm and on < 2 mm.
 d/ Inclusive of coarse fragments, carbonate, and gypsum. Carbonate for 76-19 mm estimated from calculated values for 19-2 mm.
 e/ Based on clay after carbonate removal; calculated to a carbonate-containing basis.
 f/ 4.7 kg/m² to 81 cm (Method 6A).
 g/ Assumed for calculations.

Soil: Anthony Soil Classification: Typic Torrifluent; coarse-leany, mixed, calcareous, thermic
Soil Nos.: S65NMex-7-3

Location: SW 1/4 NW 1/4, Sec. 2, T21S, R3E, south bank of Gardner Spring Arroyo about 250 feet east of gravel road,
Dona Ana County, New Mexico. Geomorphic Surface: Organ. Elevation: 4,725 feet.

Land Form: Alluvial terrace sloping 2 percent to west; relict interfan valley-fill surface. The fill is inset below
remnants of Jornada I fans and is partly dissected by arroyo channels. Vegetation: Creosotebush, tarbush.

Parent Material: Terrace alluvium derived from limestone and calcareous sandstone, siltstone, and shale with small
amounts of rhyolite and quartzite.

Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, October 1, 1965.

Described by: L. H. Gile

Soil Surface. 5 to 10 percent covered with fine pebbles of limestone, calcareous sandstone and rhyolite.

A 20753 0 to 5 cm. Brown (10YR 5.5/3 dry) or dark brown (10YR 3.5/3 moist) sandy loam; upper 1/4 inch weak
medium platy; remainder weak very fine crumb and single grain; soft and loose; few roots; effervesces strongly;
abrupt smooth boundary.

A 20754 5 to 13 cm. Grayish brown (10YR 5/2.5 dry) or dark brown (10YR 4/2.5 moist) sandy loam; weak
coarse platy; slightly hard; few roots; few faint carbonate filaments on plate surfaces and in interiors; a few
pebbles have weak carbonate coatings; effervesces strongly; abrupt smooth boundary.

IIA 20755 13 to 18 cm. Brown (10YR 5/3 dry) or dark brown (10YR 4/3 moist) light sandy loam; massive and
single grain; soft and loose; few roots; this layer is fairly distinct and has been little mixed with adjacent hori-
zons; pebbles have thin, discontinuous carbonate coatings; effervesces strongly; abrupt smooth boundary.

IIIA 20756 18 to 38 cm. Brown (10YR 5.5/3 dry) or dark brown (10YR 4/3 moist) light loam; massive, slightly
hard and hard; few roots; few carbonate filaments; abrupt smooth boundary.

IVC1 20757 38 to 43 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) light sandy loam; massive;
soft; few roots; in places, a few weak peds and channels extend into this horizon and suggest some mixing of strata;
effervesces strongly; abrupt smooth boundary.

VC2 20758 43 to 64 cm. Brown (10YR 5/3 dry, 4/3 moist) sandy loam; massive; slightly hard; very few roots;
horizon is laterally discontinuous and where absent may be a result of mixing with adjacent horizons; effervesces
strongly; clear wavy boundary.

VC3 20759 64 to 81 cm. Brown (10YR 5/3 dry, 3.5/3 moist) sandy loam; massive; slightly hard; few roots;
pebbles have very thin discontinuous filamentous coatings; effervesces strongly; clear wavy boundary.

VIC4 20760 81 to 119 cm. Brown (10YR 5/3 dry, or 10YR 4/3 moist) very gravelly loamy sand; massive and
single grain; soft and loose; very few roots; few discontinuous, filamentous pebble coatings; effervesces strongly;
clear wavy boundary.

VLIC5 20761 119 to 152 cm. Dominantly brown (10YR 5/3 dry) or dark brown (10YR 4/3 moist) sandy loam, with
occasional fine gravel lenses an inch or so thick; some pebbles have thin, discontinuous carbonate coatings.

REMARKS: Scattered apparent droppings (1- to 2-mm. diameter) of small rodents occur in the upper several feet of the
pedon, as do a few insect tunnels (1/8- to 1/4-inch diameter), some empty and some filled with loose material.
The finer-textured horizons tend to have more burrows than the coarser-textured horizons. No distinct horizon of
carbonate accumulation is apparent.

SOIL CLASSIFICATION: Typic Torrifuvent; coarse-loamy, mixed, calcareous, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Anthony SOIL Nos. S65NMex-7-4 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 20762-20769

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)													2A2 Coarse fragments b/					
		Total			Sand					Silt			Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	<0.074	3B2 Vol. 250-2	Wt. 3B1 76-2	19-2	
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	0.02-0.002	250-2								76-2
Pct. of < 2 mm																		% < 250	% < 76	% < 19
Carbonate Removed																				
0-10	A & C1	86.6	8.5	4.9	23.1	22.3	11.5	17.7	12.0	5.6	2.9	27.4	74.6	20.1						
10-36	C2	89.0	6.4	4.6	7.1	17.4	15.3	33.2	16.0	4.4	2.0	39.5	73.0	18.5						
36-43	IIAcab	65.4	23.3	11.3	5.4	9.9	7.4	18.0	24.7	17.4	5.9	53.6	40.7	50.3						
43-64	IIAcab	66.3	21.3	12.4	6.2	10.7	7.8	18.6	23.0	14.3	7.0	49.2	43.3	48.1						
64-76	IIAcab	69.0	19.6	11.4	6.5	9.5	7.9	20.8	24.3	16.1	3.5	53.8	44.7	45.5						
76-109	IIC1cab	76.0	15.4	8.6	5.2	11.2	10.7	25.5	23.4	11.3	4.1	50.3	52.6	37.4						
109-135	IIC2b	77.1	14.7	8.2	6.8	12.0	11.1	24.8	22.4	10.6	4.1	48.0	54.7	35.7						
135-160	IIC3b	77.3	14.4	8.3	3.6	10.1	11.3	27.2	25.1	10.5	3.9	52.5	52.2	36.6						
Carbonate Not Removed																				
0-10	A & C1	85.2	9.4	5.4	18.6	21.7	12.6	19.3	13.0	5.8	3.6	29.6	72.2	22.0			40		54	
10-36	C2	91.6	4.7	3.7	10.9	22.7	17.4	30.2	10.4	3.3	1.4	29.3	81.2	12.8			15		22	
36-43	IIAcab	64.0	25.4	10.6	5.4	10.1	7.7	17.6	23.2	15.7	9.7	50.1	40.8	50.6			10	16	16	
43-64	IIAcab	61.3	24.3	14.4	5.2	9.9	7.9	17.4	20.9	14.6	9.7	46.5	40.4	51.4			10	15	15	
64-76	IIAcab	65.5	21.7	12.8	7.2	9.3	7.7	19.2	22.1	13.1	8.6	47.4	43.4	47.8			10	16	16	
76-109	IIC1cab	74.4	16.7	8.9	5.9	12.5	11.0	23.5	21.5	10.5	6.2	46.1	52.9	38.2			5	9	9	
109-135	IIC2b	73.7	17.3	9.0	2.8	8.3	10.3	28.1	24.2	11.2	6.1	52.4	49.5	39.9			2	4	4	
135-160	IIC3b	73.8	17.4	8.8	2.8	9.0	9.9	26.0	26.1	11.9	5.5	54.1	47.7	41.0			3	5	5	
Depth (cm.)	6A1a Organic carbon f/ Pct.	Carbonate as CaCO ₃				Bulk density			4D1 COLE	Water content			Composition Whole Soil d/							
		6E1b 19-2 mm. c/ Pct.	3A1a Total	3A1a <0.02	3A1a <0.002	4A1d 1/3-Bar	4A1h Oven-Dry	4E1c 1/3-Bar		4E2 15-Bar	4C1 1/3-to 15-Bar	NONCARBONATE				Carbonate as CaCO ₃				
		< 2-mm. Pct.				g/cc	g/cc	g/cc		Pct.	Pct.	in/in.	Pct.	Pct.	Pct.	Pct.	Pct.			
0-10	0.16	42	11		tr			1.3g			3.2									
10-36	0.10	31	13		tr			1.3g			3.1									
36-43	0.49	37	6		1			1.44	1.41		11.7	6.8	0.06	10	52	18	9	11		
43-64	0.42	43	10		3			1.36	1.35	-	18.2	7.5	0.13	9	51	16	9	15		
64-76	0.36	24	11		4			1.41	1.37	-	16.6	6.6	0.12	12	51	15	9	13		
76-109	0.16	31	9		1			1.55	1.51	-	12.4	4.8	0.11	6	63	13	7	11		
109-135	0.15	35	10		1			1.52	1.50	-	10.3	4.8	0.08	3	66	13	7	11		
135-160	0.12	30	10		1						4.5			4	66	12	7	11		
Depth (cm.)	Ratio 15-Bar Water to Clay			e/																
	8D1	8D2	e/																	
0-10	0.59	0.59	0.73																	
10-36	0.84	0.84	0.77																	
36-43	0.64	0.71	0.64																	
43-64	0.52	0.66	0.67																	
64-76	0.52	0.75	0.65																	
76-109	0.54	0.61	0.61																	
109-135	0.53	0.60	0.65																	
135-160	0.51	0.58	0.60																	

- a/ Pretreatment with 0.1N NaOH.
- b/ Five percent 19-76 mm in 20762 and 20763; no > 76 mm. Insignificant > 19 mm in 20764 to 20769.
- c/ Computed from carbonate measured on < 19 mm and on < 2 mm.
- d/ Inclusive of 76-2 mm, carbonate, and gypsum. Carbonate measured on < 19 mm and computed to > 19 mm on the assumption that the > 19 mm has the same carbonate percentage as the 19-2 mm.
- e/ Clay after carbonate removal calculated to a carbonate-containing basis.
- f/ 3.3 kg/m² to 109 cm (Method 6A).
- g/ Assumed for calculations.

Soil: Anthony Soil Classification: Typic Torrifluent; coarse-loamy, mixed, calcareous, thermic
 Soil Nos.: S65NMex-7-4
 Location: NE 1/4 NE 1/4, Sec. 3, T21S, R3E, northwest wall of gully trenching alluvium of side valley tributary to Gardner Spring Arroyo, Dona Ana County, New Mexico.
 Geomorphic Surface: Organ. Elevation: 4725 feet.
 Land Form: Floor of small valley (ranging from about 200 to 300 feet wide) cut into Jornada I fan and tributary to major interfan valley. Valley-fill surface, sloping 2 percent to southwest, and locally cut by gullies.
 Parent Material: Terrace alluvium derived from limestone and calcareous sandstone, siltstone and shale; with some rhyolite, granite, and quartzite (see Remarks).
 Vegetation: Mainly creosotebush, with a few mesquite and tarbush.
 Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, October 1, 1965.
 Described by: L. H. Gile

Soil Surface. 20 to 30 percent covered with fine pebbles of limestone, calcareous sandstone, granite, and rhyolite; scattered calcrete fragments; many pebbles have allochthonous carbonate coatings.

A 20762 0 to 1 cm. Light brownish gray (10YR 6/2 dry) or brown (10YR 4/3 moist) very gravelly sandy loam; weak medium platy and single grain; soft and loose; few roots; effervesces strongly; abrupt smooth boundary. (Included in C1 for sampling.)

C1 20762 1 to 10 cm. Brown (10YR 5/3 dry, 4/3 moist) very fine gravelly sand; massive and single grain; soft and loose; few roots; pebbles have some allochthonous but no authigenic carbonate coatings; effervesces strongly; abrupt smooth boundary. (Included in A for sampling.)

C2 20763 10 to 36 cm. Light brown (8YR 6/4 dry) or brown (8YR 4.5/4 moist) gravelly loamy sand; massive; soft; few roots; distinct, finer strata range from about 1 mm. to several mm. thick, and are composed of dominantly medium sand; occasional distinct, thicker strata up to an inch or so thick, that are composed mainly of coarse or very coarse sand, and that laterally grade into discontinuous fine gravelly strata; most of gravels are mainly less than an inch in diameter; effervesces strongly; abrupt smooth boundary.

IIAcab 20764 36 to 43 cm. Pinkish-gray (8YR 6/2 dry) or dark brown (8YR 3.5/3 moist) heavy sandy loam; massive; slightly hard; few roots; carbonate occurs as few filaments and as thin, discontinuous and continuous coatings on pebbles; effervesces strongly; clear wavy boundary.

IIAcab 20765 43 to 64 cm. Light brownish gray (9YR 6/2 dry) or dark brown (9YR 3.5/3 moist) heavy sandy loam; generally massive with some parts weakly subangular blocky; hard and slightly hard; few roots; very few insect burrow fillings; few carbonate filaments, and thin pebble coatings; effervesces strongly; clear wavy boundary.

IIAcab 20766 64 to 76 cm. Light yellowish-brown (9YR 6/4 dry) or dark brown (9YR 4/3 moist) sandy loam; mainly massive with few parts subangular blocky; slightly hard; few roots; very few carbonate filaments and thin, discontinuous pebble coatings; effervesces strongly; clear wavy boundary.

IIC1cab 20767 76 to 109 cm. Pale brown (9YR 6/3 dry, 4/3 moist) sandy loam; massive; slightly hard; few roots; very thin, discontinuous carbonate coatings on the few pebbles; effervesces strongly; clear wavy boundary.

IIC2b 20768 109 to 135 cm. Light yellowish-brown (9YR 6/4 dry) or yellowish-brown (9YR 5/4 moist) sandy loam; massive; slightly hard; very few roots; effervesces strongly; clear wavy boundary.

IIC3b 20769 135 to 160 cm. Light yellowish-brown (9YR 6/4 moist) or yellowish-brown (9YR 5/4 dry) sandy loam; massive; slightly hard; very few roots; very few faint carbonate filaments; effervesces strongly.

Remarks: Material in upper 36 cm. (14 inches) probably the result of sedimentation in historic time; underlying material is Organ alluvium.

A charcoal horizon 15 feet from the sampled pedon was dated at $4,570 \pm 120$ years. The charcoal horizon occurred from about 125 to 150 cm. below the surface and was about 50 cm. wide. It occurred in the analogue of the IIC3b horizon.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Dona Ana SOIL Nos. S65Nmex-7-5 LOCATION Dona Ana County, New Mexico
SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 20770-20779

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1b		2A2 Coarse fragments b																		
		Total		Sand					Silt				Clay (<0.002)	3B2 Vol.	3B1 Wt.	250-2	76-2	19-2															
		Sand (2-0.05)	Silt (0.05-0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)							<0.074	<0.0002													
Pct. of < 2 mm																			% <250			% <76			% <19								
Carbonate Removed a/																																	
0-4	A	77.4	8.4	14.2	1.6	9.6	14.4	36.8	15.0	4.0	4.4	40.2	62.4	28.9	3.1																		
4-13	B1	77.1	7.7	15.2	0.7	5.8	12.7	41.2	16.7	4.4	3.3	45.6	60.4	29.9	4.7																		
13-25	B2ltca	74.0	9.1	16.9	1.4	6.2	11.6	37.3	17.5	5.7	3.4	45.7	56.5	33.7	6.0																		
25-41	B22tca	67.4	11.1	21.5	3.7	7.2	9.9	30.6	16.0	6.4	4.7	40.8	51.4	40.0	10.2																		
41-56	K1	66.8	10.9	22.3	1.8	5.3	8.7	32.7	18.3	6.4	4.5	45.4	48.5	41.5	12.1																		
56-89	K21	67.5	13.3	19.2	1.5	4.9	7.5	32.2	21.4	7.7	5.6	50.4	46.1	42.3	10.3																		
89-114	K22	67.8	15.2	17.0	1.3	4.7	7.4	30.8	23.6	9.1	6.1	53.1	44.2	43.7	9.2																		
114-127	K3	74.8	12.1	13.1	1.5	5.1	8.5	36.5	23.2	6.9	5.2	54.0	51.6	35.6	7.6																		
127-147	IIIC1ca	83.1	7.8	9.1	6.5	8.2	9.6	37.9	20.9	4.9	2.9	50.2	62.2	25.8	5.0																		
147-168	IIIC2ca	86.2	6.2	7.6	3.6	9.0	12.4	43.2	18.0	3.5	2.7	47.9	68.2	21.2	3.7																		
Carbonate Not Removed																																	
0-4	A	74.4	10.7	14.9	1.8	9.3	14.2	34.8	14.3	4.7	6.0	38.9	60.1	31.8		tr	tr	tr															
4-13	B1	71.4	12.3	16.3	0.4	4.7	10.9	38.3	17.1	5.8	6.5	46.2	54.3	36.3		tr	tr	tr															
13-25	B2ltca	68.1	13.4	18.5	1.7	5.9	10.5	33.5	16.5	6.2	7.2	42.6	51.6	39.6		2	4	4															
25-41	B22tca	59.5	15.6	24.9	2.5	5.4	7.8	27.6	16.2	0.5	15.1	33.9	43.3	48.2		3	5	5															
41-56	K1	49.2	19.8	31.0	1.3	4.8	6.8	23.4	12.9	4.9	14.9	32.3	36.3	56.7		tr	tr	tr															
56-89	K21	48.6	23.2	28.2	1.3	3.9	5.5	22.3	15.6	6.3	16.9	36.5	33.0	59.0		tr	tr	tr															
89-114	K22	51.1	26.0	22.9	1.0	3.9	5.4	22.5	18.3	8.9	17.1	42.2	32.8	58.2		tr	tr	tr															
114-127	K3	62.3	20.1	17.6	1.8	5.3	7.5	29.1	18.6	6.7	13.4	44.3	43.7	46.2		5	10	10															
127-147	IIIC1ca	74.6	13.2	12.2	4.2	5.2	7.5	34.3	23.4	6.3	6.9	52.8	51.2	36.1		35	51	44															
147-168	IIIC2ca	83.2	8.5	8.3	3.5	8.2	11.9	40.7	18.9	4.1	4.4	48.3	64.3	24.6		10	13	13															
Carbonate as CaCO ₃																																	
Depth (cm.)	6A1a Organic carbon f/ Pct.	6E1b 3A1a 3A1a			Bulk density			4D1			Water content			Composition Whole Soil d/																			
		6E1b 19-2	3A1a Total	3A1a <0.02	3A1a <0.002	4A1d 1/3-Bar	4A1h Oven Dry	COLE	4B1c 1/3-Bar	4B2 15-Bar	4C1 1/3-to 15-Bar	NONCARBONATE					Carbonate as CaCO ₃																
< 2-mm. Pct.																																	
g/cc																																	
0-4	0.20	4		2			1.3g				6.0	tr	74	8	14	4																	
4-13	0.21	7					1.45	1.45	-	10.5	6.3	tr	72	7	14	7																	
13-25	0.24	8		2			1.39	1.40	0.003	14.7	7.1	3	65	8	15	9																	
25-41	0.28	11		4			1.34	1.37	0.007	14.3	8.2	0.08	3	58	9	18	12																
41-56	0.15	28		15			1.36	1.39	0.007	16.3	8.3	0.11	tr	48	8	16	28																
56-89	0.08	33		15	6		1.71	1.74	0.007	13.8	7.3	0.11	tr	45	9	13	33																
89-114		32		11	5		1.75	1.78	0.007	13.6	6.8	0.12	tr	46	10	12	32																
114-127	34	24		6	4		1.7g				6.2	7	51	8	9	25																	
127-147	44	17		4	1		1.6g				4.6	30	30	5	5	30																	
147-168	49	11					1.58	1.58	-	6.7	4.0	7	66	5	6	16																	

Depth (cm.)	Ratio 15-Bar Water to Clay		
	8D1	8D2	e
0-4	0.40	0.47	0.44
4-13	0.39		0.45
13-25	0.38	0.43	0.46
25-41	0.33	0.39	0.43
41-56	0.27	0.52	0.52
56-89	0.26	0.55	0.51
89-114	0.30	0.57	0.59
114-127	0.35	0.53	0.62
127-147	0.38	0.56	0.61
147-168	0.48		0.59

- a/ Pretreatment with 0.1N NaOH.
- b/ Assume bulk density of 1.5 g/cc for fine-earth fabric in calculation of volume percentages if not measured. Visual estimate 76-19 mm. incorporated for 20778; others contain negligible > 19 mm.
- c/ Computed from carbonate measured on < 19 mm. and on < 2 mm., plus respective percentages 19-2 mm.
- d/ Inclusive of coarse fragments, carbonate, and gypsum. Carbonate values reported measured on < 19 mm except for 20778, which is inclusive of carbonate in 76-19 mm (see footnote c). Sand, silt, and clay computed from measurements by Method 3A1.
- e/ Clay determined after carbonate removal and calculated to a carbonate-containing basis.
- f/ 2.1 kg/m² to 89 cm (Method 6A).
- g/ Assumed for calculations.

Soil: Dona Ana Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic

Soil Nos.: S65NMex-7-5

Location: In the SW 1/4 SW 1/4, Sec. 36, T20S, R2E, about 0.5 mile south of North Tank, 300 feet west of road, Dona Ana County, New Mexico. Geomorphic Surface: Jornada II. Elevation: 4,325 feet.

Parent Material: Jornada II fan alluvium derived primarily from limestone and calcareous sandstone, siltstone and shale, with smaller amounts of rhyolite, granite and andesite.

Vegetation: There are scattered strips that are barren or nearly barren, with only a very few snakeweed. There are a few *Yucca elata*, tarbush, and scattered small (a few tens of feet in diameter) grassy stands of tobosa or burro grass. Land Form: Coalescent fan piedmont sloping 1 percent to west.

Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, October 4, 1965.

Described by: L. H. Gile

Soil Surface. Weakly cracked into polygons 1- to 5-inch diameter; surface is smooth and barren; there is a discontinuous layer of loose reddish sand 1- to 2-mm. thick.

A 20770 0 to 4 cm. Dominantly light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) with few redder parts; fine sandy loam; weak medium and coarse platy and single grain; soft and loose; no roots; effervesces strongly; abrupt smooth boundary.

B1 20771 4 to 13 cm. Light reddish-brown (5YR 6/4 dry) and reddish-brown (5YR 5/4 moist) fine sandy loam; weak very coarse prismatic, massive internally; slightly hard; few roots; effervesces strongly; clear smooth boundary.

B2tca 20772 13 to 25 cm. Light reddish-brown (5YR 5.5/4 dry) or reddish-brown (5YR 4/4 moist), with few parts of higher chroma; sandy clay loam; weak very coarse prismatic breaking to weak medium subangular blocky; slightly hard and hard; few roots; sand grains coated with silicate clay; faint discontinuous carbonate coatings on ped faces; common partially filled insect burrows 1/4-inch diameter; few pebbles with thin discontinuous carbonate coatings; effervesces strongly; clear smooth boundary.

B22tca 20773 25 to 41 cm. Light reddish-brown (5YR 5.5/4 dry) or reddish-brown (5YR 4/4 moist) with few parts slightly redder and of higher chroma, sandy clay loam; weak very coarse prismatic breaking to weak medium subangular blocky; slightly hard and hard; few roots; sand grains coated with silicate clay; few carbonate nodules in lower part; few carbonate filaments; few pebbles, with discontinuous carbonate coatings; effervesces strongly; clear smooth boundary. (See remarks)

K1 (C1ca) 20774 41 to 56 cm. White (7.5YR 9/2 dry, 8/2 moist) and pink (7.5YR 7/4 dry) or light brown (7.5YR 6/4 moist) clay loam; very weak medium platy breaking into subangular blocks; hard; very few roots; carbonate nodules and cylindroids set in a carbonate-impregnated matrix; effervesces strongly; clear wavy boundary.

K21 (C2ca) 20775 56 to 89 cm. Common white (7.5YR 9/2 dry) or pink (7.5YR 7/4 moist) carbonate nodules set in a carbonate-impregnated matrix of pink (7.5YR 7/3 dry) or light brown (7.5YR 6/4 moist); clay loam; weak medium subangular blocky; hard and very hard; harder in place than above; very few fine roots; effervesces strongly; clear wavy boundary.

K22 (C3ca) 20776 89 to 114 cm. Dominantly pink (7.5YR 7/4 dry) or light brown (7.5YR 6/4 moist) with smaller amount white (7.5YR 9/2 dry) or pinkish-white (7.5YR 8/2 moist) sandy clay loam; weak medium subangular blocky; hard and very hard; very few fine roots; effervesces strongly; clear wavy boundary.

K3 (C4ca) 20777 114 to 127 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5.5/4 moist) with 5 to 10 percent reddish-brown parts; light sandy clay loam; generally massive with few parts subangular blocky; firm; very few fine roots; few nodules colored pink (7.5YR 7/4 moist); few pebbles with discontinuous coatings; effervesces strongly; clear wavy boundary.

IIC1ca (IIC5ca) 20778 127 to 147 cm. Light brown (7.5YR 6.5/4 dry) and brown (7.5YR 5/4 moist) gravelly sandy loam; single grain; loose; very few fine roots; some pebbles have thin, discontinuous carbonate coatings; effervesces strongly; clear wavy boundary.

IIIC2ca (IIIC5ca) 20779 147 to 168 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) heavy sandy loam; massive; friable; very few roots; very few pebbles, with thin carbonate coatings; effervesces strongly.

Remarks: Thin sections of the B22tca (25 to 41 cm.) show no clay coatings on ped faces; many sand grains are partially coated with carbonate, but parts of the thin sections show more than 1 percent of oriented clay preserved as coatings on sand grains.

Clay Mineralogy, Method 7A2. B22tca and K22 horizons. Clay mineral suites are similar in the two horizons. Small amounts of mica, kaolinite, and a 2:1 layer silicate complex involving montmorillonite and mica with chloritic interlayers. Removal of carbonates and treatment with 0.1N NaOH (Method 3A1) does not alter the X-ray diffraction patterns for the layer silicates appreciably.

SOIL CLASSIFICATION: Typic Calciorthid; coarse-loamy, carbonatic, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Jal SOIL Nos. S65NMex-7-6 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 20780-20789

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1 e/			2A2 coarse fragments b/				
		Total				Sand							Silt	Clay	Int. II (0.2-0.02)	(2-0.1)	<0.074	3B2 Vol. 250-2	Wt. 3B1 76-2	19-2
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	<0.074						
Pct. of < 2 mm																				
Carbonate Removed																				
0-4	A	74.7	12.4	12.9	3.2	9.0	8.3	29.7	24.5	7.7	4.7	52.2	50.2	37.7						
4-10	B1ca	72.4	12.1	15.5	4.4	11.2	9.2	27.6	20.0	7.1	5.0	45.0	52.4	37.3						
10-23	B2ca																			
23-33	K1	56.4	17.4	26.2	3.5	6.7	5.5	19.5	21.2	10.3	7.1	44.7	35.2	55.5						
33-58	K21	60.4	18.1	21.5	4.6	7.4	6.5	20.2	21.7	10.7	7.4	46.0	38.7	51.8						
58-84	I1K22	65.1	16.8	18.1	10.8	10.1	6.9	15.7	18.6	9.7	7.1	40.4	46.5	45.3						
84-109	I1K3	82.0	8.6	9.4	21.9	20.7	11.6	18.4	9.4	4.7	3.9	23.9	72.6	22.6						
109-140	I1C1ca	78.8	9.8	11.4	15.7	21.0	12.2	18.6	11.3	5.4	4.4	26.8	67.5	27.1						
140-163	I1C2ca	67.0	15.4	17.6	7.7	12.0	8.9	20.1	18.3	8.7	6.7	39.4	48.7	43.0						
163-193	I1V3ca	86.5	6.4	7.1	13.0	27.7	19.1	19.5	7.2	3.2	3.2	19.3	79.3	17.0						
Carbonate Not Removed																				
0-4	A	73.7	14.7	11.6	3.1	8.8	8.0	29.0	24.8	7.2	7.5	51.3	48.9	38.9				tr	tr	tr
4-10	B1ca	69.7	15.3	15.0	3.5	9.8	8.4	26.9	21.1	6.7	8.6	45.4	48.6	40.6				2	7	7
10-23	B2ca	58.2	19.0	22.8	6.8	8.8	6.3	19.0	17.3	7.2	11.8	37.0	40.9	51.2				3	7	7
23-33	K1	47.7	25.3	27.0	9.9	8.4	5.0	12.0	12.4	7.1	18.2	27.2	35.3	59.4				3	6	6
33-58	K21	37.1	30.9	32.0	4.3	4.9	3.8	11.4	12.7	7.9	23.0	28.1	24.4	70.2				3	6	6
58-84	I1K22	43.7	26.9	29.4	8.0	7.0	4.4	11.7	12.6	8.8	18.1	28.9	31.1	63.6				35	47	47
84-109	I1K3	71.5	15.8	12.7	20.3	16.1	10.0	15.7	9.4	6.9	8.9	24.9	62.1	33.5				50	60	62
109-140	I1C1ca	77.5	12.0	10.5	18.1	21.9	12.9	16.1	8.5	5.3	6.7	22.2	69.0	26.9				50	65	65
140-163	I1C2ca	62.4	20.2	17.4	5.9	12.4	9.4	18.2	16.5	9.3	10.9	37.0	45.9	46.6				25	35	36
163-193	I1V3ca	88.7	6.2	5.1	18.6	29.5	19.0	16.6	5.0	2.6	3.6	14.9	83.7	13.6				30	50	51
Depth (cm.)	6A1a Organic carbon f/	Carbonate as CaCO ₃				Bulk density			4D1 COLE	Water content			Composition Whole Soil d/							
		6E1b	3A1a	3A1a	3A1a	4A1d	4A1h	4B1c		4B2	4C1	NONCARBONATE								
		19-2	Total	<0.02	<0.002	<0.001	1/3-Bar	Oven-Dry		1/3-Bar	15-Bar	1/3-to 15-Bar	>2mm.	Sand	Silt	Clay	Carbonate as CaCO ₃			
	Pct.	Pct.	< 2-mm. Pct.			g/cc	g/cc	g/cc	Pct.	Pct.	in./in.	Pct.	Pct.	Pct.	Pct.	Pct.				
0-4	0.29		5		tr		1.3g				5.8		tr	71	12	12	5			
4-10	0.38		8		1		1.46	1.46	-	13.3	6.8	0.09	3	63	11	14	9			
10-23	0.66		22		5		1.22	1.26	0.010	24.0	9.5	0.17								
23-33	0.54		51		14	8	1.39	1.39	-	21.6	9.2	0.16	4	26	8	12	50			
33-58	0.27		52		22	10	1.49	1.51	0.003	19.6	7.5	0.17	4	27	8	10	51			
58-84	0.25	43	45		19	9	1.62				7.6		27	19	5	5	44			
84-109		60	28		5		1.5g				4.5		25	22	2	3	48			
109-140		55	20		1		1.3g				4.8		29	22	3	3	43			
140-163		37	18		3		1.5g				7.0		23	35	8	9	25			
163-193		61	16		tr		1.3g				2.6		20	35	3	3	39			

Depth (cm.)	Ratio 15-Bar Water to Clay		
	8D1	8D2	e/
0-4	0.50	0.50	0.47
4-10	0.45	0.49	0.48
10-23	0.42	0.53	
23-33	0.34	0.71	0.72
33-58	0.23	0.75	0.73
58-84	0.26	0.73	0.76
84-109	0.35	0.58	0.66
109-140	0.46	0.51	0.53
140-163	0.40	0.49	0.49
163-193	0.51	0.51	0.44

a/ Pretreatment with 0.1N NaOH.

b/ Visual volume estimates of 76-19 mm, incorporated, except for 20785 and 20786, which are based on weight percentages from laboratory samples. The > 76 mm does not exceed 5 percent.

c/ Computed from carbonate measured on < 19 mm and on < 2 mm.

d/ Inclusive of coarse fragments, carbonate, and gypsum.

e/ Clay determined after carbonate removal and then calculated to a carbonate-containing basis.

f/ 3.9 kg/m² to 84 cm (Method 6A).

g/ Assumed for calculations.

65-6

Soil: Jal Soil Classification: Typic Calciorthid; coarse-loamy, carbonatic, thermic
 Soil Nos.: S65NMex-7-6
 Location: In the SW 1/4 SW 1/4, Sec. 32, T20S, R3E, about 50 feet west of road to tank, Dona Ana County, New Mexico.
 Geomorphic Surface: Jornada II. Land Form: Coalescent fan piedmont sloping 1 percent to west. Elevation: 4,460 feet.
 Parent Material: Jornada II fan alluvium derived primarily from limestone and calcareous sandstone, siltstone and shale, with smaller amounts of rhyolite, granite, and andesite.
 Vegetation: Mainly creosotebush, few tarbush, mesquite.
 Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, October 4, 1965.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Few scattered pebbles and a discontinuous layer of loose reddish sand rest on the weakly crusted, smooth surface of the A horizon.

A 20780 0 to 4 cm. Dominantly pinkish-gray (7.5YR 6/2 dry) or dark brown (7.5YR 4/3 moist) sandy loam; with smaller amounts slightly redder; weak thin and medium platy with some single grain between plates; soft and loose; no roots; effervesces strongly; abrupt smooth boundary.

B1ca 20781 4 to 10 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/3 moist) heavy sandy loam; massive; slightly hard; few roots; few carbonate filaments and thin coatings on pebbles; effervesces strongly; clear smooth boundary.

B2ca 20782 10 to 23 cm. Light brown (7YR 6/3 dry) or dark brown (7.5YR 4/4 moist) light sandy clay loam; weak medium subangular blocky and slightly hard with few parts of loose weak fine crumb between blocks; roots common; few pebbles thinly coated with carbonate; about 10 percent hard carbonate nodules that are interspersed in the fine earth and suggest disturbance by insects and roots; effervesces strongly; clear smooth boundary.

K1 (C1ca) 20783 23 to 33 cm. White (7.5YR 9/2 dry) and pink (7.5YR 7/4 moist) sandy clay loam; moderate medium platy with plate surfaces colored pinkish-gray (7.5YR 6/2 to 7/2 dry); hard; few fine roots and small volumes of brown loamy material between plates; effervesces strongly; clear smooth boundary.

K21 (C2ca) 20784 33 to 58 cm. White (7.5YR 9/2 dry) or pink (7.5YR 7/4 moist) clay loam; generally massive, with some weak platiness; hard; firmer in place than above; very few roots; effervesces strongly; clear wavy boundary.

IK22 (C3ca) 20785 58 to 84 cm. Pinkish-white (7.5YR 8/2 dry) or light brown (7.5YR 6/4 moist) gravelly sandy clay loam; zones between pebbles are massive; hard and very hard; very few roots; scattered clusters of cemented gravels and coarse sand; effervesces strongly; abrupt wavy boundary.

IIK3 (IIC4ca) 20786 84 to 109 cm. Pink (7.5YR 7.5/3 dry) or light brown (7.5YR 6/4 moist) very gravelly sandy loam; massive and single grain; soft and loose; very few roots; pebbles and sand grains thinly coated with carbonate; few pebbles cemented together; effervesces strongly; clear wavy boundary.

IIC1ca (IIC5ca) 20787 109 to 140 cm. Light reddish brown (5YR 6/4 dry) or reddish-brown (5YR 4/4 moist) very gravelly light sandy loam; single grain; loose; pebbles thinly and discontinuously coated with carbonate; effervesces strongly; clear wavy boundary.

IIIC2ca (IIIC6ca) 20788 140 to 163 cm. Light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 4.5/4 moist) light sandy clay loam; massive; friable; very few roots; a few pebbles with thin, discontinuous carbonate coatings; few fine tubular pores; effervesces strongly; abrupt wavy boundary.

IVC3ca (IVC7ca) 20789 163 to 193 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) very gravelly loamy sand; massive and single grain; soft and loose; very few roots; thin, discontinuous carbonate coatings on pebbles; effervesces strongly.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Dona Ana, deep petrocalcic phase SOIL Nos. S65NMex-7-7 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 20790-20806

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1 a/			3A1b			2A2 Coarse fragments		
		Total					Sand			Silt			Int. II (0.2-0.02)	(2-0.1)	<0.075	<0.0002	Vol.				
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	76-2					76-2	19-2			
Pct. of < 2 mm																					
Carbonate Removed																					
0-1	A	80.0	9.1	10.9	0.7	11.0	19.3	34.3	14.7	6.8	2.3	37.7	65.3	28.1	4.2			-	-		
1-4	A	82.8	6.7	10.5	0.1	6.5	17.7	41.9	16.6	5.2	1.5	42.6	66.2	25.8	3.7			-	-		
4-10	B1	80.4	7.2	12.4	-	3.1	14.0	44.3	19.0	5.5	1.7	48.2	61.4	29.1	5.5			-	-		
10-18	B21tca	74.0	10.2	15.8	0.1	3.7	14.1	39.1	17.0	7.2	3.0	43.9	57.0	34.9	7.0			-	-		
18-33	B22tca	69.3	12.7	18.0	0.2	4.7	13.4	34.2	16.8	8.8	3.9	42.7	52.5	40.1	7.5			tr	tr		
33-46	B23tca	58.3	16.7	25.0	0.4	4.2	11.2	26.3	16.2	11.4	5.3	40.9	42.1	51.4	14.8			tr	tr		
46-61	K11	63.1	10.3	26.6	0.3	5.1	13.7	29.9	14.1	7.3	3.0	35.9	49.0	44.7	15.3			tr	tr		
61-79	K12	73.0	8.7	18.8	0.5	5.9	16.7	35.2	14.7	6.0	2.7	37.5	58.3	34.7	12.0			tr	tr		
79-109	K13	74.4	9.0	16.6	0.9	6.6	17.1	39.1	14.7	6.0	3.0	37.7	59.7	33.2	10.9			tr	tr		
109-122	K14	72.7	9.4	17.9	0.7	5.4	15.3	37.0	14.3	5.5	3.9	37.6	58.4	34.6	13.9			tr	tr		
122-137	K21m	71.6	7.2	21.2	0.8	4.7	15.1	37.5	13.5	4.2	3.0	36.2	58.1	35.0	16.7			tr	tr		
137-168	K22m	72.6	6.8	20.6	0.4	5.0	15.4	39.2	12.6	3.8	3.0	36.0	60.0	33.1	14.0			tr	tr		
168-196	K23m	74.7	8.0	17.3	0.7	6.1	15.2	40.7	12.0	1.7	6.3	33.2	62.7	30.6	11.6			tr	tr		
196-223	K24m	77.2	7.6	15.2	0.5	5.4	15.1	43.6	12.6	2.6	5.0	36.3	64.6	28.4	11.2			tr	tr		
223-249	K31	78.1	9.1	12.8	0.7	4.5	13.6	45.2	14.1	4.5	4.6	41.0	64.0	28.2	8.3			tr	tr		
249-274	K32	78.3	9.7	12.0	0.8	4.7	12.7	43.7	16.4	4.8	4.9	43.3	61.9	29.4	7.9			tr	tr		
274-307	K33	78.3	9.2	12.5	0.4	4.4	12.6	43.4	17.5	5.7	3.5	45.8	60.8	30.1	8.4			tr	tr		
Depth (cm.)	6A1a Organic carbon c/	Carbonate as CaCO ₃					Bulk density			4D1 Water content				b/			pH				
		19-2	681b Total	<0.02	<0.002	<0.001	4A1d 1/3-Bar	4A1h Oven-Dry	COLE	4B1c 1/3-Bar	4B2 15-Bar	4C1 1/3-to 15-Bar	15-Bar to Clay Ratio								
		Pct.	Pct.	Pct.			g/cc	g/cc		Pct.	Pct.	in./in.		(1:1)							
0-1	0.17	1				1.3d						4.0			0.37						
1-4	0.21	1				1.3d						3.6			0.35						
4-10	0.20	1				1.60	1.64	0.007	15.1	4.2	0.17	0.34			0.34						
10-18	0.25	2				1.44	1.50	0.014	12.5	6.0	0.09	0.39			0.39						
18-33	0.21	6				1.39	1.46	0.017	14.5	7.6	0.10	0.45			0.45						
33-46	0.29	10				1.31	1.43	0.028	17.9	10.4	0.10	0.46			0.46						
46-61	0.21	32				1.7d						0.58			0.58						
61-79	0.06	31				1.70	1.79	0.017	14.9	7.6	0.12	0.59			0.59						
79-109		25				1.70	1.79	0.017	13.8	7.3	0.11	0.59			0.59						
109-122		40				1.7d						0.60			0.60						
122-137		59				1.7d						0.75			0.75						
137-168		53				1.56	1.55	-	16.2	8.7	0.12	0.90			0.90						
168-196		48				1.40	1.43	0.007	19.2	10.3	0.12	1.14			1.14						
196-223		34				1.4d						1.08			1.08						
223-249		26				1.41	1.44	0.007	17.7	9.4	0.12	0.99			0.99						
249-274		26				1.45	1.47	0.003	15.3	8.7	0.10	0.98			0.98						
274-307		14				1.43	1.49	0.014	14.0	7.5	0.09	0.70			0.70						

- a/ Pretreatment with 0.1N NaOH.
- b/ Clay after carbonate removal and calculated to a carbonate-containing basis.
- c/ 2.2 kg/m² to 79 cm (Method 6A).
- d/ Assumed for calculations.

Mineralogy (Method 7A2).
 B22tca 18-33 cm
 K12 (C2ca) 61-79 cm
 K22m (C6cam) 137-168 cm
 K33 274-307 cm

The clay mineralogy changes little with depth. The minerals are rather poorly ordered. Small amounts of mica, kaolinite and a vermiculite mineral are present. Additional 2:1 layer silicates are indicated, probably inter-layer mica and vermiculite species. There is a suggestion of chlorite interlayer minerals. A trace of montmorillonite is suggested in the upper two horizons. Clay mineralogy of the carbonate-free sample is mixed.

65-7

Soil: Dona Ana, deep petrocalcic phase Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic
 Soil Nos.: S65N Mex-7-7
 Location: NE 1/4 SE 1/4, Sec. 16, T22S, R2E, Dona Ana County, New Mexico.
 Geomorphic Surface: La Mesa. Elevation: 4335 feet.
 Land Form: Basin floor; level or nearly level; a few hundred yards west of apparent toeslopes of Jornada alluvial fan.
 Parent Material: Upper Camp Rice basin fill, sand and a few rounded pebbles of mixed composition.
 Vegetation: Scattered clumps of dropseed; clumps of snakeweed, a few *Yucca elata*, mesquite, and fluffgrass; common barren areas between vegetation.
 Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and G. Holmgren, October 6, 1965.
 Described by: L. H. Gile and R. B. Grossman.

- A 20790 0 to 1 cm. Brown (7.5YR 5.5/4 dry, 7.5YR 4.5/4 moist) sandy loam; moderate thin and medium platy; soft; no roots; effervesces weakly and strongly; abrupt smooth boundary.
- A 20791 1 to 4 cm. Reddish-brown (5YR 5.5/4 dry, 5YR 4/4 moist) light sandy loam; dominantly single grain and loose, with some parts massive and soft; very few roots; noncalcareous; abrupt smooth boundary.
- B1 20792 4 to 10 cm. Reddish-brown (5YR 5.5/4 dry, 5YR 4/4 moist) sandy loam; massive; slightly hard; few roots; dominantly noncalcareous with some parts calcareous; clear smooth boundary.
- B21tca 20793 10 to 18 cm. Reddish-brown (5YR 5.5/4 dry, 5YR 4/4 moist) heavy sandy loam; massive to weak medium subangular blocky; slightly hard; few roots; few carbonate filaments; sand grains coated with silicate clay; few fine tubular pores, some of which are lined with carbonate; effervesces weakly; clear smooth boundary.
- B22tca 20794 18 to 33 cm. Brown (7.5YR 5.5/4 dry, 7.5YR 4.5/4 moist) sandy clay loam; weak medium subangular blocky; slightly hard and hard; few roots; sand grains coated with silicate clay; few carbonate filaments on ped faces and lining the few fine tubular pores; insect burrows as below; effervesces weakly; clear wavy boundary.
- B23tca 20795 33 to 46 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) sandy clay loam; weak medium and coarse subangular blocky; hard; few roots; sand grains coated with silicate clay; common fine tubular pores, some lined with carbonate; common ped filaments on ped faces; common insect burrows, 1/4- to 1-inch diameter and of roughly tubular form; some burrows filled or partly filled with loose fine earth, others are empty and have smooth walls; effervesces weakly and strongly; clear smooth boundary.
- K11 (C1ca) 20796 46 to 61 cm. 50 to 60 percent pinkish-white (7.5YR 8/2 dry) or light brown (7.5YR 6/4 moist) nodules and plates that are loosely set in a matrix of light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) clay loam; plates and nodules are hard and very hard; platy zones are weak medium platy; individual plates are 1 to 2 inches wide; most nodules are less than an inch in diameter; the horizon has few to common roots and contains more roots than other horizons; most nodules and plate exteriors stained light brown (7.5YR 6/4 dry); with some stainings of 5YR hue; a few insect burrows, generally filled with fine earth; effervesces strongly; clear smooth boundary.
- K12 (C2ca) 20797 61 to 79 cm. Pinkish-white (7.5YR 8/2 dry) or light brown (7.5YR 6/4 moist) with few nodules of pink (higher value than 7.5YR 8/4 dry, 7.5YR 8/4 moist) generally massive, with few subangular blocky parts; very and extremely hard; harder in place than above; very few roots; few parts stained light brown (7.5YR 6/4 dry); effervesces strongly; clear wavy boundary.
- K13 (C3ca) 20798 79 to 109 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist) sandy clay loam; weak medium and coarse subangular blocky; very hard; very few roots; few nodules colored pinkish-white (higher value than 7.5YR 8/3 dry, 7.5YR 8/3 moist) few fine tubular pores; some tubular channels that are empty or partly filled (1/4- to 1/8-inch diameter); effervesces strongly; clear wavy boundary.
- K14 (C4ca) 20799 109 to 122 cm. Pinkish-white (7.5YR 8/2 dry) or light brown (7.5YR 6/4 moist) indurated, medium plates and blocks that are thinly stained light brown (7.5YR 6/4 dry); very and extremely hard; in places, plates and blocks can be removed with fingers; few roots between plates and blocks; material between plates and blocks is loose; upper surfaces of plates are smooth and hard but there are no distinct laminae; effervesces strongly; clear smooth boundary.
- K21m (C5cam) 20800 122 to 137 cm. White (higher value than 10YR 8/2 dry) or light gray (10YR 7/2 moist) carbonate-cemented material; weak and moderate, medium and coarse platy; some plates thinly coated light brown (7.5YR 6/4 dry); extremely hard; very few roots; effervesces strongly; clear wavy boundary.
- K22m (C6cam) 20801 137 to 168 cm. White (10YR 9/3, dry) or very pale brown (10YR 8/3 moist) carbonate-cemented material that is massive and continuously cemented; very and extremely hard; very few roots; few tubular channels, 1/8- to 1/4-inch diameter, with smooth linings; effervesces strongly; clear wavy boundary.
- K23 (C7cam) 20802 168 to 196 cm. White (higher value than 10YR 8/3 dry) or very pale brown (10YR 8/3 moist) closely fitted medium and coarse blocks that have discontinuous white coatings; sandy clay loam; very hard; very few roots; very few channels, 1/8- to 1/4-inch diameter, that are lined with brownish, clayey appearing material; effervesces strongly; clear wavy boundary.
- K24 (C8cam) 20803 196 to 223 cm. White (10YR 9/2, dry) or light gray (10YR 7/2 moist) light sandy clay loam; closely fitted medium and fine nodules; hard and very hard; some nodules have thin white coatings; about 5 percent loose material between nodules; very few fine roots; effervesces strongly; clear wavy boundary.
- K31 (C9ca) 20804 223 to 249 cm. Pinkish-white (7.5YR 8/2 dry) or light brown (7.5YR 6/4 moist) light sandy clay loam; there are a few reddish-brown parts that are noncalcareous; horizon consists mainly of nodules that may be textured after prolonged wetting, internodular parts are loose; nodules are hard and very hard; very few roots; effervesces strongly; clear wavy boundary.
- K32 (C10ca) 20805 249 to 274 cm. Pink (7.5YR 8/4 dry) or light brown (7.5YR 6.5/4 moist) with common nodules, white (higher value than 10YR 8/2 dry, or 10YR 8/2 moist) sandy clay loam; weak and moderate medium subangular blocky; nodules hard and very hard; internodular material is loose; very few fine roots; effervesces strongly; clear wavy boundary.
- K33 (C11ca) 20806 274 to 307 cm. Pinkish-gray (7.5YR 7/2 dry) or light brown (7.5YR 6/4 moist) with few nodules colored white (higher value than 10YR 8/2 moist, 10YR 8/2 dry) sandy clay loam; massive, with few parts weak medium subangular blocky; slightly hard and hard; very few roots; effervesces strongly.

SOIL CLASSIFICATION: Typic Haplargid; coarse-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Onite, calcic variant SOIL Nos. S66Nmex-7-1 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 66L184-66L191

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)													Coarse fragments			
		Total		Sand							Silt				2A2		3B1 b/	
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	<0.074	Vol. 250-276-2	Wt. 5-2	19-2	
Pct. of < 2 mm													>250	>76	>19			
Carbonate Removed													Carbonate Not removed					
0-5	A2ca	60.5	16.8	22.7	2.4	6.2	8.9	23.6	19.4	10.6	6.2	43.1	41.1	51.2	10	15	2	15
5-8	B21ca	56.3	15.1	28.6	1.3	4.9	7.9	21.9	20.3	10.3	4.8	42.7	36.0	56.6	1	2	2	2
8-18	B22tca	62.1	16.4	21.5	2.8	7.1	8.5	21.4	22.3	12.0	4.4	46.3	39.8	52.5	3	5	3	5
18-28	K1	63.8	17.2	19.0	3.3	7.3	8.8	20.9	23.5	12.8	4.4	47.9	40.3	51.5	15	25	5	13
28-43	IIC2	73.3	14.6	12.1	7.8	10.0	11.1	24.1	20.3	10.9	3.7	43.9	53.0	39.5	40	55	20	40
43-58	IIC1ca	89.0	6.6	4.4	12.9	22.2	20.1	24.5	9.3	4.4	2.2	23.8	79.7	16.5	45	60	10	47
58-91	IIC2ca	92.0	4.6	3.4	14.0	26.0	20.5	23.6	7.9	3.2	1.4	20.8	84.1	12.4	55	70	10	53
91-107	IIC3ca	76.6	16.5	6.9	4.0	9.0	13.1	26.7	23.8	13.4	3.1	50.7	52.8	39.3	3	6	3	6

Depth (cm.)	6A1a Organic carbon d/ Pct.	Nitrogen Pct.	C/N	6E1b Carbonate as CaCO ₃ Pct.	Bulk density			Water content		Composition Whole Material c/				
					e/			4B2 15- Bar		NONCARBONATE				Carbonate a CaCO ₃ Pct.
					g/cc	g/cc	g/cc	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	
0-5	0.15			8					7.4	15	47	13	18	7
5-8	0.09			10					8.9	2	50	13	25	10
8-18	0.15			11					6.7	5	53	14	18	10
18-28	0.25			20					6.3	25	39	10	11	15
28-43	0.18			36					5.6	55	21	4	4	16
43-58	0.07			5					3.0	60	34	2	2	2
58-91	0.02			2					2.0	70	27	1	1	1
91-107	0.03			5					3.4	6	68	15	6	5

a/ Pretreatment of < 2 mm with 0.1N NaOH.

b/ Visual estimate of 76-19 mm from photograph; 19-2 mm as percent of < 19 mm from laboratory sample. Assumed bulk density of fine-earth fabric of 1.4 g/cc for conversion of weight > 2 mm to volume basis.

c/ Inclusive of coarse fragments, carbonate, and gypsum. Carbonate measured on < 2 mm and calculated to include coarse fragments.

d/ 1.1 kg/m² to 107 cm (Method 6A).

e/ Assumed bulk density of moist fine-earth fabric for calculations.

Radiocarbon Dates a/

A radiocarbon age of 21,400 ± 490 B.P. (I-2732; LSL 67L037) was obtained on the carbonate adhering to the > 19 mm pebbles from 38 to 51 cm depth. The pebbles were abraded with a stiff brush; loose material in indentations was removed with a knife. The adhering carbonate was then removed with a mechanical vibrating tool for determination of radiocarbon age.

a/ Sample number 12 in Soil Monograph.

Soil: Onite, calcic variant.
 Classification: Typic Haplargid; coarse-loamy, mixed, thermic
 Soil Nos.: S66NMeX-7-1
 Location: Level crest of interfluvium, about 0.1 mile northeast of north end of runway, University Park airport.
 (Dona Ana Bend Colony - no legal description.) Dona Ana County, New Mexico.
 Geomorphic Surface: Picacho (late phase)
 Land Form: Alluvial fan sloping westward 2 percent. Elevation: 4,000 feet.
 Parent Material: Picacho fan alluvium derived from rhyolite (dominant), andesite, and rounded gravel and sand of mixed composition.
 Vegetation: Primarily creosotebush, with a few prickly pear.
 Collected by: L. H. Gile, April 15, 1966.
 Described by: L. H. Gile.

Soil Surface. Closely packed pebbly desert pavement, with most pebbles less than about 3 cm. diameter. Most pebbles are rhyolite, with a few andesite pebbles and rounded pebbles of mixed lithology. Many pebbles have a thin, discontinuous or continuous coating of black desert varnish. A layer of loose sand, 1 to 2 mm. thick, occurs discontinuously between pebbles.

A2ca 66L184 0 to 5 cm. Pinkish-gray (7.5YR 7/2 dry) or brown (7.5YR 4/4 moist) loam with scattered parts of 5YR hue; weak medium and coarse platy; slightly hard; no roots; many fine and very fine tubular pores; a very few fine pebbles with very thin carbonate coatings; effervesces strongly; abrupt smooth boundary.

B21ca 66L185 5 to 8 cm. Light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 4.5/4 moist) light sandy clay loam; a loose mass of soft, fine and very fine crumbs; soft and loose; very few roots; few fine pebbles, with tops noncalcareous and stained yellowish-red (5YR 5/6 dry) and bottoms thinly coated with carbonate; effervesces strongly; abrupt smooth boundary.

B22tca 66L186 8 to 18 cm. Dominantly light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist), and white (7.5YR 9/2 dry) or pinkish-white (7.5YR 8/2 moist); sandy clay loam; weak fine and medium subangular blocky; soft to hard; few roots; about 10 percent of reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) volumes, ranging from about 1 to 10 mm. diameter, scattered throughout; sand grains in reddish-brown material are coated with reddish clay; thin sections show that some of the grains in the reddish-brown volumes are coated with oriented clay; some structural units formed of apparent cicada burrows, some empty but most partly and loosely filled with calcareous fine earth; burrows have smooth linings and are about 8 to 10 mm. diameter, 1 to 2 cm. long; common carbonate nodules and cylindroids; reddish-brown material effervesces weakly, rest strongly; clear wavy boundary.

K1 (C1ca) 66L187 18 to 28 cm. Dominantly pink (7.5YR 8/3 dry) or pink (7.5YR 7.5/4 moist) gravelly heavy sandy loam, with lesser amounts pinkish-gray (7.5YR 7/2 dry) or light brown (7.5YR 6/4 moist) and a few parts light brown (7.5YR 6/4 dry); interpebble material readily removed with fingers, some are loose and single grain, other material is weak subangular blocky and hard; few roots; pebbles have thin carbonate coatings, some of which are discontinuous; effervesces strongly; clear wavy boundary.

I1K2 (I1C2ca) 66L188 28 to 43 cm. Pinkish-gray (7.5YR 8/2 dry) or pink (7.5YR 7/3 moist) very gravelly sandy loam; interpebble material is massive to single grain; soft to hard; few roots; most pebbles are continuously carbonate-coated and a few are cemented together in small clusters; effervesces strongly; clear wavy boundary.

I1C1ca (I1C3ca) 66L189 43 to 58 cm. Pinkish-gray (7.5YR 7.5/2 dry, 7.5YR 6/2 moist) very gravelly loamy sand; single grain and massive; loose and soft; few roots; pebbles have thin carbonate coatings, some of which are discontinuous; a small amount of interpebble fine earth is weakly cemented to pebbles; effervesces strongly; clear wavy boundary.

I1C2ca (I1C4ca) 66L190 58 to 91 cm. Brown (7.5YR 5.5/4 dry, 7.5YR 4.5/4 moist) very gravelly sand; single grain and loose; few roots; carbonate coatings generally continuous on pebble bottoms, patchy or absent on pebble tops; a few larger pebbles have small (several mm.) patches of gypsum crystals on bottoms; effervesces weakly to strongly; abrupt wavy to irregular boundary.

I1I1C3ca (I1I1C5ca) 66L191 91 to 107 cm. Light brown (8YR 6/3 dry) or brown (8YR 5/3 moist) fine sandy loam; massive; slightly hard; no roots; a few pebbles and sand grains have very thin and discontinuous carbonate coatings; effervesces strongly.

Remarks: See laboratory data sheet for radiocarbon age of carbonate.

Mineralogy (Method 7B1). This is a count on the fine sand (0.25-0.1 mm) from the I1K2 (28-43 cm).

Quartz (trace chert)	48 percent
Orthoclase (trace microcline)	10 percent
Microcrystalline aggregates	22 percent
Plagioclase	
IR near 1.550 (oligoclase, andesine)	3 percent
IR > 1.550	tr
IR < 1.550 (albite)	15 percent
Ferromagnesian	tr
Opakes	tr

Micromorphology (Method 4E2). Thin sections of the B22tca horizon show alternating zones of carbonate-engulfed material and argillic horizon material. In the latter, distinct coatings of oriented clay occur on some of the sand grains and constitute more than one percent of the fabric.

SOIL CLASSIFICATION: Ustollic Paleorthid; loamy-skeletal, mixed, thermic, shallow

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Monterosa SOIL Nos. S66Nmex-7-2 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 66L658-66L669, 71L078

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1		b/		2A2				Coarse fragments a	
		Total		Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Silt		Int. III (0.02-0.002)	Int. II (0.2-0.02)	< 0.074	3A1b Fine clay < 0.0002	Vol. 250-2 < 250	Wt. 3B1			19-2		
		Sand (2-0.05)	Silt (0.05-0.002)							Int. I	Int. II						76-2	5-2	19-2			
Pct. of < 2 mm																						
Carbonate Removed																						
0-4	A	72.5	17.3	10.2	3.2	3.8	6.8	36.4	22.3	12.3	5.0	54.8	39.4	3.1	20	36	6	33				
4-13	B21ca	66.3	16.1	17.6	4.5	4.0	6.7	32.1	19.0	10.6	5.5	48.5	44.0	4.9	40	59	10	53				
13-23	B22ca	63.0	16.3	20.7	8.2	4.0	5.8	27.6	17.4	11.0	5.3	44.9	46.2	8.8	30	51	14	49				
23-36	K1	62.7	16.5	20.8	11.2	4.3	5.5	25.4	16.3	10.2	6.3	47.0	46.2	9.7	10	29	11	27				
36-43	K21m	70.6	12.6	16.8	19.0	5.9	6.8	29.8	15.4	9.0	3.2	41.6	37.2	7.3	55	80	17	72				
43-64	K22m	70.4	12.2	17.4	13.6	4.8	6.8	29.8	15.4	9.0	3.2	41.6	37.2	9.3	40	61	14	58				
64-84	K31	78.5	8.6	12.9	18.1	6.4	9.2	31.5	13.3	5.5	3.1	35.9	27.8	9.5	55	76	10	66				
84-107	K32	80.5	7.6	11.9	21.4	8.6	11.0	29.8	9.7	4.5	3.1	29.2	24.0	6.5	65	79	10	70				
107-135	C1ca	82.6	6.1	11.3	21.7	8.1	11.6	31.6	9.6	3.9	2.2	28.8	21.8	6.8	50	65	9	53				
135+	C2ca	88.8	4.8	6.4	26.6	17.6	13.9	23.9	6.8	3.0	1.8	20.7	14.5	4.1	60	72	18	65				
0-1	A	59.2	26.8	14.0	2.8	3.0	5.6	28.0	19.8	14.2	12.6	50.6	52.8		50	64	5	61				
1-5	A	54.8	27.3	17.9	1.8	2.8	5.3	26.2	18.7	13.2	14.1	47.7	56.4			21	5	20				
0-18	f	57.1	27.8	15.1	3.6	4.1	6.1	27.0	16.3	15.3	12.5	48.0	51.1		30	46h		43				

Depth (cm.)	Organic carbon C, g Pct.	Nitrogen Pct.	C/N	Carbonate as CaCO ₃ Pct.	6C2a Ext. Iron as Fe Pct.	Bulk density			Water content			Composition Whole Material e				
						g/cc	i g/cc	g/cc	Pct.	Pct.	15-Bar Pct.	NONCARBONATE				Carbo ate a CaCO ₃ Pct.
												>2mm. Pct.	Sand Pct.	Silt Pct.	Clay Pct.	
0-4	0.35			tr	0.7		1.4				4.2	36	46	11	7	tr
4-13	0.71			5	1.8		1.4					58	27	6	7	2
13-23	0.81			29	1.0		1.4					42	26	7	8	17
23-36	0.64			43	0.9		1.5					19	28	8	10	35
36-43	0.79			53	1.9		1.8					66	11	2	3	18
43-64	0.29			35	1.3		1.8					51	22	4	6	17
64-84	0.13			28	2.2		1.6					69	17	2	3	9
84-107	0.33			17	3.0		1.6					76	16	2	2	4
107-135	0.15			14	0.2		1.5				6.2	62	29	2	2	5
135-165	0.09			6	0.4		1.5				4.6	71	24	1	2	2
0-1	0.16			1	0.8						6.2	64	21	10	5	tr
1-5	0.23			2	0.8						7.3	21	42	21	14	2
0-18f	0.51						1.4									

- No > 76 mm. Volume carbonate-containing; weight carbonate-free basis.
- Carbonate removed by Method 1B4 for 66L659-66L665. For other samples, Method 3A3 employed; negligible carbonate associated with coarse fragments for these latter samples. Twenty-gram sample used for determination of fine-earth separates.
- 66L658 and 66L666-66L669 determined on fine earth. Other values determined on whole soil and calculated as a percentage of the fine earth, inclusive of carbonate.
- 66L658 and 66L666-66L668 determined on fine earth, others determined on whole material. Data reported on a base free of carbonate and coarse fragments. Some values are high relative to clay suggesting a contribution from the coarse fragments. The samples were ground to pass 80 mesh. These data should not be used in the same fashion as the extractable iron determined on the fine earth after carbonate removal.
- Inclusive of 76-2 mm, carbonate, gypsum, but not organic matter. Carbonate measured directly (Method 6E1b) for 66L659-66L665. Other values calculated from determinations on fine earth. 66L659-66L665 coarse fragments obtained on sample treated by Method 1B4 and calculated to a carbonate-containing basis; other samples coarse fragments measured directly on carbonate-containing material.
- Composite of six samples from the north side of the sampling trench within 5 m of S66Nmex-7-2. 0.9 kg/m² (Method 6A).
- 2.7 kg/m² to 36 cm (Method 6A).
- Carbonate-containing.
- Assumed bulk density of moist fine-earth fabric for calculations.

Soil: Monterosa
 Classification: Ustollic Paleorthid; loamy-skeletal, mixed, thermic, shallow
 Soil Nos.: S66NMex-7-2
 Location: SE 1/4 NE 1/4, Sec. 24, T23S, R2E, about 1,800 feet south of Dripping Springs Road and about 500 feet west of section line, Dona Ana County, New Mexico.
 Geomorphic Surface: Jornada I.
 Land Form: Broad ridge remnant of coalescent fan piedmont sloping 2 percent west. Elevation: 4,370 feet.
 Parent Material: Jornada I alluvium derived from rhyolite.
 Vegetation: Creosotebush and ratany; few whitethorn.
 Collected by: R. B. Grossman, J. W. Hawley, and W. C. Lynn, October 31, 1966.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Desert pavement of rhyolite pebbles, most of which are less than 3/4-inch diameter, with a few up to 2 inches in diameter; many pebbles have coatings of black desert varnish; the pebbles have no carbonate coatings.

A 66L658 0 to 4 cm. Reddish-brown (6YR 5.5/4 dry, 6YR 4/4 moist) gravelly fine sandy loam; weak medium platy and weak very fine crumb; soft and loose; no roots; effervesces weakly; abrupt smooth boundary.

B2lca 66L659 4 to 13 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) very gravelly light loam; weak fine and very fine crumb; soft and loose; few roots; pebbles have thin, discontinuous carbonate coatings; primarily on undersides, and in the upper inch, many pebble tops are carbonate-free; effervesces strongly; clear wavy boundary.

B22ca 66L660 13 to 23 cm. Light brown (8YR 6.5/4 dry) or brown (8YR 4.5/4 moist) very gravelly heavy sandy loam; weak very fine crumb; soft and loose; roots common; thin, mainly continuous carbonate coatings on pebbles; very few pebbles are weakly cemented together by carbonate; effervesces strongly; clear smooth boundary.

K1 (C1ca) 66L661 23 to 36 cm. Dominantly light gray (10YR 7/2 dry), grayish-brown (10YR 5/2 moist) carbonate-cemented pebble clusters or fragments consisting mainly of fine earth; most are less than 2-inch diameter and can be removed with the fingers; fine earth between clusters colored light brown (8YR 6.5/4 dry) or brown (8YR 4.5/4 moist); is a light sandy clay loam and is weak very fine crumb and loose; roots common between pebbles and carbonate-cemented fragments; interiors of some fragments are pink (7.5YR 7/4 dry) and reddish-yellow (7.5YR 6/7 moist) suggesting a carbonate-engulfed former Bt; fragments range from slightly to very hard and most are weakly stained with fine earth; beneath fine-earth staining, some fragments are coated with thin (about 1/2 mm.) reddish material; laterally grades into nearly continuous zones of weak cementation; in places there are discontinuous plates of a former laminar horizon, in the lower 1 to 2 inches of the horizon, suggesting breakup of a former laminar horizon; effervesces strongly; abrupt smooth boundary.

K21m (C2cam) 66L662 36 to 43 cm. Laminar horizon and uppermost part of plugged horizon that is cemented to it. The K21m horizon occurs fairly continuously along the edge of the cut (especially south side of trench). Laminar horizon: ranges from about 1/8 to 1/2 inch thick; very and extremely hard; uppermost 1/4 to 1/2 mm. stained light gray (10YR 7/2 dry) or brown (10YR 5/3 moist), remainder is white (10YR 9/2 dry) or light gray (10YR 7/2 moist); no roots except for a discontinuous thin mat of fine roots on the surface; effervesces strongly; abrupt smooth boundary. Plugged horizon: occupies from about 2 1/2 to 2 7/8 of the lower part of the K21m, and is white (10YR 8/2 dry) or very pale brown (10YR 7/3 moist) carbonate-cemented material that is massive and very and extremely hard; no roots; pebbles are widely separated by carbonate; most pebbles in plugged horizon are fine, with a few up to 2-inch diameter; effervesces strongly; clear smooth boundary.

K22m (C3cam) 66L663 43 to 64 cm. White (8YR 9/3 dry) or pink (8YR 7/4 moist) carbonate-cemented material; massive; very hard in place, hard and very hard when removed; no roots; coatings on pebbles are somewhat whiter than material between the coatings; effervesces strongly; pebbles separated by carbonate; clear wavy boundary.

K31 (C4ca) 66L664 64 to 84 cm. White (8YR 9/2 dry) or pink (8YR 7/3 moist) discontinuously carbonate-cemented material; very gravelly heavy sandy loam; massive; slightly hard and hard when removed; very few fine roots; continuous coatings on pebbles and sand grains; effervesces strongly; clear wavy boundary.

K32 (C5ca) 66L665 84 to 107 cm. Pink (8YR 8/4 dry) or light brown (8YR 6.5/4 moist) very gravelly sandy loam; massive and soft; very few fine roots; few clusters of weakly carbonate-cemented gravels; most pebbles thinly and continuously coated with carbonate; effervesces strongly; clear wavy boundary.

C1ca (C6ca) 66L666 107 to 135 cm. Light reddish-brown (6YR 6.5/4 dry) or reddish-brown (6YR 4.5/4 moist) very gravelly light sandy loam; massive; soft; no roots; thin discontinuous carbonate coatings on pebbles; most pebbles in contact with each other and some interpebble zones are unfilled; effervesces weakly to strongly; clear wavy boundary.

C2ca (C7ca) 66L667 135 to 165 cm. Yellowish-red (5YR 5.5/5 dry) or reddish-brown (5YR 4/4 moist) very gravelly sandy loam; massive; soft; no roots; discontinuous lenses of carbonate-cemented gravel; low-carbonate material effervesces weakly, high-carbonate material effervesces strongly.

Note. Below this horizon there is a discontinuous, carbonate-cemented zone that occurs along the bottom of the trench.

Two samples of upper horizon, north side of trench. A discontinuous layer of loose reddish sand, less than 1 mm. thick, rests on the A horizon.

A 66L668 0 to 1 cm. Pale brown (9YR 6.5/3 dry) or brown (9YR 4.5/3 moist) loam; weak medium platy; soft; no roots; many vesicles, most of which range from about 0.5 to 2 mm. diameter; effervesces weakly; abrupt smooth boundary.

A 66L669 1 to 5 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 4.5/4 moist) clay loam; moderate fine platy; soft and slightly hard; no roots; some vesicles (less than above), 0.5 to 1 mm. diameter; some plates have weakly adhering reddish fines of 5YR hue; effervesces strongly; abrupt smooth boundary.

Radiocarbon Dates: A radiocarbon date of 25,200 ± 500 BP (I-2730; LSL 67L035) was obtained on the carbonate adhering to the > 19-mm. pebbles from the K22m (43 to 64 cm.) horizon. The pebbles were soaked in water overnight, dried and the loosely adhering carbonate was removed by brushing with a stiff brush and by scraping with a knife where needed. Carbonate left adhering was removed with a mechanical vibrating tool. The CaCO₃ equivalent of this material removed was 70 percent (Method 6614).

SOIL CLASSIFICATION: Typic Torriorthent; loamy-skeletal, mixed, calcareous, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Canutio SOIL Nos. S66Nmex-7-3 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 66L670-66L678

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)													3A1				2A2 Coarse fragments ^{a/}		
		Total			Sand					Silt					Vol. 250-2 <250	3B1 Wt.					
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	0.02-0.002	Int. III (0.2-0.02)	Int. II (2-0.1)	<0.075		76-2	5-2	19-2			
Pct. of < 2 mm																Pct. of < 76			Pct. of < 19		
Carbonate Not Removed																					
0-1	A21	68.8	21.8	9.4	9.5	9.2	7.5	21.4	21.2	14.4	7.4	48.6	47.6	44.2	40	60	10	58			
1-5	A22	69.3	22.7	8.0	7.6	10.3	8.1	21.3	22.0	15.3	7.4	50.0	47.3	44.4	15	27	11	27			
5-15	B2	68.6	20.4	11.0	9.5	11.4	8.1	19.4	20.2	14.6	5.8	46.4	48.4	43.8	25	41	14	39			
15-23	IIB3ca	72.0	18.2	9.8	12.8	12.1	8.7	19.7	18.7	13.1	5.1	43.4	53.3	39.3	50	68	15	65			
23-46	IIC1ca	76.9	15.0	8.1	11.7	13.0	10.5	23.3	18.4	10.3	4.7	41.9	58.5	33.8	60	78	4	64			
46-79	IIIC2ca	77.0	16.1	6.9	12.4	13.7	10.4	21.9	18.6	11.3	4.8	42.2	58.4	34.2	35	51	15	48			
79-109	IIIC3	86.4	6.5	7.1	24.5	24.4	15.6	16.0	5.9	4.2	2.3	16.7	80.5	16.9	45	66	33	66			
109-142	IVC4	67.3	11.4	21.3	26.3	13.6	7.9	12.2	7.3	6.1	5.3	19.2	60.0	37.1	60	77	28	76			

Depth (cm.)	6A1a Organic carbon d/ Pct.	Nitrogen Pct.	8D1 Ratio 15-Bar NH ₄ to Clay me/100	5A1a CEC NH ₄ OAc	Carbonate as CaCO ₃ 6E1b 3A1a <0.002 mm. Pct.	Bulk density			Water content			Composition Whole Soil b/				
						e/			4B2 15-Bar			NONCARBONATE				Carbonate as CaCO ₃ Pct.
						g/cc	cc	g/cc	Pct.	Pct.	Pct.	>2mm. Pct.	Sand Pct.	Silt Pct.	Clay Pct.	
0-1	0.15		0.80		tr(s)					7.5		60	27	9	4	tr
1-5	0.13		0.56		tr(s)					4.5		27	50	17	6	tr
5-15	0.20		0.44		tr(s)					4.8		41	41	12	6	tr
15-23	0.27		0.51		2					5.0		68	22	6	3	1
23-46	0.20		0.60	7.8	4	tr				4.9		78	16	3	2	1
46-79	0.15		0.65		3	tr				4.5		51	37	8	3	1
79-109	0.05		0.63		3e/	1				4.5		66	29	2	2	1
109-142	0.04		0.43		3	1				9.2		77	14	3	5	1

- a/ No > 76 mm.
- b/ Inclusive of coarse fragments, carbonate, and gypsum. Assumed that carbonate-free fine earth has same sand, silt, and clay percentages as values for carbonate-containing fine earth, and that negligible carbonate associated with > 2 mm.
- c/ Pieces of K-fabric from previous soil development are fairly common in the 2-0.5 mm fraction. The 0.25-0.05 mm contains a trace of carbonate grains with sufficient optical continuity to suggest a limestone source. Much of the carbonate in this and the other C horizons apparently is inherited.
- d/ 1.1 kg/m² to 109 cm (Method 6A).
- e/ Assumed bulk densities of moist fine-earth fabric for calculations.

Radiocarbon Dates ^{a/}

A radiocarbon date of 7,240 ± 130 B.P. (I-2728; LSL 66L678) was obtained for the carbonate removed from the > 19-mm pebbles occurring in the zone from 46 to 79 cm (see description). The pebbles were allowed to stand in water overnight, then dried and buffed with a stiff brush. The carbonate coatings were then removed using a mechanical vibrating tool.

a/ Sample number 6 in Soil Monograph.

66-3

Soil: Canutio
 Classification: Typic Torriorthent; loamy-skeletal, mixed, calcareous, thermic
 Soil Nos.: S66NMex-7-3
 Location: Unsectioned area about two miles north-northwest of Dona Ana, and about 0.2 mile east of Interstate 25, Dona Ana County, New Mexico. Geomorphic Surface: Leasburg.
 Land Form: Alluvial fan sloping 3 percent west. Elevation: 4,025 feet.
 Parent Material: Leasburg fan alluvium derived mainly from rhyolite.
 Vegetation: Creosotebush.
 Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and W. C. Lynn, November 1, 1966.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Desert pavement of closely packed, angular and subangular rhyolite pebbles, few andesite and monzonite. Most pebbles less than 3/4-inch diameter, few an inch to 2 inches diameter. A discontinuous layer of loose reddish sand occurs between pebbles.

A21 66L670 0 to 1 cm. Pale brown (10YR 6/3.5 dry) or dark brown (10YR 4/3 moist) sandy loam; single grain and discontinuous, weak thin platy; soft; no roots; noncalcareous; abrupt smooth boundary. Sampled away from pit face.

A22 66L671 1 to 5 cm. Pinkish-gray (8YR 6/2 dry) or dark brown (8YR 4/2 moist) gravelly sandy loam; moderate thin platy; soft and loose; very few roots; few single grain parts between plates; upper 1/4 inch weakly vesicular; noncalcareous; abrupt smooth boundary.

B2 66L672 5 to 15 cm. Reddish-brown (6YR 5.5/3 dry, 6YR 4/3 moist) gravelly sandy loam; generally massive with few parts subangular blocky; slightly hard; few fine roots; fines weakly adhering to pebbles; noncalcareous; abrupt smooth boundary.

IIB3ca 66L673 15 to 23 cm. Pinkish-gray (7.5YR 6/3 dry) or dark brown (7.5YR 4/2 moist) very gravelly sandy loam; weak fine granular between pebbles; loose; roots few to common; carbonate occurs mainly on pebble bottoms with many pebble tops carbonate-free; effervesces strongly; clear smooth boundary.

IIC1ca 66L674 23 to 46 cm. Light brown (7.5YR 6/4 dry) or dark brown (7.5YR 4/3 moist) very gravelly sandy loam; interpebble material is massive and single grain; soft and loose; roots common; pebbles are continuously coated with carbonate except at a few contact points between pebbles; a few pebbles are weakly cemented together in clusters; pebbles coated white (10YR 9/2 dry) or white (10YR 8/2 moist); slightly more carbonate on pebble bottoms than on tops; effervesces strongly; clear wavy boundary.

IIC2ca 66L675 46 to 79 cm. Pinkish-gray (8YR 6.5/3 dry) or brown (8YR 4.5/3 moist) fine gravelly sandy loam; interpebble material massive and single grain; soft; few roots; pebbles continuously coated with carbonate; most pebbles less than 3/4-inch diameter, but in places horizon grades laterally into coarse gravels; effervesces strongly; clear wavy boundary.

Note: Horizon sampled for radiocarbon dating is the lateral equivalent of this horizon. Sampled about 5 feet west in the trench. Coarser gravel than where described.

IIC3 66L676 79 to 109 cm. Stratified fine gravel and coarse sand; single grain to massive; compact packing makes the horizon firm in place; no roots; thin discontinuous carbonate coatings on fragments; many voids between fragments are empty; effervesces weakly; clear wavy boundary.

IVC4 66L677 109 to 142 cm. Reddish-brown (5YR 5.5/4 dry) or reddish-brown (5YR 4/4 moist) fine very gravelly sandy clay loam; massive; hard; no roots; thin, discontinuous reddish, clayey coatings on sand grains and pebbles; upper several inches effervesces strongly; lower part noncalcareous or effervesces weakly.

66L678. Pebbles exceeding about 1 cm. diameter obtained from the 46- to 79-cm. zone, corresponding to the IIC2ca horizon, of a pit face at right angles to the face sampled for characterization. Sample collected for radiocarbon determination on the carbonate adhering to the pebbles (see data sheet).

SOIL CLASSIFICATION: Typic Torriorthent; loamy-skeletal, carbonatic, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Dalian SOIL Nos. S66Nmex-7-4 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 66L679-66L687

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1 a/					
		Total		Sand							Silt		Int. II (2-0.1)	Int. I (<0.075)	2A2 Coarse fragments			
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	3B2 Vol.			3B1 Wt.			
Pct. of < 2 mm											250-2	76-2	19-2	5-2				
Carbonate Not Removed																		
0-4	A	63.9	25.4	10.7	3.3	7.0	7.9	24.1	21.6	14.8	10.6	52.0	42.3	48.3			13	4
4-13	Bca	68.3	19.3	12.4	7.4	9.9	11.0	25.5	14.5	10.0	9.3	39.1	53.8	39.3			38	10
13-30	Clca	69.6	17.7	12.7	8.6	12.7	11.9	23.6	12.8	8.8	8.9	34.9	56.8	36.9			34	8
30-53	C2ca	74.7	14.2	11.1	11.6	15.6	13.1	23.5	10.9	6.2	8.0	29.9	63.8	30.7			43	12
53-79	C3ca	78.1	11.8	10.1	19.4	19.4	12.8	19.3	7.2	5.0	6.8	21.7	70.9	25.5			65	16
79-109	C4	74.4	12.7	12.9	18.4	22.1	13.2	15.3	5.4	4.5	8.2	17.1	69.0	28.3			44	7
109-140	C5	75.3	12.2	12.5	19.1	18.5	12.5	18.4	6.8	4.2	8.0	20.1	68.5	28.0	45b	70b	51b	11
0-79																		
Depth (cm.)	6A1a Organic carbon g	Nitrogen Pct.	8D1 15-Bar to Clay Ratio	Carbonate as CaCO ₃ f			Bulk density			Water content			pH					
				6E1b >2mm	6E1b <2mm	3A1a <0.002 mm.	g/cc	h/ g/cc	g/cc	4B2 15-Bar Pct.	15-Bar Pct.	(1:1)						
				Pct.	Pct.	Pct.	g/cc	g/cc	g/cc	Pct.	Pct.	Pct.						
0-4	0.62		0.50	19	tr		1.3				5.3							
4-13	0.94		0.51	25	2		1.3				6.3							
13-30	0.73		0.46	30	2		1.3				5.8							
30-53	0.47		0.43	30	1		1.3				4.8							
53-79	0.35		0.43	33	1		1.3				4.3							
79-109	0.23		0.41	34	2		1.3				5.3							
109-140	0.14		0.42	36	1		1.3				5.2							
0-79				45c														
0-79				76d														
0-79				61e														

a/ For 66L683-66L685 < 2 mm based on 20-gram sample.

b/ Values for whole soil. > 19 mm fractions determined by sieving large sample in field; 19-2 mm on 66L686 (see description). No > 250 mm.

c/ < 19 mm from large field sample.

d/ 76-19 mm from large field sample.

e/ Computed for < 76 mm from determinations on < 19 and 76-19 mm.

f/ The very fine sand from the A, Bca, and C2ca horizons all contain about 10 percent carbonate which appear to be fragments of limestone and not authigenic based on continuity of the interference color bands.

g/ 3.6 kg/m² to 109 cm (Method 6A).

h/ Assumed bulk density of moist fine-earth fabric for calculations.

66-4

Soil: Dalian

Classification: Typic Torriorthent; loamy skeletal, carbonatic, thermic

Soil Nos.: S66NMex-7-4

Location: NE 1/4 SW 1/4, Sec. 20, T22S, R1E, 0.1 mile west of road, Dona Ana County, New Mexico.

Geomorphic Surface: Fillmore.

Land Form: Alluvial terrace sloping 5 percent to east.

Elevation: 3,950 feet.

Parent Material: Fillmore terrace alluvium derived mainly from limestone and calcareous sandstone and siltstone, with minor rhyolite.

Vegetation: Creosotebush, mesquite, few prickly pear.

Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and W. C. Lynn, November 1, 1966.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Desert pavement of scattered cobbles, with some areas having scattered pebbles but no cobbles. Surface fragments mainly limestone and calcareous sandstone, with few rhyolite and basalt.

A 66L679 0 to 4 cm. Pale brown (10YR 6/3 dry) or dark brown (10YR 4/3 moist) fine sandy loam; single grain and weak very fine crumb; loose; very few roots; upper 2 to 3 mm. is weakly crusted and slightly hard; few pebbles scattered throughout and occasional cobbles; effervesces strongly; abrupt smooth boundary.

Bca 66L680 4 to 13 cm. Pale brown (10YR 6.5/3 dry) or dark brown (10YR 4/3 moist) very gravelly light loam; massive; slightly hard; few roots; pebbles thinly and discontinuously carbonate-coated; few carbonate filaments; effervesces strongly; clear wavy boundary.

C1ca 66L681 13 to 30 cm. Pale brown (10YR 6.5/3 dry) or dark brown (10YR 4/3 moist) very gravelly heavy sandy loam; massive and single grain; soft and loose; fine roots common; pebbles have thin, continuous carbonate coatings; evidence of mouse activity in the form of droppings; effervesces strongly; clear wavy boundary.

C2ca 66L682 30 to 53 cm. Pale brown (10YR 6.5/3 dry) or dark brown (10YR 4/3 moist) very gravelly sandy loam; massive and single grain; soft and loose; few roots; pebbles have thin carbonate coatings, some of which are discontinuous; laterally there are pockets of very gravelly loamy sand that contain less fine earth, that have some unfilled voids between pebbles, and in which carbonate coatings are less continuous; effervesces strongly; clear wavy boundary.

C3ca 66L683 53 to 79 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) very gravelly sandy loam; massive and single grain; soft and loose; few roots; thin, discontinuous carbonate coatings on pebbles; effervesces strongly; clear wavy boundary.

C4 66L684 79 to 109 cm. Strong brown (7.5YR 5.5/5 dry, 7.5YR 4.5/5 moist) very gravelly loamy sand; massive; slightly hard and hard; no roots; thin, discontinuous carbonate coatings on pebbles; dominantly fine gravels but grades laterally into coarse gravels; firmer in place than above; effervesces strongly; clear wavy boundary.

C5 66L685 109 to 140 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) with some parts of 5YR hue; very gravelly loamy sand; massive; hard; no roots; pebbles thinly stained with reddish fines; thin filamentous carbonate on pebbles; effervesces strongly.

66L686, 66L687. The < 19mm. and the 19-76mm. of the 0- to 79-cm. zone. Large samples were sieved in the field.

SOIL CLASSIFICATION: Typic Paleorthid; loamy, carbonatic, thermic, shallow

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Upton SOIL Nos. S66NMex-7-5 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 66L688-66L697, 67L034

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)												2A2 Coarse fragments a			
		Total			Sand						Silt			Clay (< 0.002)	Vol. 19-2	Wt. 3B1	
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)			< 0.074	19-5
Pct. of < 2 mm															Pct. of < 19mm.		
Carbonate Removed																	
0-1	A	60.5	28.3	11.2	0.9	2.5	4.2	28.2	24.7	16.8	11.5	61.1	35.8	53.8			
1-5	A	48.3	33.5	18.2	0.4	1.6	2.7	20.8	22.8	20.6	12.9	58.1	25.5	65.5			
5-8	B21ca	47.8	35.6	16.6	0.5	1.7	3.0	20.2	22.4	20.7	14.9	57.3	25.4	66.5			
8-20	B22ca	46.0	35.5	18.5	0.3	1.8	2.7	18.9	22.3	22.6	12.9	58.4	23.7	68.0			
20-30	K1	46.5	39.6	13.9	0.5	1.9	2.8	19.2	22.1	24.4	15.2	59.9	24.4	66.9			
30-34	K21m																
34-58	K22m	51.9	28.9	19.2	7.3	7.0	4.9	18.9	13.8	13.3	15.6	39.5	38.1	55.5			
58-74	K3	38.4	49.4	12.2	7.7	6.8	3.5	11.7	8.7	39.8	9.6	56.2	29.7	66.2			
74-102	Cca	52.8	25.9	21.3	10.4	14.0	7.2	13.4	7.8	8.3	17.6	23.8	45.0	51.4			
Carbonate Not Removed																	
0-1	A	59.0	34.9	6.1	2.7	4.0	4.6	25.3	22.4	18.9	16.0	58.6	36.6	53.3		55	10
1-5	A	33.8	46.1	20.1	0.6	1.5	2.4	14.6	14.7	15.4	30.7	40.1	19.1	74.7	15	19	2
5-8	B21ca	52.6	39.4	8.0	2.6	4.8	4.2	19.8	21.2	19.8	19.6	54.5	31.4	60.0		11	6
8-20	B22ca	51.3	38.4	10.3	2.9	5.3	4.4	18.6	20.1	19.6	18.8	52.2	31.2	60.9	10	23	8
20-30	K1	48.2	41.0	10.8	5.6	4.6	3.4	15.6	19.0	19.0	22.0	48.7	29.2	63.6		33	12
30-34	K21m																
34-58	K22m	62.8	23.0	14.2	18.3	12.4	7.5	14.5	10.1	8.1	14.9	26.8	52.7	42.9		54	18
58-74	K3	66.9	20.1	13.0	20.6	14.7	7.3	14.6	9.7	7.3	12.8	25.8	57.2	38.3		46	21
74-102	Cca	70.3	18.2	11.5	21.4	23.4	9.8	10.7	5.0	4.7	13.5	15.1	65.3	32.4		51	19
Depth (cm.)	6A1a Organic carbon Pct.	Ratio 15-Bar Water to Clay		Carbonate as CaCO3		Bulk density		4D1			Water content			6C2a Ext. Iron as Fe Pct.	pH		
		6E1b <2mm. Pct.	3A1a <0.002 mm. Pct.	4A1d 1/3-Bar g/cc	4A1h Oven-Dry g/cc	COLE c	4B1c 1/3-Bar Pct.	4B2 15-Bar Pct.	4C1 1/3-to 15-Bar c in./in.	Ext. Iron as Fe Pct.	(1:1)						
0-1	0.19			12										0.8			
1-5	0.14			22				1.53	1.58	0.010	13.4	9.3	0.06	0.8			
5-8	0.11			27								5.3		0.7			
8-20	0.19			24	tr			0.98	0.99	0.003	f	5.7		0.7			
20-30	0.48			28	2									0.4			
30-34	d																
34-58	0.19			59	8									1.0			
58-74	0.08			55	4									1.6			
74-102	0.01			58	2									1.9			
74-102				81b													

- a. > 19 mm. present, but not included in coarse fragment percentages.
- b. 76-19 mm.
- c. Exclusive of > 19 mm.
- d. See discussion of radiocarbon data.
- e. Measured on carbonate-containing material and calculated to a carbonate-free basis.
- f. Clods too variable to report.

Radiocarbon Dates a/

C-14 ages of 14,600 ± 210 (I-2729; LSL 67L034) and 10,760 ± 150 (I-2781; LSL 67L034) were obtained, respectively, on the inorganic and organic carbon from the hard laminar zone. The sample submitted for dating contained 88 percent carbonate (Method 6E1b), and 0.60 percent organic carbon (Method 6A1a). The uppermost lamina contains 0.68 percent organic carbon. An initial portion of the hard laminar zone was separated into the upper and lower halves. The two parts contained: 0.52 and 0.53 percent organic carbon, respectively.

a/ Sample number 23 in Soil Monograph.

Soil Classification: Typic Paleorthid; loamy, carbonatic, thermic, shallow
 Soil: Upton
 Soil Nos.: S66NMex-7-5
 Location: SE 1/4 SW 1/4, Sec. 29, T22S, R1E, Dona Ana County, New Mexico.
 Geomorphic Surface: Picacho.
 Land Form: Alluvial fan sloping eastward 3 percent.
 Elevation: 4,050 feet.
 Parent Material: Picacho fan alluvium derived primarily from limestone, and calcareous sandstone and siltstone, with minor rhyolite.
 Vegetation: Creosotebush, tarbush, few prickly pear, mariola.
 Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, W. C. Lynn, November 2, 1966.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Closely packed desert pavement, about equal amounts of limestone and reddish, calcareous sandstone; most pebbles are less than 1 inch in diameter. Many pebbles have black desert varnish.

A 66L688 0 to 1 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 4.5/4 moist) gravelly sandy loam; single grain and weak thin platy; soft and loose; no roots; effervesces strongly; abrupt smooth boundary.

A 66L689 1 to 5 cm. Light gray (9YR 7/2 dry) or dark brown (9YR 4/3 moist) loam; weak medium and coarse platy with some plates breaking to thin; hard; no roots; common fine and very fine vesicles; effervesces strongly; abrupt smooth boundary.

B21ca 66L690 5 to 8 cm. Pink (7.5YR 7/4 dry) or brown (7.5YR 5/4 moist) gravelly light loam; weak fine and medium granular; soft and loose; no roots; pebbles are thinly carbonate-coated; common carbonate filaments and few fine carbonate nodules; few pebbles, which commonly have carbonate-free tops and coated bottoms; effervesces strongly; abrupt smooth boundary.

B22ca 66L691 8 to 20 cm. Pink (7.5YR 7/4 dry) or brown (7.5YR 5/4 moist) gravelly light loam; very weak medium subangular blocky; hard; few roots; common carbonate filaments and few fine carbonate nodules; effervesces strongly; clear wavy boundary.

K1 (C1ca) 66L692 20 to 30 cm. Pink (7.5YR 7/4 dry) or brown (7.5YR 5/4 moist) light sandy clay loam matrix material, with fragments of indurated K-fabric; fragments are extremely hard; material between fragments is massive and soft; some fragments have roughly horizontal laminae, suggesting a formerly continuous laminar horizon in this position; effervesces strongly; abrupt wavy boundary.

K21m (C2cam) 66L693 30 to 34 cm. Laminar horizon and the uppermost part of the plugged horizon, cemented together. Laminar horizon: from about 1/4 to 1 inch thick. Dominantly white (10YR 8/2 dry) or very pale brown (10YR 7/3 moist) with some very pale brown (10YR 7/4 dry) or yellowish-brown (10YR 5.5/4 moist); layer of fine roots rests on surface; uppermost laminae can be removed with fingernail, extremely hard; effervesces strongly; abrupt smooth boundary. Plugged horizon: (7.5YR 8/4 dry) or light brown (7.5YR 6/4 moist) carbonate-cemented material; massive; extremely hard; no roots; pebbles widely separated from each other by carbonate; effervesces strongly; abrupt smooth boundary.

K22m (C3cam) 66L694 34 to 58 cm. Pink (7.5YR 8/4 dry) or light brown (7.5YR 6/4 moist) carbonate-cemented material; massive; very and extremely hard; no roots; pebbles and sand grains widely separated by carbonate; broken material shows reddish sandstone pebbles and gray limestone pebbles; effervesces strongly; clear wavy boundary.

K3 (C4ca) 66L695 58 to 74 cm. Pink (7.5YR 8/4 dry) or light brown (7.5YR 6/4 moist) carbonate-cemented material; massive; very hard; no roots; discontinuous zones of uncemented material with a fine-earth texture of sandy loam; tops of some pebbles are carbonate-free and have no fines adhering; effervesces strongly; clear wavy boundary.

Cca (C5ca) 66L696 74 to 102 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) with some parts 5YR; very gravelly sandy loam; massive; slightly hard and hard; no roots; thin discontinuous pebble coatings on pebbles; effervesces strongly.

Remarks: The > 19mm. from 74 to 102 cm. was sampled under LSL 66L697. See data sheet for radiocarbon dates on the K21m.

Micromorphology, Method 4E2. A vertical fracture surface across the K21m horizon was examined under a scanning electron microscope. The morphology suggests a porous fabric on a submicron scale in some areas and on a few microns scale in other areas. Particles about 0.3 micron across are abundant and are probably calcite crystals.

Clay Mineralogy, Method 7A2. B22ca horizon. The clay contains a small to moderate amount of poorly ordered montmorillonite, plus traces of mica and kaolinite. A small amount of calcite is present.

SOIL CLASSIFICATION: Ustollic Calciorthid, fine-silty, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Reagan

SOIL Nos. S66Mex-7-6

LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska

LAB. Nos. 66L698-66L718

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Soil class and particle diameter (mm)														3A1b			2A2Coarse fragments		
		Total			Sand					Silt						3A1b	3B1				
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Ext. III (0.05-0.02)	Ext. II (0.02-0.002)	(2-0.1)	<0.074	<0.002	76-2		5-2	19-2			
Pct. of < 2 mm																					
Carbonate Removed																					
0-8	A	44.0	36.6	19.4	0.2	1.5	2.0	15.3	25.0	12.7	23.9	49.2	19.0	72.0	3.1						
8-15	B1	21.7	48.1	30.2	0.1	0.5	0.8	6.9	13.4	10.9	37.2	29.5	8.3	87.1	3.4						
15-33	B21	14.5	45.5	40.0	-	0.3	0.3	2.9	11.0	9.4	36.1	22.7	3.5	93.0	4.5						
33-48	B22ca	14.0	41.0	45.0	0.1	0.6	0.7	4.6	8.0	7.6	33.4	19.0	6.0	91.3	6.4						
48-64	B23ca	19.3	34.3	46.4	0.1	1.1	1.4	7.5	9.2	7.0	27.3	21.4	10.1	86.1	8.6						
64-81	B21cab	47.8	20.2	32.0	1.2	4.3	5.0	22.5	14.8	5.8	14.4	35.5	33.0	59.0	8.3						
81-114	B22cab	42.9	21.0	36.1	1.7	3.4	3.1	17.4	17.3	8.7	12.3	38.3	25.6	65.9	15.6						
114-135	K2b	44.9	26.7	28.4	0.7	1.9	2.0	16.0	24.3	12.7	14.0	49.2	20.6	67.8	14.1						
135-168	Clcab	44.5	31.0	24.5	0.4	1.2	1.5	15.5	25.9	14.2	16.8	52.2	18.6	69.1	9.8						
168-185	C2cab	58.3	18.7	23.0	0.5	1.1	1.8	25.2	29.7	9.2	9.5	59.5	28.6	54.3	7.4						
185-208	C3b	60.3	20.5	19.2	1.0	1.7	2.3	26.1	29.2	9.5	11.0	59.5	31.1	52.7	7.8						
208-259	IIC4b	26.5	43.9	29.6	0.2	0.7	0.8	7.5	17.3	16.8	27.1	39.9	9.2	84.4	9.7						
259-300	IIC4b	25.1	40.6	34.3	0.1	0.6	1.2	7.2	16.0	13.5	27.1	34.8	9.1	89.1	8.4						
300-325	IIC5b	20.6	41.5	37.9	0.2	1.5	1.6	6.6	10.7	10.3	31.2	25.5	9.9	86.1	8.9						
325-348	IIC6b	49.3	22.3	28.4	1.8	8.0	6.8	18.3	14.4	6.9	15.4	32.9	34.9	58.4	7.9						
348-363	IIIC2b2	62.0	13.3	24.7	5.1	11.2	9.1	22.5	14.1	5.7	7.6	33.4	47.9	45.1	7.8						
363-373	IIIC2b2	54.3	15.5	30.2	0.8	5.4	6.9	23.8	17.4	7.7	7.8	40.4	36.9	54.4	18.5						
373-396	IIIC2b2	54.7	15.0	30.3	0.8	5.1	6.4	24.5	17.9	7.6	7.4	41.3	36.8	54.0	20.0						
396-437	IIIC2sb2																				
437-457	IIIC2sb2																				
457-518	IIIC2sb2																				
Carbonate Not Removed																					
0-8	A	40.3	42.0	17.7	0.3	1.4	2.0	14.2	22.4	12.8	29.2	45.7	17.9	73.2		tr	tr	tr			
8-15	B1	18.1	55.7	26.2	-	0.4	0.7	5.7	11.3	10.6	45.1	26.2	6.8	89.1		tr	tr	tr			
15-33	B21	11.9	53.8	34.3	-	0.2	0.4	2.5	8.8	8.4	45.4	19.1	3.1	94.2		-	-	-			
33-48	B22ca	11.2	47.9	40.9	tr	0.5	0.6	3.7	6.4	6.5	41.4	15.3	4.8	92.9		tr	tr	tr			
48-64	B23ca	16.2	39.8	44.0	0.1	1.0	1.2	6.2	7.7	6.5	33.3	18.6	8.5	88.4		tr	tr	tr			
64-81	B21cab	42.3	26.2	31.5	0.9	3.9	4.7	19.9	12.9	5.9	20.3	32.0	29.4	63.6		tr	tr	tr			
81-114	B22cab	34.3	26.7	39.0	0.8	2.5	2.6	14.0	14.4	8.5	18.2	32.9	19.9	73.1		2	1	2			
114-135	K2b	30.6	35.2	34.2	0.8	1.2	1.3	10.3	17.0	10.8	24.4	35.8	13.6	78.7		1	1	1			
135-168	Clcab	33.6	40.5	25.9	0.3	1.0	1.1	11.4	19.8	13.6	26.9	42.4	13.8	77.2		1	1	1			
168-185	C2cab	49.3	30.1	20.6	0.4	1.0	1.5	20.0	26.4	10.0	20.1	52.6	22.9	63.2		1	1	1			
185-208	C3b	52.3	28.7	19.0	0.9	1.7	1.9	21.3	26.5	10.8	17.9	54.2	25.8	60.2		2	1	2			
208-259	IIC4b	21.0	53.0	26.0	0.2	0.6	0.6	5.6	14.0	17.5	35.5	35.9	7.0	88.1		tr	tr	tr			
259-300	IIC4b	18.7	49.7	31.6	-	0.4	0.8	4.9	12.6	13.9	35.8	30.0	6.1	89.8		tr	tr	tr			
300-325	IIC5b	15.2	50.4	34.4	0.1	0.9	1.1	4.8	8.3	9.5	40.9	21.1	6.9	90.1		tr	tr	tr			
325-348	IIC6b	41.2	30.4	28.4	1.7	6.7	5.4	15.0	12.4	7.6	22.8	29.4	28.8	65.3		tr	tr	tr			
348-363	IIIC2b2	53.2	19.4	27.4	4.1	9.5	7.4	19.5	12.7	6.6	12.8	31.2	40.5	53.3		2	2	2			
363-373	IIIC2b2	31.5	28.2	40.3	0.5	2.9	3.9	13.6	10.6	6.9	21.3	26.1	20.9	73.9		tr	tr	tr			
373-396	IIIC2b2	28.1	31.8	40.1	0.5	2.4	3.1	12.1	10.0	6.2	25.6	24.1	18.1	77.0		tr	tr	tr			
396-437	IIIC2sb2															2	2	2			
437-457	IIIC2sb2															tr	tr	tr			
457-518	IIIC2sb2															tr	tr	tr			
Depth (cm.)	6A1a	Carbonate as CaCO ₃		6F1a	Bulk Density		4D1	Water Content			Ratio 15-Bar			Composition Whole Soil b/							
		4A1d	3A1a		4A1h	4B1c		4B2	4C1	8D1	8D2	NONCARBONATE									
		g	Ret.		g/cc	1/3-Bar		Oven-Dry	1/3-Bar	15-Bar	1/3-to-15-Bar	g	Ret.	Ret.	Ret.	Ret.	Ret.	Ret.			
0-8	0.90	9	2	1.43	1.49	0.014	20.0	8.5	0.16	0.48	0.54	0.48	tr	40	33	18	9				
8-15	0.74	16	5	1.32	1.42	0.024	26.8	12.3	0.19	0.47	0.58	0.48	tr	18	41	25	16				
15-33	0.70	18	7	1.27	1.37	0.024	26.9	13.4	0.17	0.39	0.49	0.41	-	12	37	33	18				
33-48	0.66	16	8	1.35	1.45	0.024	26.9	15.7	0.15	0.38	0.48	0.42	tr	12	34	38	16				
48-64	0.69	15	8	1.41	1.51	0.024	23.7	15.1	0.12	0.34	0.42	0.38	tr	16	29	40	15				
64-81	0.37	13	6	1.59	1.67	0.017	16.6	10.1	0.10	0.32	0.40	0.36	tr	41	18	28	13				
81-114	0.34	21	11	1.40	1.50	0.024	20.0	10.3	0.14	0.26	0.37	0.36	1	34	16	28	21				
114-135	0.23	35	18	1.52	1.60	0.017	19.2	8.7	0.16	0.25	0.34	0.47	1	29	17	18	35				
135-168	0.10	31	11	1.72	1.82	0.017	15.6	8.0	0.13	0.31	0.34	0.47	1	30	21	17	31				
168-185	0.04	19	6					7.3		0.35	0.50	0.39	1	47	15	18	19				
185-208	0.08	20	5					6.6		0.35	0.47	0.43	1	48	16	15	20				
208-259	0.16	28	8	1.39	1.48	0.020	24.9	9.3	0.22	0.36	0.52	0.44	tr	19	32	21	28				
259-300	0.09	28	8	1.29	1.40	0.028	27.1	10.5	0.21	0.33	0.44	0.43	tr	18	29	25	28				
300-325	0.09	28	8					11.3		0.33	0.43	0.41	tr	15	30	27	28				
325-348	0.08	17	6	1.52	1.63	0.024	20.1	9.2	0.17	0.32	0.41	0.39	tr	40	19	24	17				
348-363	0.08	13	6					8.7		0.32	0.41	0.40	2	53	11	21	13				
363-373	0.18	44	23					10.3		0.26	0.61	0.39	tr	30	9	17	44				
373-396	0.16	50	28	1.45	1.52	0.017	23.2	8.0	0.22	0.20	0.66	0.53	tr	27	8	15	50				
396-437	0.05	28		-				9.9													
437-457	0.04	6		80																	
457-518	0.10	3		70																	

a/ Clay measured on carbonate-free material; calculated to carbonate-containing basis.
 b/ Inclusive of coarse fragments, carbonate, and gypsum. Carbonate calculated from measurement on fine earth. Coarse fragments used directly. Sand, silt, clay computed from measurements by 3A3.
 c/ 8.8 kg/m² to 114 cm (Method 6A).

Clay Mineralogy (Method 7A).

Clays of B21, B22cab, IIC5b, IIIC6b, and IIIC2b2 horizons were examined. Carbonate-free clays were also examined. Clay mineral suites are similar throughout with a moderate amount of calcite, small to moderate amounts of kaolinite, mica, and chlorite present. Minerals rather well-ordered. Trace to small amounts of montmorillonite and talc present. Clay mineralogy mixed.

Soil Classification: Ustollic Calcicorthid; fine-silty, mixed, thermic

Soil: Reagan

Soil Nos.: S66NMex-7-6

Location: NE 1/4 NW 1/4, Sec. 23, T21S, R2E; 75 feet south of section line, Dona Ana County, New Mexico.

Geomorphic Surface: Organ. Elevation: 4,300 feet.

Land Form: Coalescent fan piedmont sloping 1 percent to the west; adjacent to nearly level basin floor.

Parent Material: Alluvium derived from limestone, calcareous sandstone, and mixed igneous rocks (see Remarks).

Vegetation: Burro grass, few crucifixion thorn, and clumps of tobosa.

Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and W. C. Lynn, November 3, 1966.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. A discontinuous layer of reddish fine sand, 1 to 2 mm. thick, occurs on the surface, which is discontinuously cracked into polygons 5 to 10-cm. diameter.

A 66L698 0 to 8 cm. Light brownish-gray (10YR 6.5/2 dry) or dark brown (10YR 4/3 moist) clay loam, with some parts reddish-brown (5YR 5/4 dry) that occur along cleavage planes and in places within plates; moderate very fine to medium platy; slightly hard; roots few to common; common fine pores; effervesces strongly; abrupt smooth boundary.

B1 66L699 8 to 15 cm. Brown (10YR 5/3 dry) or dark brown (10YR 4/3 moist) heavy silt loam; very weak coarse prismatic breaking to weak medium subangular blocky; hard; roots few to common; few fine tubular pores; effervesces strongly; clear wavy boundary.

B2L 66L700 15 to 33 cm. Pale brown (9YR 6/3 dry) or dark brown (9YR 4/3 moist) silty clay loam; moderate medium and coarse prismatic, breaking to moderate medium subangular blocky; hard; few roots; few fine and very fine tubular pores; a very few fine carbonate filaments along fine root channels and pores; a very few elongate insect tunnels, about 10-by 20-mm. diameter, with smooth linings (cicada burrows?); effervesces strongly; clear smooth boundary.

B22ca 66L701 33 to 48 cm. Pale brown (9YR 6/3 dry) or dark brown (9YR 4/3 moist) silty clay loam; moderate coarse prismatic, breaking to moderate medium subangular blocky; hard; few roots; few very fine tubular pores; common carbonate filaments on ped faces; scattered patches, a few mm. wide, of continuous carbonate coatings, on some ped faces; most ped interiors are free of macroscopic carbonate; effervesces strongly; clear smooth boundary.

B23ca 66L702 48 to 64 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) silty clay loam; weak coarse prismatic breaking to weak medium subangular blocky; hard; few roots; few fine tubular pores; few to common carbonate filaments; few insect tunnels, 2- to 5-mm. diameter, partly filled with fine earth; effervesces strongly; clear wavy boundary.

B21cab 66L703 64 to 81 cm. Light reddish-brown (6YR 6/4 dry) or reddish-brown (6YR 4/4 moist) clay loam; weak medium and fine prismatic, breaking to weak medium subangular blocky; hard; few roots; few fine carbonate nodules and a few filaments, some of which descend from overlying soil; few insect burrows, 10 x 20 mm., some partially filled with fine earth; effervesces strongly; clear wavy boundary.

B22cab 66L704 81 to 114 cm. Light reddish-brown (6YR 6/4 dry) or reddish-brown (6YR 4/4 moist) clay loam; weak medium and fine prismatic, breaking to weak medium subangular blocky; hard; no roots; few fine and medium tubular pores; few fine carbonate nodules in lower part, and a few filaments; effervesces strongly; clear smooth boundary.

K2b (Clcab) 66L705 114 to 135 cm. Dominantly white (10YR 9/2 dry) or very pale brown (10YR 7/3 moist) clay loam, with lesser amounts pale brown (10YR 6/3 dry) or dark brown (10YR 4/3 moist); weak medium subangular blocky; hard; no roots; few very fine tubular pores; common carbonate nodules; effervesces strongly; clear wavy boundary.

Clcab (C2cab) 66L706 135 to 168 cm. Pale brown (9YR 6.5/3 dry) or yellowish-brown (9YR 5/4 moist) sandy clay loam; weak medium subangular blocky; some cylindrical forms; very hard and hard; no roots; few carbonate nodules and filaments; effervesces strongly; clear wavy boundary.

C2cab (C3cab) 66L707 168 to 185 cm. Pale brown (9YR 6.5/3 dry) or yellowish-brown (9YR 5/4 moist) sandy clay loam; weak medium subangular blocky; some cylindrical forms; very hard and hard; no roots; few carbonate filaments on ped faces; effervesces strongly; clear wavy boundary.

C3b (IIC4b) 66L708 185 to 208 cm. Light yellowish-brown (9YR 6.5/4 dry) or yellowish-brown (9YR 5/4 moist) clay loam; weak medium subangular blocky, with common cylindrical forms about 1/2-inch diameter; very hard; no roots; few fine tubular pores; scattered fine pebbles; effervesces strongly; clear wavy boundary.

IIC4b (IIC5b) 66L709, 66L710 208 to 300 cm. Light gray (10YR 7/2 dry) or brown (10YR 5/3 moist) heavy silt loam; breaks out as weak medium and coarse prismatic; internally, some parts are massive, and some parts are weak fine and medium platy; hard; no roots; common fine and very fine tubular pores; few parts are of 5YR hue; less hard in place than in IIC3b; effervesces strongly; clear wavy boundary. (Split for sampling, 82-102, 102-118.)

IIC5b (IIIC6b) 66L711 300 to 325 cm. Dominantly very pale brown (10YR 7/3 dry) or yellowish-brown (10YR 5/4 moist) silty clay loam; weak fine to coarse platy; hard; no roots; few fine tubular pores; some parts of reddish hue in irregular pattern and along some cleavage planes; effervesces strongly; clear wavy boundary.

IIIC6b (IIIC7b) 66L712 325 to 348 cm. Dominantly very pale brown (10YR 7/3 dry) or yellowish-brown (10YR 5/4 moist) silty clay loam; weak fine to coarse platy; hard; no roots; few fine tubular pores; some parts of reddish hue in irregular pattern and along some cleavage planes; effervesces strongly; clear wavy boundary.

IIIB2cab2 66L713 348 to 363 cm. Dominantly light reddish-brown (6YR 6/4 dry) or yellowish-red (6YR 5/5 moist) with lesser amounts pink (7.5YR 7/4 dry) or brown (7.5YR 5/4 moist) sandy clay loam; very weak medium subangular blocky; slightly hard and hard; no roots; common very fine tubular pores; few carbonate filaments and nodules; effervesces strongly; clear smooth boundary.

IIIK21b2 (IIIC1cab2) 66L714 363 to 373 cm. White (10YR 9/2 dry) or very pale brown (10YR 8/4 moist) silty clay loam; weak medium subangular blocky; hard and very hard; no roots; common channels 3- to 4-mm. diameter, filled with material colored pink (7.5YR 7/4 dry) or light brown (7.5YR 6/4 moist); effervesces strongly; clear wavy boundary.

IIIK22b2 (IIIC2cab2) 66L715 373 to 396 cm. White (7.5YR 9/2 dry) or pink (7.5YR 8/4 moist) silty clay loam; generally weak medium subangular blocky, with some tendency to weak platiness; hard; no roots; few channels, 3- to 4-mm. diameter, filled with material colored reddish-yellow (7.5YR 7.5/5 dry) or light brown (7.5YR 6/4 moist); effervesces strongly.

Horizons below were removed with a bucket auger.

IIIK23b2 (IIIC3cab2) 66L716 396 to 437 cm. White (10YR 9/2 dry) or very pale brown (10YR 7/3 moist) silty clay loam; hard and very hard; decreases in carbonate content with depth and includes K3 in lower part; effervesces strongly.

IIIC1caesb2 (IIIC4caesb2) 66L717 437 to 457 cm. 172 to 176 inches is dominantly light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist) clay loam; hard; with some material white (10YR 8/2 dry) or pale brown (10YR 6/3 moist) in lower part; 176 to 180 inches consists dominantly of the latter material; fine-grained carbonate and gypsum occur throughout; effervesces strongly.

IIIC2caesb2 (IIIC5caesb2) 66L718 457 to 518 cm. White (10YR 8/2 dry) or very pale brown (10YR 7/3 moist) light clay loam; hard and very hard; fine-grained gypsum occurs throughout; generally noncalcareous; effervesces weakly in a few spots.

With depth, the gypsum grades into crystalline gypsum then into mixed rounded gravels at about 594 cm.

Remarks: 0 to 64 cm - Organ alluvium; 64 to 208 cm - Jornada II alluvium; 208 to 348 cm - unnamed silty basin-fill unit; below 348 cm - Upper Camp Rice basin fill.

SOIL CLASSIFICATION: Ustollic Calciorthid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Reagan, light subsoil variant SOIL Nos. 666Mex-7-7 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 66L719-66L728

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)														3A1b	2A2 Coarse fragments							
		Total		Sand							Silt						3A1b	Wt. 3B1						
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	0.02-0.002	0.02-0.002	0.2-0.02	(2-0.1)	<0.074			<0.0002	76-2	5-2	19-2			
		Pct. of < 2 mm																			% <76			% <19
Carbonate Removed																								
0-8	A	42.7	30.9	26.4	0.5	1.9	2.9	18.8	18.6	8.7	22.2	41.0	24.1	67.0	6.4									
8-18	A	40.6	32.0	27.4	0.4	2.3	3.9	18.4	15.6	5.5	26.5	33.5	25.0	67.3	5.9									
18-30	B21ca	21.2	37.4	41.4	0.3	1.6	2.2	9.3	7.8	4.6	32.8	18.5	13.4	82.9	8.9									
30-41	B22ca	40.6	27.4	32.0	1.1	4.5	4.3	15.2	15.5	7.4	20.0	33.0	25.1	67.7	9.2									
41-51	IIC	74.8	8.1	17.1	5.4	14.8	11.8	31.1	11.7	3.1	5.0	32.6	63.1	29.9	5.9									
51-61	IIIB2cab	45.0	17.3	37.7	0.9	3.6	4.0	21.0	15.5	8.1	9.2	37.9	29.5	62.4	14.9									
61-89	IIIC2b	61.5	15.0	23.5	1.2	3.2	4.5	30.1	22.5	5.8	9.2	49.7	39.0	48.2	10.6									
89-112	IIIC1cab																							
112-140	IIIC2cab																							
140-175	IVC3cab																							
Carbonate Not Removed																								
0-8	A	38.4	35.8	25.8	0.5	2.0	2.5	15.9	17.5	8.5	27.3	37.7	20.9	70.7		1	1	1						
8-18	A	35.0	38.7	26.3	0.3	2.0	3.2	15.6	13.9	5.6	33.1	30.0	21.1	72.1		tr	tr	tr						
18-30	B21ca	17.8	44.8	37.4	0.3	1.2	1.9	7.6	6.8	4.0	40.8	15.7	11.0	85.9		tr	tr	tr						
30-41	B22ca	34.8	34.1	31.1	1.0	3.9	3.8	12.9	13.2	7.0	27.1	28.8	21.6	72.5		tr	tr	tr						
41-51	IIC	70.9	10.8	18.3	4.2	12.9	11.0	31.0	11.8	2.5	8.3	32.4	59.1	33.8		3	3	4						
51-61	IIIB2cab	36.1	23.4	40.5	1.6	3.0	3.1	16.1	12.3	6.5	16.9	29.7	23.8	69.7		1	1	1						
61-89	IIIC2b	45.2	25.3	29.5	1.1	2.2	3.5	21.7	16.7	6.4	18.9	38.5	28.5	62.1		1	1	1						
89-112	IIIC1cab															2	2	2						
112-140	IIIC2cab															3	3	3						
140-175	IVC3cab															7	6	7						

- a/ 76-2mm. material contains only trace amounts of carbonate.
- b/ Clay measured on carbonate-free material and calculated to a carbonate-containing basis.
- c/ Inclusive of coarse fragments, carbonate, gypsum, but not organic matter. Carbonate calculated from measurement on fine earth. Coarse fragments used directly. Sand, silt, and clay computed from measurements by Method 3A3. Explanation
- d/ 6.2 kg/m² to 89 cm (Method 6A).
- e/ Assumed for calculations.

Clay Mineralogy (7A2C)

Clay from the B21ca (66L721) contains a moderate amount of calcite and small amounts of mica, kaolinite, montmorillonite, and chlorite. Clays are poorly ordered. By inference there is a considerable amorphous component. Clay from the IIIB2cab (66L724) contains a moderate amount of calcite, small amounts of mica, kaolinite, and montmorillonite, and a trace of chlorite. Clay from the IIIC1cab (66L726) contains a moderate amount of montmorillonite, small to moderate amounts of mica and kaolinite, and small amounts of chlorite and calcite. Clay from the IVC3cab (66L728) contains a moderate to abundant amount of montmorillonite, and moderate amounts of mica, kaolinite, and calcite. Some interlayer chlorite is present in the montmorillonite.

Crystalline order of the montmorillonite and its abundance increase with depth. A noticeable increase occurs in the IVC3cab horizon.

Soil Classification: Ustollic Calciorthid; fine-loamy, mixed, thermic
 Soil: Reagan, light subsoil variant
 Soil Nos.: S66NMex-7-7
 Location: NE 1/4 NW 1/4, Sec. 23, T21S, R2E, 40 feet south of section line, about 0.1 mile east of S66NMex-7-6, Dona
 Ana County, New Mexico.
 Geomorphic Surface: Organ.
 Land Form: Coalescent fan piedmont sloping 1 percent to the west.
 Elevation: 4,310 feet.
 Parent Material: Sediments derived from limestone, calcareous sandstone, and mixed igneous rocks (see Remarks).
 Vegetation: Burro grass, creosotebush, tarbush.
 Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and W. C. Lynn, November 4, 1966.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Cracks (2 to 3 mm. diameter) form polygonal pattern, with polygons about 5 to 10 cm. diameter; surface
 crusted, with some crusts curling upward; discontinuous layer of loose sand beneath loose surface plates.

A 66L719 0 to 8 cm. Light brownish-gray (10YR 6.5/2 dry) or brown (10YR 4.5/3 moist) clay loam; moderate fine
 and medium platy; slightly hard; few roots; thin (less than 1/2 mm.) layers of 5YR-hued material between some plates;
 common fine pores, tending to horizontal orientation; effervesces strongly; abrupt smooth boundary.

A 66L720 8 to 18 cm. Pale brown (9YR 6/3 dry) or dark brown (9YR 4/3 moist) clay loam; very weak medium
 prismatic breaking to weak medium and coarse platy; slightly hard; few roots; common tubular pores tending to horizon-
 tal; between some plates there are less than 1-mm.-thick layers of 5YR material; effervesces strongly; abrupt smooth
 boundary.

B21ca 66L721 18 to 30 cm. Pale brown (9YR 6/3 dry) or dark brown (9YR 4/3 moist) silty clay loam; slightly hard
 and hard; weak medium prismatic, breaking to weak medium subangular blocky; few roots; few carbonate filaments on ped
 faces and lining root channels; effervesces strongly; clear smooth boundary.

B22ca 66L722 30 to 41 cm. Light yellowish-brown (9YR 6/4 dry) or yellowish-brown (9YR 4.5/4 moist) sandy clay
 loam; weak medium prismatic, breaking to weak medium subangular blocky; slightly hard and hard; few roots; few car-
 bonate filaments on ped faces and lining root channels; effervesces strongly; clear to abrupt smooth boundary.

IIC 66L723 41 to 51 cm. Reddish-brown (5YR 5.5/4 dry, 5YR 4/4 moist) light sandy loam, with few grayer, finer-
 textured lenses, 1 to 2 mm. thick; massive; slightly hard; few roots; this horizon is notably coarser than adjacent
 horizons and marks the base of the Organ sediments; horizon is weakly stratified and occurs discontinuously; very few
 fine carbonate filaments; effervesces strongly; abrupt smooth boundary.

IIIB2cab 66L724 51 to 61 cm. Reddish-brown (6YR 5.5/4 dry, 6YR 4/4 moist) clay loam; weak medium prismatic,
 breaking to weak medium subangular blocky; hard; few roots; few parts of 6 chroma; few carbonate filaments and nod-
 ules; common fine tubular pores; effervesces strongly; clear wavy boundary.

IIIK2b (IIIC1cab) 66L725 61 to 89 cm. Dominantly pinkish-white (7.5YR 8/2 dry) or pink (7.5YR 7/4 moist) with
 some brown (7.5YR 5.5/4 dry, 7.5YR 4.5/4 moist), and few fine volumes of 5YR hue; clay loam; weak medium subangular
 blocky; hard and very hard; few roots; few fine tubular pores, some empty and some with fine roots of fine earth
 fillings; effervesces strongly; clear wavy boundary.

IIIC1cab (IIIC2cab) 66L726 89 to 112 cm. Brown (7.5YR 5.5/4 dry, 7.5YR 4.5/4 moist) heavy sandy loam; weak
 medium subangular blocky; hard and very hard; few roots; common carbonate nodules and filaments; very few pebbles,
 with thin discontinuous carbonate coatings; effervesces strongly; clear wavy boundary.

IIIC2cab (IIIC3cab) 66L727 112 to 140 cm. Light reddish-brown (6YR 6/4 dry) or reddish-brown (6YR 4.5/4 moist)
 heavy sandy loam; generally massive but with weak tendency to subangular blocky; hard; no roots; subangular blocks
 are weakly cylindrical; cylinders colored 8YR 6/4 moist; few carbonate filaments and nodules; few pebbles, with
 thin, discontinuous carbonate coatings; effervesces strongly; clear wavy boundary.

IVC3cab (IVC4cab) 66L728 140 to 175 cm. Reddish-yellow (6YR 6/5 dry) or reddish-brown (6YR 4.5/4 moist) heavy
 sandy loam; massive; slightly hard and hard; no roots; a few pebbles, and a discontinuous lens of gravelly light
 sandy loam; few carbonate nodules and filaments; pebbles thinly and discontinuously coated with carbonate; efferv-
 esces strongly.

Remarks: 0 to 51 cm - Organ alluvium; 51 to 175 cm - Jornada II alluvium.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Bucklebar SOIL Nos. S66NMex-7-8 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 66L729-66L736

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1													2A2 Coarse fragments			
		Total			Sand					Silt					Vol. 250-2 % < 250	3B1 Wt.		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	< 0.074		76-2	5-2	19-2
Pct. of < 2 mm																		
Carbonate Removed																		
0-8	C	80.6	7.8	11.6	6.6	9.7	10.8	34.7	18.8	5.4	2.4	44.9	61.8	28.4				
8-15	A2	66.6	16.9	16.5	2.5	5.5	7.7	31.0	19.9	7.4	9.5	46.1	46.7	43.9				
15-30	B21t	56.4	15.9	27.7	4.5	7.2	7.2	23.5	14.0	6.0	9.9	33.6	42.4	51.0				
30-51	B22t	68.7	7.9	23.4	10.1	12.2	10.7	25.5	10.2	3.7	4.2	27.0	58.5	36.3				
51-81	B21tb	55.5	15.2	29.3	1.7	4.1	7.0	24.7	18.0	8.2	7.0	40.8	37.5	55.0				
81-124	B22tb	53.0	23.3	23.7	2.5	3.8	5.4	20.6	20.7	14.3	9.0	47.9	32.3	60.1				
124-150	B31b	58.7	24.0	17.3	3.9	5.5	7.1	22.5	19.7	16.2	7.8	49.3	39.0	53.7				
150-198	B32b	56.5	24.1	19.4	2.3	3.9	6.4	24.0	19.9	16.3	7.8	50.6	36.6	55.7				
Carbonate Not Removed																		
0-8	C	79.0	9.7	11.3	7.2	9.7	9.9	32.1	20.1	5.6	4.1	45.2	58.9	31.3	4	7	6	7
8-15	A2	66.1	19.3	14.6	2.2	5.2	7.6	30.3	20.8	7.6	11.7	46.6	45.3	45.4	2	4	3	4
15-30	B21t	56.8	16.9	26.3	5.7	7.3	7.0	22.8	14.0	5.6	11.3	32.8	42.8	50.8	2	4	3	4
30-51	B22t	67.7	9.4	22.9	9.3	12.1	10.3	25.3	10.7	3.8	5.6	27.9	57.0	37.7	4	7	7	7
51-81	B21tb	55.1	16.0	28.9	1.7	4.8	7.1	24.7	16.8	8.2	7.8	39.2	38.3	54.6	1	2	1	2
81-124	B22tb	51.9	23.9	24.2	2.7	4.2	5.3	20.2	19.5	14.7	9.2	46.5	32.4	60.1	2	3	3	3
124-150	B31b	56.2	27.0	16.8	3.9	5.3	6.5	21.5	19.0	16.8	10.2	48.5	37.2	55.6	3	5	3	5
150-198	B32b	52.5	27.0	20.5	1.8	3.6	5.7	22.5	18.9	16.4	10.6	48.7	33.6	58.9	1	2	2	2
Depth (cm.)	6A1a Organic carbon c/ Pct.	Ratio 15-Bar Water to Clay 8D1 a/		Carbonate as CaCO ₃ 6E1b 3A1a 6E2a <0.002 <2mm. mm. Pct. Pct.		Bulk density 4A1d 4A1h 4D1 COLE			Water content 4B1c 4B2 4C1			Composition Whole Soil b/ NONCARBONATE					Carbonate as CaCO ₃ Pct.	
0-8	0.15	0.35	0.35	2	tr		1.3d				4.0		6	74	7	11	2	
8-15	0.27	0.36	0.32	tr(s)	-		1.5d				5.2		4	64	16	16	tr	
15-30	0.35	0.31	0.29	tr(s)			1.5d				8.1		4	54	15	27	tr	
30-51	0.23	0.32	0.31	tr(s)			1.5d				7.3		7	64	7	22	tr	
51-81	0.20	0.33	0.32	tr(s)			1.6d	1.81	0.024	16.7	9.5	0.12	2	54	15	29	tr	
81-124	0.20	0.33	0.33	tr(s)			1.6d				7.9		3	51	23	23	tr	
124-150	0.16	0.39	0.38	2	tr		1.5d				6.5		5	55	22	16	2	
150-198	0.12	0.37	0.41	6	tr		1.5d	1.62	0.024	17.8	7.5	0.15	2	52	22	18	6	

- a/ Clay measured on carbonate-free material; calculated to carbonate-containing basis.
- b/ Inclusive of coarse fragments, carbonate, and gypsum.
- c/ 2.9 kg/m² to 81 cm (Method 6A).
- d/ Assumed for calculations.

66-8

Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic
 Soil: Bucklebar
 Soil Nos.: S66NMex-7-8
 Location: NE 1/4 NW 1/4, Sec. 24, T22S, R2E, about 0.1 mile east of 60-7-7, north bank of gully, Dona Ana County, New Mexico. Vegetation: Few tarbush and mesquite.
 Geomorphic Surface: Drainageway on Jornada II surface; surficial (8 to 51 cm) sediments are possibly of Organ age.
 Elevation: 4,460 feet.
 Parent Material: Drainageway sediments derived from monzonite, rhyolite, limestone, and andesite (see Remarks).
 Land Form: Broad drainageway on coalescent fan piedmont sloping 1 percent to northeast.
 Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and W. C. Lynn, November 4, 1966.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Smooth and largely barren between dunes; about 10 percent covered with scattered sand grains and fine pebbles - monzonite, andesite, rhyolite, few limestone.

C 66L729 0 to 8 cm. Reddish-brown (5YR 5.5/4 dry, 5YR 4/4 moist) loamy sand; massive and single grain; soft and loose; no roots; some weak stratification apparent and the deposit grades into a dune, 1 to 2 feet high, about 4 feet north of gully and sample site; some material of 7.5YR hue; effervesces strongly; abrupt smooth boundary.

A2 66L730 8 to 15 cm. Pinkish-gray (7.5YR 6/2 dry) or dark brown (7.5YR 4/2 moist) heavy fine sandy loam; generally massive, with some weak platiness in upper part; very hard to slightly hard; few roots; generally noncalcareous with some effervescence in upper part; abrupt smooth boundary.

B21t 66L731 15 to 30 cm. Reddish-brown (6YR 5/4 dry) or dark reddish-brown (6YR 3.5/4 moist) light sandy clay loam; very weak medium and coarse subangular blocky; hard; few roots; few insect burrows, 2 to 10 cm. diameter, some empty, some filled or partly filled with fine earth that is slightly darker than the enclosing material; thin clayey coatings on sand grains; laterally there are occasional strata of material with more coarse and very coarse sand, that rests with abrupt to clear boundary on underlying horizon; few very fine tubular pores; noncalcareous; clear smooth boundary.

B22t 66L732 30 to 51 cm. Reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) sandy clay loam; very weak medium and coarse subangular blocky; hard; few roots; thin, discontinuous clayey coatings on some sand grains; few insect burrow fillings; in the lower part of this horizon is a discontinuous stratum, commonly less than 10 cm. thick with more coarse and very coarse sand than the upper part; sand grains thinly coated with clay; few very fine tubular pores; noncalcareous; abrupt smooth boundary.

B21tb 66L733 51 to 81 cm. Reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) sandy clay loam; weak coarse prismatic, breaking to very weak medium subangular blocky; hard; very few roots; few very fine tubular pores; few insect channels, 2 to 10 cm. diameter; very slightly redder than B22t; sand grains thinly coated with silicate clay; discontinuous, weakly reflective surfaces on some prism faces; noncalcareous; clear wavy boundary.

B22tb 66L734 81 to 124 cm. Reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) sandy clay loam; weak coarse prismatic breaking to very weak medium and coarse subangular blocky; hard; very few roots; few insect channels, 2 to 10 cm. diameter, some of which are filled with fine earth; few very fine tubular pores; discontinuous, weakly reflective surfaces on some prism faces; noncalcareous; clear smooth boundary.

B31b 66L735 124 to 150 cm. Reddish-brown (5YR 5.5/4 dry, 5YR 4/4 moist) light sandy clay loam; weak medium prismatic, breaking to very weak medium and coarse subangular blocky; hard; no roots; few fine and very fine tubular pores; few carbonate filaments along ped faces and in some pores; effervesces weakly; clear wavy boundary.

B32b 66L736 150 to 198 cm. Light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 4.5/4 moist) heavy fine sandy loam; weak medium subangular blocky; hard; no roots; few very fine tubular pores; common fine carbonate filaments throughout; effervesces strongly.

Remarks: Alluvial parent materials in upper 8 cm probably the result of sedimentation in historic time; from 8 cm to 51 cm possibly Organ sediments; underlying material, Jornada II.

Soil Classification: Ustollic Haplargid; loamy-skeletal, mixed, thermic.

Soil: Coxwell, shallow variant

Soil Nos.: S66NMex-7-9

Location: SW 1/4 NE 1/4, Sec. 6, T22S, R4E, about 0.1 mile north of Highway 70 at San Agustin Pass, north bank of telephone company road, Dona Ana County, New Mexico.

Geomorphic Surface: Undifferentiated mountain slopes and summits.

Elevation: 5,800 feet.

Vegetation: Scattered clumps of blue grama and sideoats grama; and a few snakeweed, *Yucca baccata*, and *Quercus sp.*

Land Form: Mountain side sloping 40 percent westward.

Parent Material: Monzonite bedrock, with a small amount of colluvium at surface.

Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and W. C. Lynn, November 7, 1966.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Between grass clumps there are scattered cobbles, with a few stones 1 to 3 feet in diameter; most of remainder covered by a pavement of monzonite fragments less than 1 inch diameter.

A1 66L737 0 to 5 cm. Dark grayish-brown (10YR 4/2 dry) or very dark brown (10YR 2.5/2 moist) fine gravelly sandy loam; generally massive and soft, with parts a loose mass of soft fine crumbs; roots common; noncalcareous; abrupt smooth boundary.

B21t 66L738 5 to 15 cm. Dark grayish-brown (10YR 4/2 dry) or very dark brown (10YR 2.5/2 moist) light sandy clay loam, with few parts slightly redder and lighter; weak fine and medium subangular blocky; hard; roots common; coarse sand grains and pebbles have thin, discontinuous clay coatings; few fine tubular pores; noncalcareous; clear smooth boundary.

B22t 66L739 15 to 33 cm. Weathered monzonite bedrock, dominantly brown (10YR 5.5/3 dry, 10YR 4.5/3 moist) and brown (7.5YR 5.5/4 dry, 7.5YR 4.5/4 moist) sandy clay loam when crushed with fingers; structure controlled by cleavage planes in the bedrock, which breaks out as portions that crush easily into fragments ranging dominantly from 1 to 5 mm. diameter; readily removed with knife; slightly hard; a few veins of harder bedrock (dominantly 7.5YR 5/4 dry, with some of 5YR hue) occur in random orientation, range from about 5 to 10 cm. in diameter and may be removed with knife, but many fragments are extremely hard; a few seams colored with reddish-brown (5YR 5/4 dry) clay coatings on rock fragments; in some cases the fragments are reddish-brown throughout; scattered diagonal seams, coated with dark, apparent organic carbon, contain a few descending roots; noncalcareous; clear irregular boundary.

B31 66L740 33 to 48 cm. Weathered monzonite bedrock, dominantly very pale brown (10YR 8/3 to 7/3 moist) intermingled in fine pattern with brownish-yellow (10YR 6/6 dry) light sandy clay loam when crushed; structure controlled by cleavage planes in the bedrock, which fractures into angular fragments, 1 to 5 mm. diameter; readily removed with knife; slightly hard; few roots; a few veins, randomly oriented, are brownish-yellow (10YR 6/6 dry), about 5 to 10 cm. thick, and are readily removed with knife but removed portions are hard to extremely hard; some staining of organic carbon along seams; noncalcareous; gradual irregular boundary.

B32 66L741 48 to 84 cm. Weathered monzonite bedrock, dominantly white (10YR 9/2 to 8/2 dry) with some brownish-yellow (10YR 6/6 dry); sandy clay loam when crushed; structure is bedrock-controlled as above; removed readily with knife; slightly hard; few roots; seams, 1 to 3 mm. wide, stained with dark material extend diagonally through the horizon; small amount of apparent organic staining along seams; noncalcareous; gradual irregular boundary.

B33 66L742 84 to 122 cm. Weathered monzonite bedrock, dominantly white (10YR 9/2 and 10YR 8/2 dry and moist) with some brownish-yellow (10YR 6/6 dry) in fine pattern; sandy clay loam when crushed; structure is bedrock-controlled; removed readily with knife; slightly hard; very few roots; a few seams with slight staining of apparent organic carbon; noncalcareous; abrupt irregular boundary.

B34 66L743 122 to 198 cm. Weathered monzonite bedrock, dominantly white (10YR 9/2 to 8/2 dry) with brownish-yellow (10YR 6/6 dry) in fine pattern; sandy loam when crushed; structure is bedrock-controlled; readily removed with knife; slightly hard; no roots; in the upper part is a vein, 6 to 8 cm. thick, of material that breaks into hard to extremely hard fragments, in places stained yellowish-brown (10YR 4/6 to 5/6 dry); noncalcareous; clear wavy boundary.

R 66L744 198 to 234 cm. Monzonite bedrock, relatively little-weathered; crushes with fingers into a mass of fine pebbles and coarse sand grains; difficultly removed with knife; no roots; reddish stainings along surfaces of some fragments; noncalcareous.

Sand Mineralogy, Method 7B1. The 2-0.1 and 0.1-0.05 mm. (very fine sand) from the particle-size analyses on the B22t and the B34 horizons were examined. Grain mounts of the very fine sand were examined. Thin sections of the 2-0.1 mm. were prepared. A wafer of the 2-0.1 mm. was prepared and broken into fragments which were then remounted. In this manner, orientation by size and shape was randomized. The point or the line intercept method was used. The mica in the very fine sand was adjusted downward to 20 percent of the original values and the other percentages raised proportionally, thereby making the values more nearly percentages by volume.

The percentages are given in the table below. Minor amounts of epidote, pyroxene, and zircon were observed. The hornblende is green. The biotite grains in the very fine sand mounts range widely in interference color. A higher proportion of those in the B22t show a medium yellow interference color. A minority of the grains of biotite in the B22t are altered to a reddish-brown earthy appearance.

Identification	Quartz %	Feldspar ^a / %	Microcrystalline	Biotite ^c / %	Hornblende %	Opakes %
			Aggregates ^b / %			
B22t, 66L739						
2-0.1 mm.	20	50	10	15	-	5
0.1-0.05 mm.	10	55	20	5	tr	5
B34, 66L743						
2-0.1 mm.	15	45	5	30	5	3
0.1-0.05 mm.	35	40	15	2 ^b	2	5

- About 15 percent of the feldspar has an index of refraction near 1.550, indicative of plagioclase of intermediate calcium composition; only a trace of high calcium plagioclase is present. A small proportion of sanidine is present.
- Mostly sericitized feldspar; a minority are reddish-brown and appear earthy.
- Some chlorite(?) included, perhaps a higher proportion in the B34.

Clay Mineralogy, Methods 7A2, 7A3. Clay in the B22t horizon contains moderate to abundant, well-ordered montmorillonite and a small amount (15 percent) of very well-ordered kaolinite. The montmorillonite contains some interlayer material. Clay from the B33 horizon is very similar, perhaps a little less interlayering in the montmorillonite. Clay from the B34 horizon contains a moderate amount of mica, small amounts of montmorillonite and kaolinite, plus moderate to abundant amounts of regularly alternating mica-montmorillonite. Clay from the R horizon contains moderate amounts of montmorillonite and mica. Kaolinite is absent.

SOIL CLASSIFICATION: Ustollic Haplargid; loamy-skeletal, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Coxwell, shallow variant

SOIL Nos. S66Mex-7-10

LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska

LAB. Nos. 66L746-66L752

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1											3A1b < 0.0002	2A2 Coarse fragments a/				
		Total				Sand				Silt				3B2 Vol.	3B1 Wt.			
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)			(2-0.1)	250-2	19-5	5-2
Pct. of < 2 mm															< 0.074	< 0.0002	% < 250	% < 19 mm.
Water Washed b/																		
Not Water Washed																		
0-5	A1	71.8	16.0	12.2	18.1	17.2	8.8	16.1	11.6	8.2	7.8	28.9	60.2	34.9		45	14	20
5-13	B21t	59.7	17.9	22.4	11.4	12.5	7.3	15.9	12.6	8.3	9.6	30.4	47.1	47.5		35	8	22
13-25	B22t	63.3	14.1	22.6	18.4	16.6	7.3	12.9	8.1	5.2	8.9	20.5	55.2	41.2		40	12	39
25-43	B23t	80.2	9.3	10.5	34.1	21.1	7.3	11.6	6.1	3.8	5.5	16.1	74.1	23.0		45	19	42
43-84	B3	81.2	9.5	9.3	29.7	19.3	8.3	15.7	8.2	4.3	5.2	20.9	73.0	23.0		50	20	45
84-132	R1	90.4	6.6	3.0	31.1	25.9	9.7	16.5	7.2	3.2	3.4	18.7	83.2	13.0			43	35
132-178	R2	82.6	11.1	6.3	27.7	21.9	8.8	15.9	8.3	4.5	6.6	21.1	74.3	21.6			37	36
0-5	A1	70.8	16.5	12.7	16.9	16.4	8.7	16.7	12.1	8.5	8.0	30.0	58.7	36.0	5.8		13	19
5-13	B21t	63.5	16.6	19.9	15.9	14.6	7.6	14.9	10.5	7.3	9.3	26.2	53.0	42.5	10.4		8	20
13-25	B22t	66.5	12.1	21.4	23.9	17.3	6.8	11.6	6.9	4.7	7.4	17.9	59.6	37.3	11.9		11	32
25-43	B23t	82.1	8.3	9.6	24.8	25.2	10.6	15.0	6.5	3.7	4.6	17.6	75.6	21.2	4.5		19	38
43-84	B3	85.1	8.1	6.8	39.2	21.2	7.6	11.4	5.7	3.3	4.8	15.0	79.4	17.8	4.4		21	40
84-132	R1	89.4	7.7	2.9	29.0	22.5	10.4	18.4	9.1	4.1	3.6	23.0	80.3	15.2	1.4		38	36
132-178	R2	85.9	9.5	4.6	38.2	20.6	7.8	12.9	6.4	3.7	5.8	16.8	79.5	17.4	2.7		39	35
Depth (cm.)	6A1a Organic carbon d/	Nitrogen	8C1a pH (1:1)	5A1a CEC (NH4)2CO3 mg/100g	6E2a Carbonate as CaCO3	8D1 15-Bar to Clay Ratio	Bulk density			4D1 COLE	Water content			Composition Whole Soil				
							4A1d 1/3-Bar	4A1h Oven-Dry	g/cc		4B1c 1/3-Bar	4B2 15-Bar	4C1 1/3-to 15-Bar	NONCARBONATE			Carbonate as CaCO3	
														Pct.	Pct.	in. An.		Pct.
0-5	0.62		7.2	11.9	tr(s)	0.38		1.3e				4.6		70	21	5	4	tr
5-13	1.01		6.5	19.2	tr(s)	0.36		1.4e				8.0		67	20	6	7	tr
13-25	0.70		6.4	20.1	tr(s)	0.41		1.45	1.58	0.018		9.2	0.09	51	31	7	11	tr
25-43	0.27		6.6	11.6	tr(s)	0.44		1.44	1.55	0.013		18.0	0.10	61	31	4	4	tr
43-84	0.11		6.6	11.1	tr(s)	0.47		1.6e				4.4		65	29	3	3	tr
84-132	0.09		6.7	10.4	tr(s)	0.67						2.0		78	20	1	1	tr
132-178	0.08		6.8	12.0	tr(s)	0.56						3.5		73	22	3	2	tr

- a/ A1 and B21t contain 10 percent 75-20 mm weight in water-washed laboratory samples; others contain < 5 percent. > 75 mm. 30 percent by volume for A1 and B2t by visual estimate.
- b/ Samples washed in water before fine earth reported from coarse fragments.
- c/ Based on particle-size analyses of water-washed samples for < 76.
- d/ 2.4 kg/m² to 84 cm (Method 6A).
- e/ Assumed for calculations.

66-10

Soil Classification: Ustollic Haplargid; loamy-skeletal, mixed, thermic
 Soil: Coxwell, shallow variant
 Soil Nos.: S66NMex-7-10
 Location: SW 1/4 NE 1/4, Sec. 6, T22S, R4E, 0.2 mile north of Highway 70 at San Agustin Pass, east bank of telephone company road; Dona Ana County, New Mexico.
 Geomorphic Surface: Undifferentiated mountain slopes and summits.
 Elevation: 5,850 feet.
 Vegetation: Sideoats grama, blue grama, beargrass, snakeweed, Quercus sp., Yucca baccata.
 Land Form: Mountain side sloping 35 percent westward.
 Parent Material: Monzonite bedrock, with small amount of colluvium at surface.
 Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and W. C. Lynn, November 7, 1966.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Between grass clumps and shrubs, the surface is nearly 100 percent covered with greater than 2 mm. material, dominantly of cobble size, with a few fragments greater than 10 inch diameter.

A1 66L746 0 to 5 cm. Dark brown (10YR 4/3 dry) or very dark brown (10YR 2.5/2 moist) gravelly and cobbly sandy loam; weak medium platy and weak fine crumb; soft; few roots; noncalcareous; abrupt smooth boundary.

B21t 66L747 5 to 13 cm. Dark reddish-gray (6YR 4/2 dry) or dark reddish-brown (6YR 2.5/2 moist) gravelly and cobbly sandy clay loam; weak medium subangular blocky; slightly hard; common roots; sand grains and pebbles have reddish clayey coatings; noncalcareous; abrupt smooth boundary.

B22t 66L748 13 to 25 cm. Weathered monzonite bedrock, dark red and yellowish-red (2.5YR 3/6, 5YR 4/6 dry and moist) heavy sandy loam when crushed with fingers; structure controlled by bedrock, which breaks out as angular rock fragments, about 1 to 5 mm. diameter; removed readily with knife; slightly hard or hard; few roots; many fragments separated by clay coatings; noncalcareous; clear wavy boundary.

B23t 66L749 25 to 43 cm. Weathered monzonite bedrock; dominantly yellowish-red and reddish-brown (5YR 5/6, 5/4 dry or moist) with some parts dark red (2.5YR 3/6 dry); crushes to sandy loam; structure is bedrock-controlled; portions are removed readily with knife, are slightly hard, and break easily into rock aggregates, ranging dominantly from 1 to 10 mm. diameter; few roots; fragments are stained yellowish-red (5YR 5/6 dry) with thin clayey coatings apparent in places; staining penetrates some crystals; noncalcareous; clear wavy boundary.

B3 66L750 43 to 84 cm. Weathered monzonite bedrock, dominantly reddish-brown (5YR 5/4 dry and moist) with some 7.5YR hue; portions are removed difficultly with knife, are slightly hard, and crush easily into rock fragments ranging from about 1 to 10 mm. diameter; few roots, mainly in weathered seams, 1 to 2 cm. diameter; 5YR material stains and in places thinly coats the rock fragments; noncalcareous; gradual wavy boundary.

R1 66L751 84 to 132 cm. Little-weathered monzonite bedrock; crushes into fragments dominantly of coarser sand and fine pebble size; roots extend downward along seams (1 to 10 mm. diameter) of soft material; weak reddish-brown stainings on some fragments; noncalcareous; gradual irregular boundary.

R2 66L752 132 to 178 cm. Similar to above, but firmer in place and with fewer reddish-brown stainings on rock fragments; a few roots along seams; noncalcareous.

Remarks: Laterally there are extremely hard dikes ranging up to several meters in diameter.

Mineralogy (Method 7A2).

B22t	13-25 cm
R2	132-178 cm

The X-ray traces of the clay from the B22t horizon show a strong peak from a well-ordered kaolinite with a small amount of montmorillonite present. The montmorillonite has interlayer components. Clay from the R2 horizon contains well-ordered kaolinite and an abundant amount of a well-ordered 2:1 layer silicate complex. The complex contains discrete components of montmorillonite and vermiculite and an additional component of interstratified mica-montmorillonite. The three components are present in about equal amounts.

SOIL CLASSIFICATION: Typic Torripsamment; mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Pintura SOIL Nos. S66NMex-7-11 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 66L753-66L759

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1													2A2 Coarse fragments						
		Total				Sand					Silt				Clay				3B1 Wt.		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	0.02-0.002	0.2-0.02	(2-0.1)	<0.074	76-2	5-2	19-2				
Pct. of < 2 mm															% < 76	% < 19					
Carbonate Not Removed																					
0-28	C1	93.7	3.0	3.3	0.2	13.2	32.7	41.4	6.2	1.9	1.1	23.6	87.5	8.9		tr	tr	tr			
28-58	C2	92.7	3.5	3.8	1.0	15.1	31.0	39.2	6.4	2.3	1.2	23.3	86.3	10.1		tr	tr	tr			
58-84	B2b	89.2	6.0	4.8	1.8	15.8	27.4	35.3	8.9	4.6	1.4	28.4	80.3	15.2		tr	tr	tr			
84-109	B3cab	89.2	5.9	4.9	1.8	15.4	26.9	36.5	8.6	4.0	1.9	27.4	80.6	15.1	2	2	2				
109-137	C1cab	88.8	5.8	5.4	3.2	14.6	25.5	37.9	7.6	3.1	2.7	26.0	81.2	14.7	1	1	1				
137-163	C2cab	94.0	2.7	3.3	3.7	21.4	30.4	35.1	3.4	1.1	1.6	16.3	90.6	7.3	1	1	1				
163-188	C3b	94.8	2.5	2.7	2.9	20.7	29.8	37.0	4.4	1.2	1.3	18.3	90.4	6.9		tr	tr	tr			
Depth (cm.)	6A1a Organic carbon a/ Pct.	Nitrogen Pct.	C/N	Carbonate as CaCO ₃		Bulk density			4D1 COLE	Water content			pH								
				6E1b <2mm. Pct.	3A1a <0.002 mm. Pct.	4A1d 1/3-Bar g/cc	4A1h Oven-Dry g/cc	4E1a 0.06-Bar		4E1a 0.1-Bar	4E2 15-Bar	(1:1)									
0-28	0.15			-(s)																	
28-58	0.15			tr(s)																	
58-84	0.13			tr(s)																	
84-109	0.10			1	-																
109-137	0.10			2	-																
137-163	0.06			1	-																
163-188	0.06			tr																	

a/ 2.1 kg/m² to 109 cm (Method 6A).

b/ Assumed for calculations.

66-11

Soil: Pintura

Classification: Typic Torripsamment; mixed, thermic

Soil Nos.: S66NMex-7-11

Location: About one mile west of Tortugas Mountain, 0.1 mile north of Dripping Springs Road, Dona Ana County, New Mexico. Geomorphic Surface: Dune on Fort Selden

Land Form: Coppice dune on shoulder of slight ridge; slope is 6 percent to southeast.

Parent Material: Eolian sand, in dune; underlying soil formed in sands (see Remarks).

Elevation: 4,125 feet.

Vegetation: Mesquite, few creosotebush.

Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and W. C. Lynn, November 8, 1966.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Surface of dune weakly crusted; in places there is a thin, discontinuous layer of loose sand on the crust.

C1 66L753 0 to 28 cm. Brown (10YR 5.5/3 dry) or dark brown (10YR 4/3 moist) sand; massive and single grain; soft and loose; roots few to common; stratification more apparent than in horizon below, but weak stratification is apparent throughout; noncalcareous; clear wavy boundary.

C2 66L754 28 to 58 cm. Brown (10YR 5.5/3 dry) or dark brown (10YR 4/3 moist) sand; generally massive and single grain with a tendency for weak platiness where horizontal stratification is apparent; strata about 1 to 4 mm. thick; soft and loose; roots few to common; generally noncalcareous, in places effervesces weakly; abrupt smooth boundary.

B2b 66L755 58 to 84 cm. Brown (10YR 5/3 dry) or dark grayish-brown (10YR 3.5/2 moist) sand; massive; soft; few roots; generally effervesces weakly, in places is noncalcareous; clear wavy boundary.

B3cab 66L756 84 to 109 cm. Light brownish-gray (10YR 6/2 dry) or dark grayish-brown (10YR 4/2 moist) sand; massive; soft; few roots; few patchy carbonate coatings on sand grains; effervesces weakly; clear wavy boundary.

C1cab 66L757 109 to 137 cm. Light gray (10YR 7/2 dry) or grayish-brown (10YR 5.5/2 moist) loamy sand; massive; soft; few roots; few carbonate filaments; sand grains have patchy coatings and there are a few pebbles with thin, discontinuous carbonate coatings; few krotovinas with colors of B3cab, 2 to 10 cm. diameter; effervesces strongly; clear wavy boundary.

C2cab 66L758 137 to 163 cm. Light brownish-gray (10YR 6.5/2 dry) or grayish-brown (10YR 4.5/2 moist) sand; massive; soft; few roots; few faint patchy coatings on sand grains; a few pebbles, with thin, patchy carbonate coatings; effervesces strongly; clear wavy boundary.

C3b 66L759 163 to 188 cm. Light brownish-gray (10YR 6.5/2 dry) or grayish-brown (10YR 4.5/2 moist) sand; massive; soft; no roots; effervesces weakly.

Remarks: Eolian sand and alluvial-colluvial material associated with undifferentiated Fort Selden valley-slope surface.

Sand Mineralogy (Method 7B1): C horizon, 66L759. The fine sand (0.25-0.10 mm.) contains 45 percent quartz, 30 percent feldspar with an index of refraction appreciably below 1.550, 20 percent microcrystalline aggregates with an index of refraction below 1.550, 5 percent feldspar with an index at or above 1.550, and minor proportions of the hornblende group and opaques. Some of the quartz grains show peripheral regrowth; most of the grains are rather angular but a small minority are quite circular in outline. Most of the feldspar with an index below 1.550 is orthoclase; microcline and albite are present and some grains may have a refractive index below 1.53. Some of the grains of feldspar of intermediate to high calcium content are etched and otherwise appear weathered; some are zoned. The microcrystalline aggregates would appear to be fragments of the fine ground mass of rhyolite. The zoned grains of intermediate and high calcium feldspar suggest a minor contribution from volcanic rocks of basaltic composition.

SOIL CLASSIFICATION: Petrocalcic Paleargid; loamy, mixed, thermic, shallow

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Cruces SOIL Nos. S66(67)NMex-7-12 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 67L131-67L133, 66L750-66L765

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)													3A1		a/	Coarse fragments		
		Total					Sand				Silt				Clay (<0.075)	Pct. of < 2 mm	2-19	19-75		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)							
0-3	A	83.8	6.9	9.3	0.7	6.6	13.7	49.3	13.5	4.2	2.7	44.9	70.3	21.3						
3-20	B21t	68.1	10.1	21.8	1.3	6.6	12.4	35.5	12.4	6.2	3.9	38.2	55.7	37.3						
20-33	B22t	62.9	13.8	23.3	1.1	6.4	13.8	31.1	10.5	8.4	5.4	35.2	52.4	42.1						
33-46	K21m	68.6	8.1	23.3	1.1	5.8	12.1	37.7	11.9	2.7	5.4	35.7	56.7	35.7						
46-66	K22m	73.4	6.8	19.8	1.4	4.0	10.9	41.4	15.7	4.0	2.8	44.2	57.7	32.5						
66-99	K23m	83.8	8.1	8.1	6.7	15.3	16.3	34.3	11.2	0.7	7.4	29.6	72.6	20.6						
99-137	K24m&K31	85.2	7.1	7.7	7.1	16.9	17.6	32.6	11.0	0.3	6.8	27.6	74.2	19.1						
137-208	K33	87.6	7.8	4.6	4.0	12.5	19.0	38.5	13.5	3.4	4.4	35.8	74.1	18.3						
251-305	Bcab(?)	82.9	5.9	11.2	2.3	7.9	15.0	43.3	14.3	2.4	3.5	40.2	68.5	22.8						
Depth (cm.)	Organic carbon	Nitrogen	C/N	Carbonate as CaCO ₃	Bulk density			Water content			Composition Whole Material									
					b/	g/cc	g/cc	g/cc	Pct.	Pct.	Pct.	NONCARBONATE			Carbonate as CaCO ₃					
												>2mm.	Sand	Silt		Clay				
Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.							
0-3				tr(s)																
3-20				tr																
20-33				tr																
33-46				67																
46-66				74																
66-99				53																
99-137				54																
137-208				21																
251-305				25																

a/ Pretreatment of < 2 mm with 0.1N NaOH.

b/ Assumed bulk densities of moist fine-earth fabric for calculations.

Soil: Cruces

Classification: Petrocalcic Paleargid; loamy, mixed, thermic, shallow

Soil Nos.: S66(67)NMex-7-12

Location: NW 1/4, Sec. 26, T23S, R1W, on north wall of borrow pit just east of airport road, Dona Ana County,

Geomorphic Surface: La Mesa (upper).

New Mexico.

Land Form: Relict basin floor, nearly level.

Parent Material: Upper Camp Rice basin-fill (fluvial facies), noncalcareous sand and a few rounded pebbles of mixed composition. Elevation: 4,410 feet.

Vegetation: Scattered mesquite, snakeweed, Mormon tea, dropseed, *Yucca elata*.

Collected by: R. B. Grossman, J. W. Hawley, and W. C. Lynn, November 8, 1966.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Hard and barren between clumps of vegetation; a few fine pebbles are scattered about on the surface.

A 67L131 0 to 3 cm. Reddish-brown (5YR 5/3.5 dry, 5YR 3.5/3.5 moist) light sandy loam; generally massive, with some weak medium platy; soft; no roots; noncalcareous; abrupt smooth boundary.

B2lt 67L132 3 to 20 cm. Reddish-brown (5YR 4.5/5 dry, 5YR 3.5/5 moist) light sandy clay loam; weak very coarse prismatic, massive and very weak subangular blocky internally; slightly hard to hard; very few fine roots; sand grains coated with reddish clay and there is some clay bridging between grains; few fine tubular pores; noncalcareous; clear smooth boundary.

B22t 67L133 20 to 33 cm. Reddish-brown (5YR 4.5/5 dry, 5YR 3.5/5 moist) with some parts of lower chroma; sandy clay loam with slightly more clay than in B2lt; weak very coarse prismatic, massive and weak medium subangular blocky internally; hard; no roots; sand grains coated with reddish clay and there are some clay bridges; few insect burrows, 5 to 10 mm. diameter, filled with dark material; few fine tubular pores; some ped faces weakly reflective; noncalcareous except for lower inch, which has lower chroma, is less red and effervesces weakly; abrupt smooth boundary.

K21m (C1cam) 66L760 33 to 46 cm. Several platy units, extremely hard, each consisting of a laminar horizon (ranging from about 2 to 15 mm. thick) and an underlying carbonate-plugged horizon, cemented together; the laminar horizon is dominantly pink (7.5YR 8/4 dry) or light brown (7.5YR 6/4 moist); the plugged horizon is dominantly white (7.5YR 9/4 dry) or pink (7.5YR 7/4 moist); when plugged horizon is fractured, smooth surfaces of nodules, and grainy-appearing, internodular material are apparent,

many nodules have smooth carbonate coatings; very weak, very coarse prisms, 2 to 3 feet in diameter, extend through the Km horizon; no roots; lining occasional fracture planes or slight cracks, coating the bottoms of plates, and in places, forming laminae, is a prominent reddish staining that ranges from 5YR 5/4 to 5/6 dry to 2.5YR 6/4 dry; effervesces strongly; clear wavy boundary.

K22m (C2cam) 66L761 46 to 66 cm. Several platy units as in K21m, but lacking evidence of fracture and recementation and prominent reddish color; laminar horizon ranges from white to very pale brown (10YR 9/3 to 7/3 dry) and very pale brown to brown (10YR 8/3 to 6/3 moist); plugged horizon white (7.5YR 9/2 dry) or pink (7.5YR 7.5/4 moist); extremely hard; no roots; effervesces strongly; clear wavy boundary.

K23m (C3cam) 66L762 66 to 99 cm. White (10YR 9/2 dry) or very pale brown (10YR 8/3 moist) carbonate-cemented material; weak tendency for platiness; as shown by discontinuous horizontal cleavage planes from about 2 to 6 inches apart; extremely hard; no roots; very few channels, 2 to 3 mm. diameter, with smooth linings; some empty, some filled with loose fine earth; effervesces strongly; clear wavy boundary.

K24m (C4cam) 66L763 99 to 114 cm. White (9YR 9/2 dry) or very pale brown (9YR 7/3 moist) carbonate-cemented material; extremely hard; no roots; few channels, 2 to 5 mm. diameter, some of which are empty, and some lined with dark clayey material; effervesces strongly; clear wavy boundary.

K31 (C5ca) 66L763 114 to 137 cm. White (10YR 9/2 dry, 10YR 8/2 moist) nodular material consisting of closely fitted nodules and clusters of nodules, discontinuously cemented together; hard and very hard; no roots; nodules have smooth surfaces; effervesces strongly; clear wavy boundary.

K32 (C6ca) 137 to 168 cm. Dominantly white (10YR 9/2 dry, 10YR 8/2 moist) discontinuously cemented, nodular material; hard and very hard; no roots; discontinuous volumes of reddish-brown material, a heavy fine sandy loam, some colored 5YR 6/4 dry, 5YR 5/4 moist; and some are 1/2 chip to 1 chip darker; this material effervesces weakly or is noncalcareous; remainder effervesces strongly; clear wavy boundary.

K33 (C7ca) 66L764 168 to 251 cm. Dominantly white (7.5YR 9/2 dry) or pink (7.5YR 7.5/4 moist) carbonate-cemented material; lesser amounts of reddish-brown (5YR 5.5/4 dry, 5YR 4.5/4 moist) light sandy clay loam; massive; hard and very hard; no roots; some peds of 5YR material have discontinuous, calcareous coatings; reddish-brown material increases with depth; effervesces strongly; clear wavy boundary. (Sampled 168 to 208 cm)

Bcab(?) (or C8ca) 66L765 251 to 305 cm. Reddish-brown (5YR 5.5/4 dry, 5YR 4.5/4 moist) heavy sandy loam, with scattered veins and filaments of carbonate; massive; hard; no roots; noncalcareous; or effervesces weakly to strongly.

Soil: Pintura
 Classification: Typic Torripsamment; mixed, thermic
 Soil Nos.: S66NMex-7-13
 Location: SE 1/4 SE 1/4, Sec. 27, T23S, R1W, just north of Interstate 10; sampled slightly west of Desert Project boundary because of position - well to the west of the valley - on the highest part of La Mesa. Dona Ana County, New Mexico. Land Form: Coppice dune. Geomorphic Surface: Dune on La Mesa (upper).
 Elevation: 4,420 feet.
 Parent Material: Dune sand over Upper Camp Rice basin fill.
 Vegetation: Mesquite.
 Collected by: R. B. Grossman, J. W. Hawley, and W. C. Lynn, November 8, 1966.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. The surface of the dune is noncalcareous or effervesces weakly. The dune has a weakly crusted surface that in places is covered by a thin, loose layer of sand.

C1 66L766 0 to 25 cm. Reddish-brown (5YR 5/4 dry, 5YR 3.5/4 moist) loamy fine sand; generally massive and soft, with some weak thin and very thin platy; plates generally 1 mm. or less in thickness, between more massive layers that range up to 3 cm. or more in thickness; few roots; noncalcareous; clear wavy boundary.

C2 66L767-8 25 to 152 cm. The 25 to 152 cm. material was subdivided for sampling (25 to 86 cm. and 86 to 152 cm.), and is similar to above, but in places contains somewhat more of the platy material and more roots and workings by soil fauna.

I1Aa 66L769 152 to 193 cm. Reddish-brown (5YR 4.5/4 dry, 5YR 3.5/3 moist) loamy sand; massive; soft; few roots; noncalcareous in upper part; effervesces weakly in lower part; clear wavy boundary.

I1Bb 66L770 193 to 226 cm. Light reddish-brown (5YR 5.5/4 dry) or reddish-brown (5YR 4/4 moist) light sandy loam; massive; slightly hard; few roots; few carbonate filaments along root channels; effervesces strongly; abrupt smooth boundary to Km horizon which was not sampled.

Mineralogy (Method 7B1). The fine sand from the C1 horizon contains 50 percent quartz, 25 percent feldspar, 20 percent microcrystalline aggregates, 2 percent opaques and 1 percent ferromagnesian minerals. Most of the feldspar is orthoclase and albite with about 20 percent plagioclase of intermediate calcium content. The microcrystalline aggregates appear to be fragments of fine-grain groundmass similar to that observed in rhyolite of the area. The grains have patchy coatings of reddish-brown clayey material that is resistant to removal by the PSDA procedure (Method 3A1). These coatings give a dry color of 5YR 6/4 to the sand after clay removal. Treatment with dithionite-citrate (Method 6C2) removes the coatings and the sands are left white; the clay is increased about one percentage unit.

SOIL CLASSIFICATION: Typic Camborthid; fine-silty, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Mimbres, overwash phase SOIL No. 866Mex-7-14 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. No. 661771-661778, 671041

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Soil class and particle diameter (mm) 3A1													2A2 Coarse fragments			
		Total				Sand					Silt				Clay			
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (<0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	<0.074	3B1 Wt.			
Pct. of < 2 mm															76-2	5-2	19-2	
Carbonate Removed																		
0-10	A	61.4	18.5	20.1	0.3	1.4	3.4	21.6	34.7	10.7	7.8	61.2	26.7	58.7				
10-28	B21ca	40.2	22.7	37.1	-	1.1	2.7	14.0	22.4	11.2	11.5	43.3	17.8	73.4				
28-43	B22ca	48.4	19.2	32.4	0.1	1.9	4.1	18.4	23.9	10.1	9.1	46.4	24.5	66.1				
43-69	B21cab	44.9	22.2	32.9	-	2.1	4.1	15.1	23.6	12.6	9.6	46.1	21.3	70.1				
69-91	B22cab	31.7	37.9	30.4	-	0.4	0.8	4.9	25.6	24.5	13.4	53.6	6.1	87.5				
91-114	B31cab	39.1	37.5	23.4	-	0.4	0.9	5.5	32.3	26.3	11.2	62.5	6.8	84.8				
114-142	B32cab	49.4	28.0	22.6	-	0.3	0.9	9.9	38.3	18.4	9.6	64.6	11.1	75.1				
142-173	Bcab2	63.9	18.3	17.8	-	1.1	2.5	21.2	39.1	12.9	5.4	68.6	24.8	57.7				
Carbonate Not Removed																		
0-10	A	57.4	24.3	18.3	0.2	1.6	3.1	19.3	33.2	11.5	12.8	58.5	24.2	62.7	tr	tr	tr	
10-28	B21ca	33.9	31.0	35.1	0.0	0.9	2.2	11.7	19.1	10.5	20.5	37.7	14.8	78.1	-	-	-	
28-43	B22ca	43.7	26.7	29.6	0.1	1.9	3.6	16.1	22.0	10.2	16.5	42.8	21.7	69.0	-	-	-	
43-69	B21cab	41.3	28.1	30.6	0.1	1.9	3.4	14.0	21.9	13.6	14.5	44.6	19.4	72.7	tr	-	tr	
69-91	B22cab	28.7	43.5	27.8	0.0	0.4	0.9	4.6	22.8	23.8	19.7	49.9	5.9	88.9	tr	-	tr	
91-114	B31cab	33.5	44.7	21.8	0.0	0.3	0.8	4.7	27.7	27.5	17.2	58.6	5.8	87.3	tr	-	tr	
114-142	B32cab	41.6	35.9	22.5	0.0	0.3	0.8	7.9	32.6	20.3	15.6	59.2	9.0	81.0	tr	tr	tr	
142-173	Bcab2	59.0	22.4	18.6	0.0	1.0	2.3	17.8	37.9	14.1	8.3	65.9	21.1	63.1	tr	-	tr	
Depth (cm.)	Soil class	Ratio 15-Bar Water to Clay				Carbonate as CaCO ₃		Bulk density			4D1			Composition Whole Soil				
		8D1	8D2	a/	6E1b	3A1a	4A1d	4A1h	4D1	4E1c	4E2	4C1	NONCARBONATE			Carbonate as CaCO ₃		
		b/			<2mm	<0.002 mm	g/cc	g/cc	g/cc	COLE	15-Bar	15-Bar	15-Bar	Pct.	Pct.	Pct.	Pct.	Pct.
0-10	0.59	0.47	0.50	0.45	4	1	1.31	1.40	0.020	26.9	8.6	0.24	tr	59	18	19	4	
10-28	0.40	0.39	0.44	0.42	12	4	1.46	1.67	0.047	21.5	13.6	0.12	-	35	20	33	12	
28-43	0.27	0.40	0.42	0.39	8	2	1.4c			11.7			-	44	18	30	8	
43-69	0.20	0.39	0.40	0.38	5	1	1.43	1.62	0.044	21.2	11.9	0.13	tr	43	21	31	5	
69-91	0.20	0.42	0.46	0.44	11	2	1.33	1.44	0.028	23.5	11.8	0.16	tr	28	34	27	11	
91-114	0.19	0.42	0.53	0.48	11	3	1.40	1.49	0.020	23.2	10.0	0.18	tr	35	33	21	11	
114-142	0.16	0.44	0.56	0.49	11	5	1.5c			9.8			tr	44	25	20	11	
142-173	0.11	0.40	0.45	0.44	5	2	1.62	1.72	0.020	17.3	7.4	0.16	tr	61	17	17	5	

- a/ Clay measured on carbonate-free material; calculated to carbonate-containing basis.
- b/ 3.7 kg/m² to 91 cm (Method 6A).
- c/ Assumed for calculations.

Radiocarbon Dates a/

A date of 6,150 ± 140 B.P. (I-2735; ISL 671041) was obtained on the carbonate from the sand fraction (2-0.05 mm) of the soft carbonate nodules from the B22cab (69-91 cm). The samples were dispersed and the sand separated by Method 3A1, except that the dispersing agent was adjusted to pH 8.5 with NaOH. The sands from the nodules have a CaCO₃ equivalent of 26 percent. The sands from the internodular material (671043), selected on the basis of minimum whitening by carbonate, have a CaCO₃ equivalent of 1.5 percent. The ratio of authigenic carbonate to allogenic carbonate for the sand from the nodules is calculated as 23. A portion of the sands from the nodules was crushed to pass 0.25 mm and examined under the petrographic microscope. All of the carbonate appears fine grain, consistent with authigenic origin.

a/ Sample number 7 in Soil Monograph.

66-14

Soil Classification: Typic Camborthid; fine-silty, mixed, thermic

Soil: Mimbres, overwash phase

Soil Nos.: S660Mex-7-14

Location: NE 1/4 SW 1/4, Sec. 11, T21S, R1W, east side of railroad cut, Dona Ana County, New Mexico.

Geomorphic Surface: Leasburg.

Land Form: Level terrace bordering the Rio Grande.

Elevation: 4,000 feet.

Parent Material: Terrace veneer of mixed composition and uncertain origin (the sediment may have been derived from higher slopes to the east, or may represent a flood plain deposit).

Vegetation: Site covered by spoil bank; tobosa, creosotebush, and mesquite occur in nearby uncultivated railroad

Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and W. C. Lynn, November 9, 1966.

right-of-way.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Covered by spoil bank along railroad cut.

A 66L771 0 to 10 cm. Light brown (7.5YR 6/3 dry) or brown (7.5YR 4/3 moist) sandy clay loam; massive with tendency for weak platiness in upper part; hard; few roots; few very fine tubular pores; effervesces strongly; clear smooth boundary.

B21ca 66L772 10 to 28 cm. Light brown (7.5YR 6/3 dry) or brown (7.5YR 4.5/3 moist) clay loam; weak medium prismatic, breaking to weak medium subangular blocky; hard; few fine roots; scattered carbonate filaments on some ped faces and in lower part of horizon there are a very few carbonate nodules, 1 to 2 mm. diameter; few fine tubular pores; effervesces strongly; clear smooth boundary.

B22ca 66L773 28 to 43 cm. Light brown (7.5YR 6/3 dry) or brown (7.5YR 4.5/3 moist) sandy clay loam; weak medium prismatic breaking to weak and moderate medium subangular blocky; hard; very few roots; few fine carbonate nodules, 1 to 4 mm. diameter; few carbonate filaments; few very fine tubular pores; effervesces strongly; clear wavy boundary.

B21cab 66L774 43 to 69 cm. Light brown (7.5YR 6/3 dry) or brown (7.5YR 4.5/3 moist) clay loam; weak medium prismatic, breaking to weak medium subangular blocky, with some parts massive; hard; no roots; common very fine tubular pores; very few fine carbonate nodules; few insect burrow fillings, filled with fine earth that is darker than horizon, and that are 5 to 10 mm. diameter; effervesces strongly; clear wavy boundary.

B22cab 66L775 69 to 91 cm. Light yellowish-brown (9YR 6/4 dry) or yellowish-brown (9YR 4.5/4 moist) light clay loam; weak medium prismatic breaking to weak medium subangular blocky; hard; no roots; common carbonate nodules and filaments; effervesces strongly; clear wavy boundary.

B31cab 66L776 91 to 114 cm. Light yellowish-brown (10YR 6.5/4 dry) or yellowish-brown (10YR 4.5/4 moist) loam; weak medium prismatic, breaking to weak medium subangular blocky; hard and very hard; no roots; common carbonate nodules and filaments; nodules are white (10YR 9/2 dry) or very pale brown (10YR 8/2 moist); common fine tubular pores; effervesces strongly; clear smooth boundary.

B32cab 66L777 114 to 142 cm. Light brown (8YR 6.5/4 dry) or brown (8YR 5/4 moist) loam; weak medium prismatic, breaking to weak medium and coarse subangular blocky; hard and very hard; no roots; common carbonate filaments and few nodules; few fine tubular pores; effervesces strongly; clear wavy boundary.

Bcab2 66L778 142 to 173 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) sandy loam; moderate medium subangular blocky, with some cylindrical forms; very hard; no roots; common carbonate filaments and a few fine nodules; few very fine tubular pores; effervesces strongly.

Remarks: Carbonate morphology and a very few pebbles at the base of the B22ca along the cut suggest that the material from 0 to 43 cm is a younger deposit that buried the underlying horizons.

SOIL CLASSIFICATION: Ustollic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SND-4 SOIL Nos. S66NMex-7-15 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 66L779-66L789

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1											c/ Coarse fragments 2A2					
		Total		Sand					Silt				3B2 Vol. 250-2 <250	3B1 Wr. Pct < 76 mm				
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)		(2-0.1)	76-19	19-5	5-2	
Pct. of < 2 mm																		
Water Washed																		
0-10	A1	72.7	15.4	11.9	16.3	17.5	10.2	17.1	11.6	8.9	6.5	29.7	61.1	33.8	40	30	9	12
10-28	B1t	61.6	20.3	18.1	12.4	13.3	7.9	15.0	13.0	11.9	8.4	33.4	46.8	46.1	40	30	9	12
28-41	IIB1t&A	59.9	23.1	17.0	13.0	11.9	7.1	13.8	14.1	13.9	9.2	35.9	45.8	48.7	25	19	7	18
41-58	IIB2t&A	60.0	21.8	18.2	9.0	11.5	8.0	16.4	15.1	13.2	8.6	37.7	44.9	48.9	25	18	8	16
58-81	IIIB21t	55.5	17.6	26.9	11.6	12.6	7.3	13.0	11.0	9.8	7.8	28.0	44.5	50.9	50	45	4	9
81-102	IVB22t	58.0	18.7	23.3	8.8	13.0	8.0	14.6	13.6	10.7	8.0	32.8	44.4	50.0	25	15	7	14
102-142	IVB23tca	59.3	19.5	21.2	12.0	14.5	7.9	13.4	11.5	10.0	9.5	29.1	47.8	47.7	25	15	5	14
142-185	IVB3tca	72.4	13.3	14.3	19.8	21.2	9.1	13.7	8.6	6.4	6.9	22.3	63.8	32.3	30	15	7	23
185-201	R1	74.9	12.0	13.1	22.3	19.6	9.1	14.8	9.1	5.2	6.8	22.4	65.8	29.8	0	35	28	
201-244	R2	90.5	6.2	3.3	40.0	24.3	8.4	12.3	5.5	2.9	3.3	14.7	85.0	12.2	0	25	39	
Not Water Washed																		
0-10	A1	74.1	14.9	11.0	20.2	18.9	9.7	15.2	10.1	8.3	6.6	26.4	64.0	31.6				
10-28	B1t	63.5	19.5	17.0	16.7	13.1	7.5	13.8	12.4	11.0	8.5	31.3	51.1	43.9				
28-41	IIB1t&A	60.3	23.1	16.6	12.4	11.9	7.4	14.3	14.3	13.7	9.4	36.2	46.0	48.5				
41-58	IIB2t&A	63.8	19.8	16.4	14.8	15.3	8.2	13.6	11.9	11.1	8.7	30.5	51.9	43.4				
58-81	IIIB21t	55.9	17.5	26.6	13.2	14.1	7.1	11.6	9.9	9.6	7.9	25.9	46.0	50.0				
81-102	IVB22t	56.8	19.0	24.2	11.5	13.6	7.6	12.8	11.3	10.3	8.7	28.8	45.5	50.1				
102-142	IVB23tca	59.5	20.7	19.8	15.0	14.5	7.3	12.1	10.6	10.4	10.3	27.8	48.9	47.0				
142-185	IVB3tca	75.5	11.7	12.8	37.0	17.0	6.0	9.3	6.2	5.5	6.2	16.8	69.3	26.1				
185-201	R1	76.1	12.8	11.1	24.1	20.1	9.1	14.7	8.1	5.5	7.3	21.3	68.0	26.2				
201-244	R2	88.1	9.1	2.8	22.5	23.4	11.3	20.2	10.7	5.0	4.1	26.5	77.4	17.5				
Depth (cm.)	6A1a Organic carbon a/ Pct.	Nitrogen Pct.	8C1a pH (1:1)	5A1a CEC NH ₄ OAc me/100g	6E2a Carbonate as CaCO ₃ Pct.	8D1 15-Bar Co Clay Ratio	Bulk density		4D1 COLE	Water content			Composition Whole Soil					
							4A1d 1/3-Bar g/cc	4A1h Oven-Dry g/cc		4B1c 1/3-Bar Pct.	4B2 15-Bar Pct.	4C1 1/3 to 15-Bar in/in.	NONCARBONATE			Carbonate as CaCO ₃ Pct.		
													Pct.	Pct.	Pct.		Pct.	Pct.
0-10	0.94		7.0	12.2	-(s)	0.47	1.3b				5.6		26	54	11	9	-	
10-28	0.90		7.0	13.1	-(s)	0.40	1.32	1.39	0.014	21.2	7.2	0.15	28	44	15	13	-	
28-41	0.55		7.1	11.6	-(s)	0.38	1.33	1.40	0.014	16.0	6.5	0.11	31	41	16	12	-	
41-58	0.38		7.1	11.9	-(s)	0.36	1.42	1.48	0.011	18.0	6.5	0.13	30	42	15	13	-	
58-81	0.28		7.3	18.3	tr(s)	0.42	1.69	1.86	0.027	17.5	11.4	0.08	23	43	14	20	tr	
81-102	0.16		7.8	16.8	tr(s)	0.43	1.70	1.82	0.020	16.6	10.0	0.09	24	44	14	18	tr	
102-142	0.10		7.9	16.8	tr(s)	0.46	1.69	1.81	0.020	15.9	9.8	0.08	23	46	15	16	tr	
142-185	0.07		7.9	16.5	tr(s)	0.53	1.57	1.66	0.013	15.1	7.6	0.09	35	47	9	9	tr	
185-201	0.11		7.9	17.8	tr(s)								63	28	4	5	tr	
201-244	0.07		8.1	14.8	tr(s)								64	33	2	1	tr	

a/ 4.4 kg/m² to 102 cm (Method 6A).

b/ Assumed for calculations.

c/ Values for A1 and B1t based on large sample sieved and weighed.

Mineralogy (Method 7A2). IIB2t&A, 41-58 cm and R2, 201-244 cm

Clays from IIB2t&A horizon contain a small amount of fairly well-ordered kaolinite and a moderate amount of a 2:1 layer silicate complex. The complex includes discrete components of mica and vermiculite and a trace of poorly ordered montmorillonite. Interlayer components are suggested. The R2 horizon contains a moderate amount of a similar 2:1 layer silicate complex. The proportion of discrete montmorillonite is higher than in the IIB2t&A horizon and the mica appears to have an interstratified component that expands upon solvation. Kaolinite is absent.

Soil Classification: Ustollic Haplargid; fine-loamy, mixed, thermic

Soil: SND-4

Soil Nos : S66NMex-7-15

Location: NE 1/4 NE 1/4, Sec. 2, T22S, R3E, about 0.1 mile south of Highway 70, east bank of road cut, Dona Ana

County, New Mexico. Geomorphic Surface: Undifferentiated mountain slopes and summits.

Vegetation: Sideoats grama, blue grama, *Quercus sp.*, few snakeweed, *Yucca elata*, beargrass, Apache plume, buckthorn.

Parent Material: Colluvium-alluvium derived from monzonite, with probably younger colluvial overlay in upper 28 cm.

Elevation: 5,400 feet

Land Form: Ridge side sloping 25 percent eastward.

Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and W. C. Lynn, November 9, 1966.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. About 40 percent of the surface is occupied by grass clumps, with a few shrubs; between grass clumps the surface is nearly 100 percent covered by a desert pavement consisting dominantly of monzonite gravel, with a few cobbles.

A1 66L779 0 to 10 cm. Dark grayish-brown (10YR 3.5/2 dry) or very dark brown (10YR 2.5/2 moist) very gravelly heavy sandy loam; massive; slightly hard; roots common; few fine tubular pores; few insect tunnels, 2 to 10 mm. diameter, with smooth linings; noncalcareous; clear irregular boundary.

Blt 66L780 10 to 28 cm. Reddish-brown (5YR 4.5/4 dry, 5YR 3.5/4 moist) very gravelly heavy sandy loam; massive; slightly hard; roots common; few fine tubular pores, a few tongues of A horizon material descend into this horizon; few insect burrows, 5 to 10 mm. diameter, some of which are filled with dark fine earth; thin, discontinuous coatings of silicate clay on sand grains and pebbles; horizon grades to less gravelly material in lower part; noncalcareous; clear irregular boundary.

IIBlt&A 66L781 28 to 41 cm. Dominantly reddish-brown (5YR 4/4 dry and moist) light sandy clay loam; massive; slightly hard and hard; few roots; scattered A-like volumes, 1 to 10 cm. wide, that are brown (9YR 5.5/3 dry) or dark brown (7.5YR 4/4 moist) heavy sandy loam; a few discontinuous stainings of organic carbon; in places, a few clayey, tubular pore fillings, 1 to 2 mm. diameter and of 5YR hue, extend upward through A-like material into the Blt; noncalcareous; clear irregular boundary.

IIB2t&A 66L782 41 to 58 cm. Dominantly reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) sandy clay loam; generally massive but with some weak medium prismatic, especially in lower part; hard; few roots; common very fine tubular pores; discontinuous stainings of organic carbon on peds; clay occurs as grain coatings, pore fillings, and linings along cleavage planes; A-like volumes are light yellowish-brown (9YR 6/4 dry) or dark yellowish-brown (9YR 4.5/4 moist) light sandy clay loam and are massive and slightly hard; noncalcareous; clear wavy boundary.

IIB2lt 66L783 58 to 81 cm. Reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) gravelly sandy clay loam; weak medium and coarse prismatic, breaking to moderate medium subangular blocky; very hard; few roots; common very fine tubular pores; illuvial clay occurs as nearly continuous clay skins on surfaces of pebbles and peds, and as pore fillings and grain coatings in ped interiors; some peds discontinuously stained with organic carbon; noncalcareous; clear wavy boundary.

IVB22t 66L784 81 to 102 cm. Reddish-brown (6YR 5.5/4 dry, 6YR 4.5/4 moist) with parts reddish-brown (5YR 4/4 dry and moist) sandy clay loam; weak medium and coarse prismatic, breaking to moderate medium subangular blocky; very hard; few roots; common very fine tubular pores; nearly continuous clay skins on surfaces of pebbles, prisms and blocks; in ped interiors there are common clay coatings, fillings, and bridges; some peds discontinuously stained with dark brown (10YR 3/3 dry) organic carbon, descending from overlying horizons; noncalcareous; clear wavy boundary.

IVB23tca 66L785 102 to 142 cm. Reddish-brown (5YR 4.5/4 dry, 5YR 4/4 moist) sandy clay loam; massive; very hard in place and when removed; no roots; moderately thick and locally continuous (a few square cm.) clay coatings extend downward along cleavage planes, with interiors of fragments containing somewhat less clay as grain coatings; pebbles thickly coated with clay; 10 to 20 percent of the horizon consists of lighter-colored, slightly hard zones that are a light yellowish-brown (7.5YR 6/4 dry) or yellowish-brown (7.5YR 5/4 moist) heavy sandy loam; with only small amounts of illuvial clay, in the form of scattered tubular (1 to 2 mm. diameter) pore fillings that contrast sharply with the adjacent low-clay matrix; few to common carbonate filaments, usually occurring on, and hence postdating, the illuvial clay coatings; parts of both the clayey, hard zones and the softer zones are noncalcareous; other parts effervesce weakly to strongly; clear wavy boundary.

IVB3tca 66L786 142 to 185 cm. Dominantly pinkish-gray (7.5YR 6/2 dry) or brown (7.5YR 4.5/2 moist) sandy loam; massive; hard in place; difficultly removed with hammer, but only hard or slightly hard when removed; no roots; clay-enriched zones (sandy clay loam texture) of reddish-brown (5YR 4.5/4 dry, 5YR 4/4 moist) occurring as tongues that descend from overlying B25, and consist of coatings on sand grains, fillings between grains, and coatings along channels; base of this horizon marks the boundary of the deposit on the underlying bedrock; lower inch in places consists of continuously clay-coated material; thin, discontinuous carbonate coatings on pebbles, and a few carbonate filaments; noncalcareous or effervesces weakly; abrupt wavy boundary.

R1 66L787 185 to 201 cm. Monzonite bedrock, a relatively little-weathered stratum that is removed difficultly with a hammer; no roots; fragments, ranging from about 1 to 10 cm. in diameter may be broken out, which are coated and separated slightly from each other by thin, reddish-brown, clayey coatings; generally noncalcareous; a few places effervesce weakly along cleavage planes; abrupt smooth boundary.

R2 66L788 201 to 244 cm. Monzonite bedrock, relatively little-weathered; removed difficultly with knife; breaks out as portions 2 to 10 cm. diameter, which are hard, and which crush into a mass of fine pebble and sand-sized material; no roots; a few carbonate filaments along some cleavage planes; yellow (9YR 7/6 dry) or yellowish-brown (9YR 5.5/6 moist) material thinly coats some cleavage planes, and is noncalcareous or effervesces weakly; very thin, reddish-brown clay coatings on some cleavage planes; generally noncalcareous, a few places effervesce weakly along cleavage planes.

SOIL CLASSIFICATION: Typic Haplargid; loamy-skeletal, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Pinaleno SOIL Nos. S66NMex-7-16 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 66L790-66L799

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1											a/ 2A2 Coarse fragments							
		Total				Sand				Silt			Clay (< 0.002)	3B2 Vol. 250-2	3B1 Wt. b/					
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	0.02-0.002	0.2-0.02			(2-0.1)	< 0.074	76-19	19-5	5-2	
Pct. of < 2 mm																	% < 250	← Z < 76 mm →		
0-5	A2	73.2	18.2	8.6	3.0	4.3	5.4	29.2	31.3	13.0	5.2	64.8	41.9	44.4						
5-15	B21t	70.3	17.4	12.3	7.8	6.8	6.9	24.8	24.0	12.3	5.1	52.8	46.3	43.3	60	37	25	8		
15-25	B22tca	68.7	19.3	12.0	5.6	7.3	7.6	24.6	23.6	14.1	5.2	53.2	45.1	45.5	60	37	25	8		
25-58	C1ca	73.2	17.8	9.0	13.7	11.2	7.5	21.2	19.6	12.2	5.6	44.8	53.6	38.0	60	17	36	17		
58-94	C2ca	74.3	17.6	8.1	19.9	11.0	7.5	19.2	16.7	10.7	6.9	38.9	57.6	35.5	60	17	36	17		
94-132	C3ca	83.8	9.3	6.9	31.7	19.6	9.5	15.3	7.7	4.7	4.6	20.3	76.1	20.3						
5-25	B2	72.3	17.8	9.9	5.4	6.5	5.8	26.9	27.7	12.8	5.0	58.8	44.6	42.3						
Depth (cm.)	6A1a Organic carbon d/	Nitrogen Pct.	C/N	Carbonate as CaCO ₃		6C2b Ext. Iron as Fe Pct.	Bulk density e/			6S1a Phos. Total Pct.	Water content 4B2 15-Bar Ratio			8D1 15-Bar to Clay Ratio	pH (1:1)					
5-5	0.20			6E1b >2mm. Pct.	6E1b <2mm. Pct.	-(s) 0.9				0.021			4.0	0.47						
5-15	0.32					tr(s) 0.8	1.4			0.021			4.8	0.39						
15-25	0.46					1 0.7	1.4			0.025			4.6	0.38						
25-58	0.30					2 0.7	1.4			0.018			4.3	0.48						
58-94	0.22					3 0.7	1.4			0.029			5.1	0.63						
94-132	0.09					1 0.6	1.4			0.021			3.8	0.55						
5-25	0.16					tr(s)	1.5			0.021			4.0	0.40						
25-94				1 b/																
25-94				tr(s)c/																

- a/ Large samples from 5 to 25 and 25 to 94 cm zones sieved and weighed in field.
- b/ < 19 mm.
- c/ 76-19 mm.
- d/ 2.2 kg/m² to 94 cm (Method 6A).
- e/ Assumed bulk density of moist fine-earth fabric for calculations.

Soil: Pinaleno
 Classification: Typic Haplargid; loamy-skeletal, mixed, thermic
 Soil Nos.: S66NMex-7-16
 Location: NW 1/4 NE 1/4, Sec. 30, T23S, R3E, 100 feet north of arroyo channel, 400 feet west of pipeline, Dona Ana County, New Mexico.
 Elevation: 4,350 feet.
 Land Form: Low alluvial terrace sloping 2 percent to the west.
 Geomorphic Surface: Fillmore.
 Vegetation: Creosotebush and ratany.
 Parent Material: Fillmore terrace alluvium derived from rhyolite.
 Collected by: L. H. Gile, R. B. Grossman, J. W. Hawley, and W. C. Lynn, November 10, 1966.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. There is a concentration of cobbles and coarse gravels on the surface--most about 3 to 4 inch diameter with a few ranging up to 6 inch diameter.

A2 66L790 0 to 5 cm. Reddish-brown (6YR 5.5/4 dry, 6YR 4/4 moist) very gravelly light sandy loam; weak medium and thin platy; soft; no roots; noncalcareous; abrupt smooth boundary.

B2lt 66L791 5 to 15 cm. Reddish-brown (5YR 4.5/4 dry, 5YR 3.5/4 moist) very gravelly sandy loam; weak very fine crumb; loose and soft; few roots; pebbles and sand grains weakly stained reddish-brown; noncalcareous; clear smooth boundary.

B22tea 66L792 15 to 25 cm. Reddish-brown (5YR 4.5/4 dry, 5YR 3.5/4 moist) very gravelly sandy loam; interpebble material is weak very fine crumb; soft and loose; few roots; tops of many pebbles are noncalcareous and weakly stained reddish-brown; interpebble fine earth is noncalcareous or effervesces weakly; clear smooth boundary.

C1ca 66L793 25 to 58 cm. Brown (7.5YR 5.5/3 dry, 7.5YR 4.5/3 moist) very gravelly sandy loam; single grain and weak fine crumb between pebbles; soft and loose; roots few to common; carbonate coatings mainly on pebble bottoms but with some discontinuous coatings and filaments on tops; effervesces strongly; clear wavy boundary.

C2ca 66L794 58 to 94 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 4.5/4 moist) very gravelly sandy loam; massive and single grain; soft and loose; few roots; thin, continuous and discontinuous coatings on pebbles and sand grains, with a tendency for carbonate to occur primarily on pebble bottoms; several low-gravel lenses, 1 to 2 inch diameter; laterally the very gravelly sediments grade into low-gravel sediments with only a few gravel lenses; effervesces strongly; clear wavy boundary.

C3ca 66L795 94 to 132 cm. Reddish-brown (5YR 5/4 dry) or reddish-brown (5YR 4/4 moist) fine very gravelly sand; massive and single grain; soft and loose; no roots; thin, discontinuous carbonate coatings on pebbles; effervesces weakly.

B2 66L796 Description of offset sample from a 5- to 25-cm. horizon, low in gravel. Reddish-brown (5YR 5.5/4 dry, 5YR 4/4 moist) sandy loam; massive; slightly hard; few roots; some weak staining of sand grains and pebbles; noncalcareous.

Micromorphology, Method 4E1b. The lower part of the B21 horizon was examined in thin section. The fabric consists largely of coarse fragments and larger sand-size grains. Fines form a loose network within the interstices. A continuous very thin coating of oriented clay on sand grains is very common. Many grains, in addition, have thicker, patchy coatings of clay-rich fabric. These latter coatings show moderate to weak internal orientation of the clay. They are often thicker in embayments. Some apparently are inherited from previous cycles of soil development. Fragments of rhyolite groundmass are the most common component. These fragments contain numerous small black opaque grains, and such grains are common also in the fines in the interstices. Discrete quartz and feldspar are next in abundance. Ferrromagnesian minerals are scarce with biotite, epidote and hornblende in the order listed. The mica appears weakly altered for the most part. Peripheral alteration is rather strong for a minority of grains; this alteration may be inherited from earlier cycles of soil development. A few grains have patchy opaque coatings, and a larger number of grains have patchy reddish-brown coatings that absorb light very strongly and show only weak internal orientation of silicate clay. Overall, the impression of alteration from earlier cycles of soil development is strong.

SOIL CLASSIFICATION: Typic Torrifuvent; sandy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Vinton SOIL Nos. S67NMex-7-1 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 67L134

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1											Course fragments		
		Total			Sand					Silt			> 2	2 - 19	19 - 76
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)			
Pct. of < 2 mm											Pct. of < 76mm				
		Carbonate Not Removed													
13-28	Clca	80.1	12.5	7.4								3.1			
Depth (cm.)	Organic carbon	Nitrogen	Carbonate as CaCO ₃			Bulk density			Water content			pH			
			6E1b	3A1a	3A1a	3A1a									
			Total	<0.05	<0.02	<0.002							(1:1)		
	Pct.	Pct.	< 2-mm. Pct.				g/cc	g/cc	g/cc						
13-28			2	2	1										

Radiocarbon Dates a/

A C-14 age of 4,035 ± 115 years BP (I-2902) was obtained on charcoal from the C2ca horizon. C-14 ages were obtained on carbonate from the Clca horizon, 13 to 28 cm. This horizon lies above the charcoal. A date of 4,430 ± 135 years BP (I-3008; 67L134) was obtained on the carbonate adhering to the surface of the 19- to 5-mm. pebbles. A date of 1,610 ± 95 years BP (I-2902; 67L470) was obtained on the carbonate in the 0.02-0.002 mm. fraction of the < 2 mm. The > 5 mm. pebbles stood in water three days. They were then dried, sieved, and each pebble checked to exclude fragments of detrital K fabric and pebbles heavily coated with carbonate. The pebbles were then placed in an ultrasonic machine and agitated to remove the carbonate coatings. The 0.02 to 0.002 mm. fraction of the coatings was obtained by sedimenting and decanting to obtain the < 0.02 mm., followed by successive centrifugation and decantation to remove the < 0.002 mm. The sample was dispersed as in Method 3A1, except that treatment with hydrogen peroxide was omitted and a solution of sodium phosphate glass adjusted to pH 8.5 with NaOH was used as the dispersing agent. The 0.02-0.002 mm. from the coatings contains 20 percent carbonate.

a/ Sample numbers 3 and 4 in Soil Monograph.

Soil Classification: Typic Torrifluent; sandy, mixed, thermic

67-1

Series: Vinton

Pedon No.: S67NMex-7-1

Location: NE 1/4 SE 1/4, Sec. 32, R3E, T21S south edge of gully, 30 feet west of S59NMex-7-5, about 300 ft. west of section line road.

Geomorphic Surface: Organ.

Land Form: Alluvial fan sloping 2 percent west.

Elevation: 4,600 feet.

Parent Material: Organ fan alluvium derived from monzonite.

Vegetation: Scattered clumps of black grama and fluffgrass; a few Mormon tea, creosotebush and Yucca elata.

Collected by: L. H. Gile and J. W. Hawley.

Described by: L. H. Gile.

Soil Surface. There are a few scattered coarse sand grains and fine pebbles of monzonite on the surface.

A 0 to 3 cm. Brown (9YR 5.5/3 dry, 9YR 4/3 moist) sandy loam; weak, very fine crumb in lower part, upper part is weak medium platy; soft; very few roots; effervesces strongly; clear smooth boundary.

B 3 to 13 cm. Reddish-brown (6YR 5.5/4 dry, 6YR 4.5/4 moist) sandy loam; massive; soft; few roots; a few discontinuous carbonate coatings on some grains; noncalcareous or effervesces weakly; clear smooth boundary.

C1ca 67L134 13 to 28 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist) coarse sandy loam; massive; soft and slightly hard; few roots; many pebbles and sand grains are continuously coated with carbonate and there are a few fragments of allogenic carbonate (K-fabric) derived from upstream soil; there is a scattering of pebbles, fine and coarse, in this horizon, which are not present in the horizons below; effervesces strongly; clear wavy boundary.

C2ca 28 to 46 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) coarse sandy loam; massive; soft; few roots; thin, discontinuous and continuous carbonate coatings on sand grains; bits of charcoal and darkened masses of fine earth occurring as discontinuous lenses ranging from 1/2 to 2 inches diameter and up to a foot or more wide, and as isolated pockets, several inches diameter, occurring in this horizon and extending into the C3ca horizon; effervesces strongly; clear wavy boundary.

C3ca 46 to 61 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) loamy coarse sand; massive; soft; few roots; thin, discontinuous carbonate coatings on sand grains; effervesces strongly; clear wavy boundary.

C4 61 to 84 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5/4 moist) coarse sand; massive; soft; no roots; easily removed from horizon with fingers; few fine roots; few strata, 1 to 10 mm. thick, of slightly finer sand; noncalcareous or effervesces weakly; abrupt smooth boundary.

IIC5ca or IIBbca 84 to 107 cm. Reddish-brown (6YR 5.5/4 dry, 6YR 4/4 moist) medium sandy loam; generally massive with some parts weak medium subangular blocky; slightly hard and hard; very few roots, few carbonate filaments; few pebbles and coarse sand grains, with thin, discontinuous carbonate coatings; several 1/4 to 1/2 inch fragments of allogenic K-fabric; effervesces strongly.

Remarks: Only certain horizons of this pedon were sampled because of its position next to the gully, where upper horizons have been truncated. Because of the importance of the dated charcoal to genetic studies, another pedon (S67NMex-7-3) was sampled to compare with nearby pedon S59NMex-7-5. Pedon S67NMex-7-3 is 70 m. west downslope

No standard characterization data for S67Mx-7-2. See description for radiocarbon date.

Soil Classification: Typic Paleorthid; loamy-skeletal, mixed, thermic
 Series: Monterosa
 Pedon No.: S67NMex-7-2
 Location: In the NE 1/4 SE 1/4, Sec. 19, R3E, T23S, Dona Ana County, New Mexico.
 Geomorphic Surface: Jornada I.
 Land Form: Summit of broad ridge remnant of coalescent alluvial-fan piedmont surface; sloping 2 percent to the southwest.
 Elevation: 4,425 feet.
 Parent Material: Upper Jornada I alluvium derived from rhyolite.
 Vegetation: Creosotebush, ratany, a few prickly pear.
 Collected and Described by: L. H. Gile.

Soil Surface. 90 to 95 percent covered with a desert pavement of rhyolite pebbles, mainly < 1 inch in diameter, but with a few up to 2 inches in diameter. Most of the pebbles are carbonate-free, with only a very few having thin, discontinuous carbonate coatings. Some of the pebbles are partially to completely coated with black desert varnish. A thin, discontinuous layer of reddish-brown sand, about 1 mm. thick, occurs between and beneath the pebbles.

A2ca 0 to 5 cm. Dominantly pinkish-gray (7.5YR 6/2 dry) or dark brown (7.5YR 4/2 moist) with some light brown (7.5YR 6/4 dry) or dark brown (7.5YR 4/3 moist); gravelly fine sandy loam; weak fine platy; soft; some thin (< 1 mm.) reddish-brown layers between plates in upper part; pebble tops are usually carbonate-free, and some are stained reddish-brown; pebble bottoms have thin, discontinuous carbonate coatings; very few roots; effervesces weakly; abrupt smooth boundary.

Bca 5 to 18 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 4/4 moist) very gravelly light sandy clay loam; structure is pebble controlled, and is weak fine crumb and weak medium and fine subangular blocky; soft and slightly hard; few roots; thin, primarily continuous carbonate coatings on pebbles with coating thickest on undersides and generally becoming thicker in the lower part of the horizon; some pebble tops in the upper part of the horizon are carbonate-free and a few are stained reddish-brown; a few carbonate filaments occur in interpebble fine earth; effervesces strongly; clear smooth boundary.

Kl 18 to 30 cm. Dominantly white (10YR 9/2 to 9/3 dry) or very pale brown (10YR 8/3 moist), carbonate-cemented fragments; massive; hard; the horizon consists largely (80 to 90 percent) of fractured laminar and plugged horizons; fragments of a formerly continuous, uppermost laminar horizon occur from about 7 to 8 inches with another at from about 10 to 11 inches; although the lowest one is more continuous, it is broken enough so it can usually be removed with the fingers; the plugged horizon has scattered pinkish parts, suggesting a former Bt horizon; fine earth between the fragments is brown (7.5YR 5.5/4 dry, 7.5YR 4.5/4 moist) and is a very gravelly light sandy clay loam, a soft mass of weak fine crumbs; fine roots are common in the fine earth; effervesces strongly; abrupt smooth boundary.

K21m 30 to 36 cm. The continuous laminar horizon and adherent plugged horizon, dominantly white (10YR 9/2 dry or 10YR 8/2 moist) with some colors slightly darker, and some pinkish parts, suggesting a former Bt horizon; massive; extremely hard; no roots; pebbles in plugged horizon are widely separated by carbonate; laminar horizon ranges from 1/8 to 1/2 inch in thickness; effervesces strongly; clear smooth boundary.

K22m 67L192 36 to 56 cm. Pink (7.5YR 8/4 dry) or light brown (7.5YR 6/4 moist) carbonate-cemented material; very and extremely hard; massive; no roots; many pebbles separated from each other by carbonate; effervesces strongly; clear wavy boundary.

IIK31 56 to 89 cm. Dominantly very pale brown (10YR 9/3 dry, 10YR 8/3 moist) with some pink (7.5YR 7/4 dry) or light brown (7.5YR 6/4 moist) clay loam; weak medium subangular blocky; hard and very hard; no roots; a few pebbles, carbonate-coated; virtually all of the horizon is K-fabric with sand grains separated by carbonate; effervesces strongly; clear smooth boundary.

IIK32 89 to 132 cm. Pink (8YR 8/4 dry) or light brown (8YR 6/4 moist) very gravelly sandy clay loam; massive and weak fine and very fine crumb; soft and loose; no roots; pebbles largely discrete but a few are weakly cemented together; thin, continuous carbonate coatings on pebbles and sand grains; effervesces strongly.

Radiocarbon Dates

A date of 19,700 years B.P. (I-3009, LSL 67L192) was obtained for the carbonate removed from the > 20 mm pebbles from the K22m horizon (36-56 cm). The pebbles were allowed to stand in water two days. They were then sieved, dried, and the surface abraided by hand with a steel brush. Massive but non-laminar carbonate that still adhered was removed by scraping with a knife. A Vibratool was used to remove the largely laminar coatings. These coatings were ground to form the sample, which contained 70 percent carbonate.

SOIL CLASSIFICATION: Typic Camborthid; coarse-loamy, mixed, thermic

SOIL Pajarito SOIL Nos. S67NMex-7-3 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 67L905-67L911

GENERAL METHODS: 1A1, 1E1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm) 3A1													3B2 Vol. 250-2 % <250	3B1 Coarse fragments 2A2		
		Total				Sand				Silt						76-19	19-5	5-2
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	<0.074				
Carbonate Not Removed																		
0-3	A	77.9	15.1	7.0	7.2	11.4	8.7	22.8	27.8	11.6	3.5	54.3	50.0	37.6	10	0	5	12
3-10	A	73.1	18.3	8.6	6.9	11.0	8.3	20.9	26.1	14.4	3.9	53.7	47.0	42.8	5	0	1	9
10-20	B2t	74.5	16.4	9.1	12.1	14.2	8.2	18.6	21.3	12.9	3.5	45.9	53.1	36.2	5	0	2	10
20-28	B2t	73.6	17.5	8.9	13.8	13.7	7.6	17.0	21.5	13.9	3.6	46.1	52.0	39.4	10	0	2	14
28-58	C1ca	73.9	17.9	8.2	13.3	13.6	8.6	17.5	20.8	13.0	4.9	44.7	53.0	38.8	15	0	4	21
58-91	C2ca	74.2	17.0	8.8	11.4	13.4	9.8	20.2	19.3	12.5	4.5	44.0	54.9	36.8	10	0	4	14
91-127	C3	90.9	4.8	4.3	33.0	31.3	11.7	10.5	4.5	2.6	2.2	12.2	86.4	11.4	20	0	5	26

Depth (cm.)	6A1a Organic carbon a/ Pct.	Nitrogen Pct.	C/N	Carbonate as CaCO ₃		Bulk density			Water content			pH		
				6E1b 2mm. Pct.	3A1a <0.002 mm. Pct.	b/ g/cc	b/ g/cc	b/ g/cc	4E1a 1/10-Bar Pct.	4B2 15-Bar Pct.			(:1)	
				0-3	0.18			tr(s)			1.4			
3-10	0.30			tr(s)			1.4					3.2		
10-20	0.26			tr(s)			1.5					3.6		
20-28	0.22			tr(s)	-		1.5					3.5		
28-58	0.19			2	tr		1.4					3.7		
58-91	0.13			3	tr		1.4					3.8		
91-127	0.04			1	tr		1.4			7.2		1.6		

a/ 2.2 kg/m² to 91 cm (Method 6A).
b/ Assumed bulk densities for calculations.

Soil Classification: Typic Camborthid; coarse-loamy, mixed, thermic
 Series: Pajarito
 Pedon No.: S67NMex-7-3
 Location: In the NE 1/4 SE 1/4, Sec. 32, R3E, T21S, 15 feet north of gully.
 Geomorphic Surface: Organ.
 Elevation: 4,600 feet.
 Land Form: Ridge sloping 2 percent west.
 Vegetation: Scattered clumps of black grama and three-awn; a few Mormon tea, Yucca elata and mesquite.
 Parent Material: Organ alluvium derived from monzonite.
 Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, October 16, 1967.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Between grass clumps, the surface is about 25 percent covered with fine monzonite gravel and coarse sands. A discontinuous layer (< 5 mm. thick) of loose reddish sand occurs in places.

A 67L905 0 to 3 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 4/3 moist) light sandy loam; weak medium platy and weak fine crumb; soft; very friable and loose; no roots; light brownish-gray (10YR 6/2 dry) crust at the surface; noncalcareous; abrupt smooth boundary.

A 67L906 3 to 10 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 4/3 moist) sandy loam; massive; slightly hard; friable; roots common; noncalcareous; abrupt smooth boundary.

B2t 67L907 10 to 20 cm. Reddish-brown (6YR 5/4 dry) or reddish-brown (6YR 3.5/4 moist) sandy loam; massive; slightly hard; friable; few roots; faint reddish stainings on sand grains; noncalcareous; clear wavy boundary.

B2t 67L908 20 to 28 cm. Reddish-brown (6YR 5/4 dry, 6YR 3.5/4 moist) sandy loam; massive; slightly hard, friable; few roots; faint reddish stainings on sand grains; krotovina, 1-1/2 inch diameter, extends through the horizon and is filled with dark fine earth; noncalcareous; clear smooth boundary.

C1ca 67L909 28 to 58 cm. Brown (7.5YR 5.5/4 dry) or dark brown (7.5YR 4/4 moist) sandy loam; massive; slightly hard, friable; few roots; fine pebbles and sand grains thinly carbonate-coated; effervesces strongly; horizon becomes coarser with depth and in the lower two inches is a coarse light sandy loam which rests abruptly on the finer-textured C2ca; effervesces strongly; abrupt smooth boundary.

C2ca 67L910 58 to 91 cm. Brown (7.5YR 5.5/4 dry) or dark brown (7.5YR 4/4 moist) sandy loam; massive; slightly hard, very friable; few roots; two lenses of darkened fine earth, containing fine bits of charcoal, occur in the horizon and are about 10 cm. wide and 3 cm. thick; thin coatings of carbonate on fine pebbles and sand grains; effervesces strongly; abrupt wavy boundary.

C3 67L911 91 to 127 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 4/4 moist) stratified fine gravelly sand; massive; slightly hard; no roots; five feet east of sampled horizon is a prominent lens of darkened material (about three feet across and six inches thick where exposed) which contains numerous fragments of charcoal; the top of the charcoal bed ranges from about 3 to 3-1/2 feet below the surface; effervesces weakly, with a few spots noncalcareous.

Remarks: This pedon is 70 m. west and downslope from pedon S67NMex-7-1. The charcoal from the C horizon has a C-14 age of 4,200 yrs. \pm 100 B. P. (I-4282).

SOIL CLASSIFICATION: Typic Haplargid; loamy-skeletal, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Pinaleno SOIL Nos. S67NMex-7-4 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 67L912-67L919; 67L929-67L930, 70L989

GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)														3A1					
		Total		Sand							Silt					3B1		Coarse fragments 2A2			
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	0.074	3B2 Vol	Pct < 76 mm. wt					
Pct. of < 2 mm														250-2	76-19	19-5	5-2				
														Carbonate		Not Removed					
0-5	A2	68.4	23.4	8.2	5.4	7.4	5.6	22.3	27.8	16.1	7.3	59.2	40.5	47.6	50	25	23	8			
5-18	B1t	67.4	21.6	11.0	8.7	8.8	5.6	19.7	24.5	14.3	7.3	52.1	42.8	46.7	50	25	23	8			
18-30	B2t	64.9	19.7	15.4	15.2	10.8	5.2	14.8	18.7	13.3	6.4	42.2	46.1	46.2	65	19	42	16			
30-51	B3t	68.0	19.0	13.0	18.2	10.3	5.6	14.3	19.5	13.5	5.5	42.5	48.5	44.0	65	19	42	16			
51-71	C1ca	72.0	18.8	9.2	10.3	12.1	8.1	20.3	21.2	13.7	5.1	47.4	50.8	40.5	65	19	42	16			
71-94	C2ca	75.3	16.9	7.8	13.9	16.6	9.2	18.3	17.3	12.4	4.5	40.7	57.9	35.0	65	19	42	16			
94-147	C3	85.5	10.5	4.0	31.5	22.0	9.1	13.3	9.6	7.4	3.1	24.4	75.9	19.9							
147-178	Btb	44.8	21.2	34.0	9.0	6.0	2.9	10.6	16.4	12.2	9.0	36.0	28.4	65.2							
0-18	a/																				
18-94	a/																				
0-38	d/	61.8	24.7	13.5	8.2	7.2	4.9	18.6	22.9	17.8	6.9	53.8	38.9	50.4	45	22	28	12			
Depth (cm.)	6A1a Organic carbon e/	Nitrogen	C/N	6C2a Ext. Iron as Fe Pct.	Carbonate as CaCO ₃		Bulk density			Water content			Composition Whole Material c/								
					6E1b	3A1a				4B2 15-Bar			> 2mm. Sand Silt Clay Carbonate as CaCO ₃								
					Pct.	Pct.	g/cc	g/cc	g/cc	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.				
0-5	0.18			0.9	tr(s)						3.6		65	24	8	3	tr(s)				
5-18	0.28			0.9	tr(s)						4.7		65	23	8	4	tr(s)				
18-30	0.30			0.9	tr(s)						6.0		78	15	4	3	tr(s)				
30-51	0.23			0.8	tr(s)	-					5.7		78	15	4	3	tr(s)				
51-71	0.11			0.7	2	tr					4.4		78	16	4	2	tr				
71-94	0.07			0.7	1	-					3.9		78	16	4	2	tr				
94-147	0.03			0.7	1	-					3.3										
147-178	0.11			1.3	1	-					1.8										
0-38	0.41d																				

- a/ Large sample sieved and weighed in field 0-18 and 18-94 cm zones. 9 and 1 percent > 76 mm by weight, respectively.
- b/ Assumed bulk density of moist fine-earth fabric for calculations.
- c/ Inclusive of coarse fragments, carbonate and gypsum. Carbonate calculated from measurements on fine earth. Carbonate included in < 2 mm separates.
- d/ Composite of material taken at regularly spaced intervals along north side of the sample trench. 1.2 kg/m² to 38 cm (Method 6A).
- e/ 0.9 kg/m² to 94 cm (Method 6A).

Soil Classification: Typic Haplargid; loamy-skeletal, mixed, thermic
 Series: Pinaleno
 Pedon No.: S67NMex-7-4
 Location: In the NE 1/4, Sec. 21, R3E, T23S, about 0.1 mile north of arroyo.
 Geomorphic Surface: Organ.
 Land Form: Alluvial fan sloping 4 percent west.
 Elevation: 4,730 feet.
 Vegetation: Scattered clumps of fluffgrass, and a few mesquite, Mormon tea, cholla, snakeweed, ratany, and buckthorn.

Parent Material: Organ fan alluvium derived from rhyolite.
 Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, October 17, 1967.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. 90 percent covered with rhyolite pebbles mainly < 1 inch diameter, and a few 1 to 3 inches diameter. A discontinuous layer of loose, reddish-brown sand occurs between pebbles.

A2 67L912 0 to 5 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 4/3 moist) very gravelly sandy loam; weak medium platy and weak very fine crumb; soft, very friable; very few roots; upper 1/8 inch of horizon is colored light brownish-gray (10YR 6/2 dry) or dark grayish-brown (10YR 4/2 moist) and is vesicular at the surface; noncalcareous; abrupt smooth boundary.

B1t 67L913 5 to 18 cm. Reddish-brown (6YR 5/4 dry) or dark reddish-brown (6YR 3.5/4 moist) very gravelly sandy loam; weak fine and medium crumb; soft and slightly hard, very friable; roots common; pebbles have faint reddish stains; noncalcareous; clear smooth boundary.

B2t 67L914 18 to 30 cm. Reddish-brown (5YR 5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) very gravelly heavy sandy loam with few parts slightly less red; weak fine and medium subangular blocky; slightly hard, friable; few roots; sand grains and pebbles have thin, reddish clay coatings; few insect tunnels, with smooth linings, 0.5 to 2 cm. diameter; noncalcareous; clear smooth boundary.

B3t 67L915 30 to 51 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/4 moist) very gravelly sandy loam; weak medium subangular blocky; slightly hard, friable; few roots; discontinuous brown stainings on pebbles; generally noncalcareous, with some weak effervescence in lower part; abrupt wavy boundary.

Clca 67L916 51 to 71 cm. Light yellowish-brown (9YR 6/4 dry) or dark yellowish-brown (9YR 4/4 moist) very gravelly light sandy loam; gravel is mainly < 1 inch diameter; single grain; soft; few roots; thin, discontinuous carbonate coatings on pebbles, mainly on undersides; weakly stratified; most pebble interstices filled, or nearly filled with loose fine earth; effervesces strongly; clear wavy boundary.

C2ca 67L917 71 to 94 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) very gravelly sandy loam, with more gravel > 1 inch diameter, than above; massive and single grain; soft to hard; no roots; upper 5 to 8 cm. of this horizon consists mainly of fine gravel < 1 inch diameter; most pebble interstices filled with tightly packed fine earth except for upper 5 to 8 cm. of horizon which has loose fine earth; thin, discontinuous and filamentous carbonate coatings on pebbles and in fine earth; effervesces strongly; abrupt wavy boundary.

C3 67L918 94 to 147 cm. Yellowish-brown (9YR 5/4 dry) or dark yellowish-brown (9YR 4/4 moist) very gravelly loamy sand; massive and single grain; soft and loose; no roots; a few patchy carbonate coatings on bottoms of some pebbles; many interstices between pebbles empty or nearly so; weakly stratified, with occasional, indistinct fine-earth strata, 1/8 to 1/4 inch thick; noncalcareous or effervesces weakly; abrupt wavy boundary.

Btb 67L919 147 to 178 cm. Reddish-brown (4YR 5/4 dry) or dark reddish-brown (4YR 3.5/4 moist) very gravelly sandy clay loam; weak medium subangular blocky; very hard in place, hard when removed; firm; no roots; common insect tunnels, 1 to 2 cm. diameter, with smooth linings, and empty; sand grains and pebbles thickly coated with reddish clay; few carbonate filaments; noncalcareous or effervesces weakly.

Radiocarbon Dates: A radiocarbon date of 3,360 ± 195 years B.P. (Isotopes No. I-4411) was obtained for the carbonate adhering to the > 9 mm. pebbles from the Clca. The $\delta_c(C^{13})\%$ for this sample is -5.0. The > 9 mm. was separated by wet sieving. Carbonate coatings were removed from the pebbles with a mechanical vibrating tool. The total field sample weighed 85 pounds; the > 9 mm. weighed 27 pounds. The carbonate coatings were patchy, thin, and flaky.

Clay Mineralogy (Method 7A2): Clay from the B2t horizon (18 to 30 cm.) contains a small amount of poorly ordered montmorillonite, a small to moderate amount of mica and a small amount of kaolinite. The clay mineral suite of the C2ca horizon is similar. The montmorillonite component expands less than in the B2t. Chlorite interlayer material is suggested. Clay from the Btb horizon (147 to 178 cm.) contains small to moderate amounts of kaolinite and mica plus a small amount of montmorillonite. The montmorillonite expands to give a series of spacings as in the upper horizons. However collapse to a 10Å spacing is more distinct than in upper horizons, and suggests fewer chlorite interlayers.

SOIL CLASSIFICATION: Typic Haplargid; loamy-skeletal, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Pinaleno SOIL Nos. S67Mex-7-5 LOCATION Dona Ana County, New Mexico
SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 67L920-67L928; 67L931-67L932
GENERAL METHODS: 1A1, 1B1b, 2A1, 2B

Depth (cm)	Horizon	Size class and particle diameter (mm)													3B2 Vol 250-2 % <250	3B1 Coarse fragments 2A2			
		Total			Sand						Silt					Pct < 76 mm wt			
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	< 0.074		76-19	19-5	5-2	
Pct. of < 2 mm																	Pct < 76 mm wt.		
CARBONATE NOT REMOVED																	b/		
0-5	A1	72.6	18.4	9.0	6.6	8.6	6.5	27.1	23.7	11.5	6.9	53.6	48.8	40.1					
5-15	B1t	65.3	17.3	17.4	9.7	9.7	5.8	22.7	17.5	10.5	6.8	43.4	47.7	43.5	65	28	32	16	
15-36	B2t	65.7	16.6	17.7	18.5	12.8	4.9	14.1	15.3	10.0	6.6	34.8	50.3	43.4	65	28	32	16	
36-51	B3t	61.0	20.9	18.1	10.6	10.4	4.9	14.4	20.7	15.3	5.6	45.9	40.3	51.8	65	28	32	16	
51-64	C1ca	61.2	23.6	15.2	11.4	9.4	5.1	14.7	20.6	15.5	8.1	45.8	40.6	51.5	65	24	40	11	
64-89	C2ca&K	67.4	21.6	11.0	16.8	13.2	7.6	14.8	14.8	13.1	8.5	37.1	52.5	41.9	65	24	40	11	
89-104	C3ca	76.0	18.1	5.9	19.7	19.2	9.5	15.1	12.5	11.6	6.5	32.5	63.5	32.7	65	24	40	11	
104-124	C4ca	68.9	24.9	6.2	17.2	14.7	7.0	13.3	16.8	16.0	8.9	41.1	52.0	42.1					
124-160	C5ca	76.7	14.1	9.2	19.3	18.9	8.8	17.1	12.6	8.9	5.2	31.6	64.1	30.3					
CARBONATE REMOVED																			
51-64	C1ca	63.2	20.7	16.1	12.5	10.0	5.4	15.0	20.4	14.1	6.6	44.4	42.8	49.6					
64-89	C2ca&K	72.6	16.7	10.7	17.7	14.9	8.1	16.6	15.2	11.5	5.2	36.7	57.2	36.6					
89-104	C3ca	77.7	15.2	7.1	21.0	18.8	9.6	15.8	12.5	10.1	5.1	31.5	65.2	29.9					

Depth (cm)	6A1a Organic carbon d/ Pct.	Nitrogen Pct.	Carbonate as CaCO ₃				6C2a Bulk density		3A1b Fine Clay f/ Pct.	Water content				Composition Whole Material					
			6E1b 76-19 mm Pct.	6E1b <19mm Pct.	6E2a <2mm Pct.	3A1a <0.002 mm Pct.	Ext. Iron as Fe Pct.	e/ g/cc		4E2 15-Bar Pct.	Noncarbonate				Carbonate as CaCO ₃				
											> 2mm Pct.	Sand Pct.	Silt Pct.	Clay Pct.					
0-5	0.22				tr(s)		0.9	1.4		3.6		4.1							
5-15	0.34				tr(s)		1.1	1.5		7.4		5.6		78	14	4	4		tr(s)
15-36	0.30				tr(s)		0.9	1.5		10.9		6.8		78	14	4	4		tr(s)
36-51	0.30				tr(s)		0.9	1.5		7.6		7.5		78	14	5	4		tr(s)
51-64	0.30			2	4	tr	1.1	1.4		6.6		6.5		74	14	5	4		3
64-89	0.21			5	11	2	0.6	1.5		3.6		5.0		74	13	4	2		5
89-104	0.02			3	7	tr	0.7	1.4		2.4		3.8		74	17	3	2		4
104-124	0.04				4	tr	0.7	1.4				4.1							
124-160	0.06			2	2	tr	0.8	1.4				5.0							

- a/ Pretreatment of < 2 mm with 0.1N NaOH.
- b/ Large samples sieved and weighed in the field for 5 to 51 and 51 to 104 cm zones. 7 and 5 percent by weight > 75 mm in zones, respectively.
- c/ Coarse fragments treated with 1N HCl for carbonate removal.

LSL No.	Treatment	19-5	5-2
68L924	before	51.9	14.5
	after	49.0	14.7
68L925	before	52.1	15.4
	after	48.0	15.3
68L926	before	55.3	18.8
	after	53.0	19.1

- d/ 1.2 kg/m² to 114 cm (Method 6A).
- e/ Assumed bulk densities of moist fine-earth fabric for calculations.
- f/ On carbonate-free < 2 mm for C1ca horizon and horizons below it.

67-5

Soil Classification: Typic Haplargid; loamy-skeletal, mixed, thermic
 Series: Pinaleno
 Pedon No.: S67NMex-7-5
 Location: In the SW 1/4 SW 1/4, Sec. 16, R3E, T23S, 900 feet east-northeast of section corner, Dona Ana County, N. M.
 Geomorphic Surface: Isaacks' Ranch.
 Elevation: 4,600 feet.
 Land Form: Alluvial fan sloping 3 percent west.
 Vegetation: Fluffgrass and scattered snakeweed, ratany, Mormon tea, creosotebush, tarbush, Yucca baccata, and mesquite.

Parent Material: Isaacks' Ranch fan alluvium derived from rhyolite.
 Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, October 18, 1967.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. 25 percent covered with rhyolite pebbles, mainly less than 3 cm. diameter, but laterally with concentrations of larger pebbles and cobbles. A discontinuous layer of loose reddish sand occurs at the surface.

A2 67L920 0 to 5 cm. Dominantly brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/4 moist) with surficial crust, 1 to 2 mm. thick, colored brown (7.5YR 5.5/2 dry) or dark brown (7.5YR 5/2 moist) and with discontinuous volumes of 5YR hue throughout; very gravelly sandy loam; weak fine and very fine crumb, and weak thin platy; loose mass of soft crumbs and plates; very few roots; noncalcareous; abrupt smooth boundary.

Blt 67L921 5 to 15 cm. Reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) very gravelly sandy loam; weak medium sub-angular blocky and weak fine crumb; soft; friable; few roots; thin reddish clay coatings on sand grains and pebbles; noncalcareous; clear smooth boundary.

B2t 67L922 15 to 36 cm. Reddish-brown (5YR 5/5 dry, 5YR 4/5 moist) very gravelly heavy sandy loam to light sandy clay loam; weak medium subangular blocky; slightly hard, friable; very few roots; sand grains and pebbles have reddish coatings of silicate clay; few fine tubular pores; noncalcareous; clear wavy boundary.

B3t 67L923 36 to 51 cm. Reddish-brown (6YR 5/4 dry, 6YR 4/4 moist) with few volumes slightly redder and browner; weak medium subangular blocky between pebbles; slightly hard, friable; very few roots; many pebbles have discontinuous reddish clay coatings; some pebbles in lower part have thin patchy carbonate coatings on undersides; noncalcareous except for lower inch or two which in places effervesces weakly; clear to abrupt wavy boundary.

Clca 67L924 51 to 64 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) very gravelly heavy sandy loam; massive; soft, very friable; very few roots; thin, filamentous discontinuous carbonate coatings on pebbles; effervesces strongly; clear to abrupt, wavy to smooth boundary.

K & C2ca 67L925 64 to 89 cm. Alternating zones of (1) Cca material, light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) very gravelly sandy loam; massive and single grain; soft and loose; few roots; carbonate coatings on pebbles; effervesces strongly; and (2) K-fabric, pinkish-white (7.5YR 8/2 dry) or pink (7.5YR 7/4 moist) carbonate-cemented, very gravelly material; very hard; many pebbles and sand grains separated by carbonate; no roots; a few volumes of loamy material, light brown (7.5YR 5/4 dry) or brown (7.5YR 4/4 moist); effervesces strongly; clear or abrupt wavy boundary.

C3ca 67L926 89 to 104 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) very gravelly light sandy loam; massive and single grain; soft and loose; very few roots; effervesces strongly; clear wavy boundary.

C4ca 67L927 104 to 124 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) very gravelly sandy loam; massive; soft, friable; few roots; (this horizon contains less gravel than above and is firmer in place); pebbles have thin, discontinuous carbonate coatings on pebbles; few volumes are weakly carbonate-cemented; effervesces strongly; clear wavy boundary.

C5ca 67L928 124 to 160 cm. Dominantly reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) very gravelly light sandy loam; single grain; loose; no roots; thin patchy carbonate coatings on pebbles, with discontinuous lenses of weakly carbonate-cemented material; effervesces weakly to strongly.

Radiocarbon Age: A radiocarbon age of 10,700 ± 150 years B.P. (Isotopes I-4413; LSL 67L937) was obtained for the carbonate adhering to the > 20 mm pebbles from the 75-90 cm zone. The δ¹³C‰ for this sample is - 2.0. The pebbles were separated in the field. They were allowed to stand in water overnight. Each pebble was then abraided with a nylon vegetable brush. The carbonate coatings for the age determination were removed with a Vibra-tool. The coatings were removed from about 50 percent of the 20 gm field sample of > 20 mm.

SOIL CLASSIFICATION: Typic Haplrgid; fine, mixed, thermic

SOIL SND-3 SOIL Nos. S67RMex-7-6 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 671841-671845

GENERAL METHODS: 1B1b, 2A1, 2B

Depth (cm)	Horizon	Size class and particle diameter (mm)													Coarse fragments 2A2		
		Total			Sand						Silt				3B1 > 2	2-19	19-75
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	<0.074			
Pct. of < 2 mm													Pct. of < 75mm				
0-5	A	40.4	34.3	25.3	1.2	4.2	4.8	15.5	14.7	8.8	25.5	33.6	25.7	67.6	tr		
5-15	B1t	35.8	26.3	37.9	1.5	5.2	4.8	13.4	10.9	6.2	20.1	25.7	24.9	69.9	tr		
15-25	B21t	34.6	24.9	40.5	1.5	4.4	4.2	12.8	11.7	7.2	17.7	27.1	22.9	71.8	tr		
25-38	B22t	27.3	24.8	47.9	2.4	4.0	3.3	8.8	8.8	7.1	17.7	21.5	18.5	77.6	tr		
38-48	B23tca	25.3a	24.7	50.0	0.9	3.0	3.2	9.4	8.8	6.7	18.0	21.4	16.5	79.4	tr		
Depth (cm)	6A1a Organic carbon	Nitrogen	C/N	Carbonate as CaCO ₃		Bulk density			Water content			pH					
				6E1b < 2mm. Pct.	3A1a < 0.002 mm. Pct.	g/cc	g/cc	g/cc	Pct.	Pct.	Pct.			(1:1)			
0-5	0.43			tr(s)	-												
5-15	0.39			- (s)													
15-25	0.36			tr(s)													
25-38	0.35			2	-												
38-48	0.29			5	1												

a. Carbonate comprises 1-5 percent of sand.

67-6

Soil Classification: Typic Haplargid; fine, mixed, thermic
 Series: SND-3
 Pedon No.: S67NMex-7-6
 Location: SE 1/4 SW 1/4, Sec. 4, T21S, R2E, about 0.1 mile west of Jornada Road and about 0.1 mile south of pedon 61-3, Dona Ana County, New Mexico.
 Geomorphic Surface: Jornada I.
 Land Form: Transition from toe of piedmont slope to floor of Jornada del Muerto Basin; one-half percent slope to east.
 Elevation: 4,320 feet.
 Parent Material: Jornada I basin-fill alluvium derived mainly from monzonite, andesite, latite and rhyolite.
 Vegetation: Barren where sampled; adjacent vegetated strips have tobosa, burro grass, and scattered snakeweed and *Yucca elata*.
 Collected by: L. H. Gile, December 13, 1967.
 Described by: L. H. Gile.

Soil Surface. Barren and smooth; cracked into polygons 1/2 to 2 inches diameter.

A2 67L841 0 to 5 cm. Light brown (7.5YR 6/3 dry) or dark brown (7.5YR 4/3 moist) loam; weak thin platy and vesicular in upper part; lower part is massive and weak very fine crumb, and in places has 5YR hue; soft; very few roots; noncalcareous except for surface of crust, which effervesces weakly; abrupt smooth boundary.

B1t 67L842 5 to 15 cm. Reddish-brown (5YR 5/4 dry, 3.5/4 moist) clay loam; weak medium prismatic breaking to weak medium subangular blocky; slightly hard to hard; fine roots; few to common; sand grains stained with clay; a few weakly reflective surfaces on peds; few fine tubular pores; noncalcareous; clear wavy boundary.

B21t 67L843 15 to 25 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) heavy clay loam; moderate medium prismatic breaking to moderate medium subangular blocky; hard and very hard; roots few to common; many ped surfaces weakly reflective; sand grains coated with clay; few fine tubular pores; noncalcareous; clear wavy boundary.

B22t 67L844 25 to 38 cm. Reddish-brown (5YR 4.5/5 dry, 3.5/5 moist) clay; moderate medium prismatic breaking to moderate medium subangular blocky; very hard; few roots; few fine tubular pores; smooth reflective surfaces on many peds; sand grains coated with clay and there are common clay bridges; effervesces weakly; clear smooth boundary.

B23tca 67L845 38 to 48 cm. Yellowish-red (4YR 4/5 dry and moist) clay; moderate medium prismatic, breaking to moderate medium subangular blocky; very hard; few roots; few fine tubular pores; ped surfaces smooth and reflective; clay coatings on sand grains and there are common clay bridges; few fine carbonate nodules; effervesces strongly; clear smooth boundary to underlying K1 horizon.

SOIL CLASSIFICATION: Typic Torripsamment; mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Pintura SOIL Nos. S68NMex-7-1 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 68L1406-68L1413

GENERAL METHODS: 1A, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)													3B1 Coarse fragments 2A1			
		Total			Sand						Silt				> 2	19-5	5-2	
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	< 0.074				Pct.
Pct. of < 2 mm																		
Carbonate Not Removed - 3A1 a/ b/																		
0-33	C1	86.0	5.3	8.7	0.0	0.9	8.4	52.2	24.5	4.5	0.8	60.0	61.5	25.3	-	-	-	
33-102	C2	86.8	5.7	7.5	0.1	2.6	14.4	50.5	19.2	4.7	1.0	50.5	67.6	22.2	-	-	-	
102-122	C3	89.0	3.5	7.5	0.0	1.7	13.4	57.3	16.7	2.8	0.7	49.6	72.3	18.4	-	-	-	
122-142	Ab	86.2	6.4	7.4	0.2	3.8	16.3	48.7	17.3	5.4	1.0	47.0	68.9	21.8	-	-	-	
142-152	B1tb	84.1	5.4	10.5	0.4	6.0	19.8	45.6	12.4	4.0	1.4	37.7	71.7	21.4	tr	-	tr	
152-168	B2tcal	78.3	7.8	13.9	0.9	5.5	17.0	41.8	13.0	5.5	2.3	38.4	65.3	28.1	tr	tr	tr	
Carbonate Removed - 3A3 a/ b/																		
168-190	B22tcal	72.1	10.5	17.4	2.5	6.4	14.0	36.1	13.1	7.6	2.9	38.3	59.0	34.6	3	2	1	
190-206	K1b	70.2	7.7	22.1	3.2	6.8	13.5	34.3	12.4	5.5	2.2	35.4	57.8	35.8	tr	tr	tr	
Depth (cm.)	6A1a Organic carbon c/ Pct.	Nitrogen Pct.	C/N	6E2a Carbonate as CaCO ₃ Pct.	Bulk density d/ g/cc			Water content Pct.			pH (1:1)							
					g/cc	g/cc	g/cc	4E1a 0.06-Bar Pct.	4E1a 0.1-Bar Pct.	4E2 15-Bar Pct.								
0-33	0.18			tr		1.4			17.5	9.9	2.8							
33-102	0.21			tr		1.4			14.8	9.3	2.4							
102-122	0.21			tr (s)					14.6	8.6	2.4							
122-142	0.25			tr (s)					15.7	10.3	2.4							
142-152	0.28			tr (s)							3.2							
152-168	0.23			tr (s)							4.6							
168-190	0.35			4							6.8							
190-206	0.21			14							9.0							

- a/ Pretreatment with 0.1N NaOH.
- b/ 20 g. sample.
- c/ 2.9 kg/m² to 102 cm (Method 6A).
- d/ Assumed bulk densities for calculations.

Soil Classification: Typic Torripsamment; mixed, thermic
 Series: Pintura
 Pedon No.: S68NMex-7-1
 Location: In the NE 1/4 NW 1/4, Sec. 22, T22S, R2E, in fresh cut on east side of Jornada Road, Dona Ana County,
 Geomorphic Surface: Dune on Jornada II New Mexico
 Land Form: Dune; rests on Jornada alluvial-fan piedmont sloping 1 percent to the west.
 Elevation: 4,330 feet.
 Vegetation: Vegetation on dune is mainly mesquite, with a few four-wing saltbush.
 Parent Material: Eolian sand.
 Collected by: L. H. Gile, February 5, 1968.
 Described by: L. H. Gile.

Soil Surface. Weakly crusted on the surface of the dune.

C1 68L1406 0 to 33 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) loamy fine sand; massive and single grain; soft and loose; roots few to common; after drying and wind erosion, weak stratification apparent; strata range from about 1-10 cm. thick; at least some of the finer strata apparently represent a former crusted surface of the dune, and have a discontinuous concentration of fine mesquite leaves and bits of organic matter; noncalcareous; diffuse wavy boundary.

C2 68L1407 33 to 102 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) loamy fine sand; massive and single grain; soft and loose; roots few to common; weak stratifications apparent on drying, as above; fewer leaves and other bits of organic carbon than above; noncalcareous; clear wavy boundary.

C3 68L1408 102 to 122 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) loamy fine sand; massive and single grain; soft and loose; roots few to common; stratification apparent after drying and wind-blasting; noncalcareous; abrupt smooth boundary.

Ab 68L1409 122 to 142 cm. Reddish-brown (6YR 5/4 dry, 4/4 moist) loamy fine sand; massive; slightly hard; few roots; noncalcareous; clear wavy boundary.

B1tb 68L1410 142 to 152 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) light sandy loam; generally massive, with weak tendency to subangular blocky; slightly hard; few roots; few fine and medium tubular pores; thin stainings of silicate clay on sand grains; few insect burrow fillings 5-10 mm. diameter; very few short carbonate filaments; generally noncalcareous except along a few root channels; clear wavy boundary.

B21tcab 68L1411 152 to 168 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) heavy sandy loam; weak medium prismatic, breaking to weak medium subangular blocky; slightly hard, with some parts hard; sand grains thinly coated with silicate clay; few carbonate filaments; generally effervesces weakly, with a few parts noncalcareous; common fine and very fine tubular pores; clear wavy boundary.

B22tcab 68L1412 168 to 190 cm. Reddish-brown (6YR 5.5/4 dry, 4.5/4 moist) sandy clay loam; weak medium prismatic breaking to weak medium subangular blocky; hard; few fine and very fine tubular pores; few roots; few carbonate nodules and filaments; coatings of silicate clay on some sand grains, in places disrupted by carbonate accumulation; effervesces strongly; clear smooth boundary.

K1b 68L1413 190 to 206 cm. Dominantly pink (7.5YR 7/4 dry) or brown (7.5YR 5.5/4 moist) with lesser amount reddish-brown (6YR 4.5/4 moist) sandy clay loam; weak medium subangular blocky; hard; very few roots; common carbonate nodules and filaments; effervesces strongly; clear wavy boundary to underlying K2 horizon, not sampled.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Bucklebar SOIL Nos. S68NMex-7-2 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 69L242-69L252

GENERAL METHODS: 1A, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)													RHI Coarse fragments 2A1			
		Total			Sand						Silt				<0.074	> 2	19-5	5-2
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	Pct.				
Carbonate Not Removed - 3A1 a, b																		
0-5	A2	62.4	18.6	19.0	0.5	4.8	10.1	26.2	20.7	12.5	6.1	47.7	41.6	50.2	tr	-	tr	
5-15	B1t	64.9	12.6	22.5	1.3	7.0	12.2	31.4	13.1	7.8	4.8	37.8	51.8	41.6	tr	tr	tr	
15-33	B2t	72.8	9.4	17.8	2.9	13.7	16.6	30.7	8.9	5.8	3.6	29.7	63.9	31.2	tr	tr	tr	
Carbonate Removed - 3A3 a, b																		
33-58	B21tca	74.3	8.6	17.1	2.8	11.6	16.9	33.5	9.5	5.3	3.3	31.2	64.8	29.7	tr	tr	tr	
58-79	B22tca	81.6	4.0	14.4	3.9	12.4	19.0	37.5	8.8	2.4	1.6	29.5	72.8	21.7	tr	tr	tr	
79-99	B23tca	82.9	4.0	13.1	2.0	10.2	19.6	41.4	9.8	2.4	1.6	32.5	73.1	29.8	tr	tr	tr	
99-127	K11b	84.9	3.1	12.0	1.7	8.7	20.6	45.2	8.7	1.9	1.2	32.2	76.2	18.1	tr	tr	tr	
127-157	K12b	85.5	2.7	11.8	1.8	9.1	20.1	45.8	8.8	1.6	1.1	32.9	76.7	17.4	1	-	1	
157-183	K13b	87.9	2.2	9.9	2.7	12.5	22.3	42.8	7.6	1.2	1.0	29.9	80.2	14.4	1	tr	1	
183-190	K14b	88.1	3.4	8.5	2.0	11.0	21.7	45.2	8.3	1.5	1.9	32.7	79.8	14.5	5	3	2	
190-218	K2mb	79.4	6.3	14.3	3.3	10.3	17.0	38.0	10.9	3.1	3.2	34.0	68.5	24.6	6	3	3	
Depth (cm.)	6A1a Organic carbon	Nitrogen	C/N	6E1b 6E2a Carbonate as CaCO ₃	Bulk density			Water content			pH							
					d/								(1:1)					
	Pct.	Pct.		Pct.	g/cc	g/cc	g/cc	Pct.	Pct.	Pct.								
0-5	0.50			tr(s)	1.4					6.4								
5-15	0.36			tr(s)	1.6					7.4								
15-33	0.29			tr(s)	1.6					7.1								
33-58	0.22			2	1.6					6.9								
58-79	0.17			3	1.6					6.0								
79-99	0.11			3	1.6					6.1								
99-127				11														
127-157				11														
157-183				13														
183-190				10														
190-218				17														
Depth (cm.)	Extractable bases				5A6a CEC											Base saturation		
	Ca	Mg	Na	K		NH ₄ OAc											Pct.	Pct.
	meq/100 g																	
0-5	2.3	0.1	1.4		16.0													
5-15	2.7	0.1	0.9		16.2													
15-33	2.1	0.1	0.7		14.3													
33-58	2.1	0.2	0.4		12.4													
58-79	1.9	0.1	0.3		9.8													
79-99	1.8	0.2	0.2		8.4													
99-127	1.7	0.2	0.2		6.5													
127-157	1.9	0.2	0.2		6.5													
157-183	2.2	0.2	0.1		5.3													
183-190	2.6	0.2	0.1		5.0													
190-218	3.2	0.3	0.2		7.3													

- a/ Pretreatment with 0.1N NaOH.
- b/ 20 g. sample.
- c/ 3.5 kg/m² to 99 cm (Method 6A).
- d/ Assumed bulk densities of moist fine-earth fabric for calculations.

Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic
 Series: Bucklebar
 Pedon No.: S68NMex-7-2
 Location: The SW 1/4 NW 1/4, Sec. 31, T23S R1E, Dona Ana County, New Mexico
 Geomorphic Surface: La Mesa (lower)
 Land Form: Basin floor, nearly level.
 Elevation: 4,200 feet.
 Parent Materials: Noncalcareous basin-floor sediments of mixed origin.
 Vegetation: Mesquite on low dunes; interdune areas are barren or have scattered annual weeds.
 Collected by: L. H. Gile, February 26, 1969.
 Described by: L. H. Gile.

Soil Surface. Smooth and barren except for a few annual weeds; weakly cracked into polygons.

A2 69L242 0 to 5 cm. Pinkish-gray (7.5YR 6/3 dry) or brown (7.5YR 4.5/3 moist) heavy sandy loam; weak thin and medium platy, in places with some 5YR material between plates; soft; few roots; effervesces weakly; abrupt smooth boundary.

B1t 69L243 5 to 15 cm. Brown (7.5YR 5/3 dry) or dark brown (7.5YR 3.5/3 moist) sandy clay loam; massive; hard; few roots; noncalcareous; clear smooth boundary.

B2t 69L244 15 to 33 cm. Reddish-brown (6YR 5/4 dry, 3.5/4 moist) sandy clay loam; weak coarse prismatic, breaking to very weak subangular blocky; few roots; sand grains stained with clay; a few insect burrows, 1/2-1 cm. diameter, filled with dark fine earth; noncalcareous; clear wavy boundary.

B21tcab 69L245 33 to 58 cm. Dominantly light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) with lesser amount reddish-brown (5YR 5/4 dry) sandy clay loam; weak coarse prismatic breaking to weak medium subangular blocky; hard; few roots; sand grains in reddish-brown parts stained with clay; few carbonate filaments, a few insect burrows, about 1/2 cm. diameter; filled with dark fine earth; generally effervesces strongly, some of reddish-brown parts effervesce weakly; clear wavy boundary.

B22tcab 69L246 58 to 79 cm. Dominantly yellowish-red (5YR 5/5 dry, 4/5 moist) with lesser amount light brown (7.5YR 6/4 dry) sandy clay loam; weak coarse prismatic breaking to weak medium subangular blocky; hard; few roots; a very few pebbles with thin carbonate coatings; a few insect burrows, about 1/2 cm. diameter, filled with dark fine earth; sand grains of reddish-brown parts stained with clay; common carbonate filaments, and a very few nodules; effervesces strongly; clear wavy boundary.

B23tcab 69L247 79 to 99 cm. Dominantly light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) with lesser amounts of white (7.5YR 9/2 dry) or pink (7.5YR 7/4 moist) and a few parts reddish-brown (5YR 5/4 dry) heavy sandy loam; weak coarse prismatic, breaking to weak medium subangular blocky; generally hard and very hard, with a few volumes being only slightly hard; few roots; a few carbonate nodules and vertical cylindroids; common carbonate filaments; effervesces strongly; clear wavy boundary.

K11b 69L248 99 to 127 cm. Dominantly pink (7.5YR 8/4 dry) or light brown (7.5YR 6.5/4 moist) with substantial parts reddish-brown (5YR 5.5/4 dry, 4.5/4 moist) and some intermediate colors; heavy sandy loam; weak medium and coarse subangular blocky; most of horizon is very hard, but some channel fillings soft; some of the latter material is pink (7.5YR 7/4 dry) or light brown (7.5YR 6/4 moist) and is readily removed from the enclosing, very hard material; carbonate occurs both in cylindrical and in massive forms; reddish-brown cylindroids effervesce weakly or are noncalcareous, remainder effervesces strongly; clear wavy boundary.

K12b 69L249 127 to 157 cm. Dominantly white (7.5YR 9/4 dry) or pink (7.5YR 7/4 moist) with some parts less white and a few parts reddish-brown (5YR 5/4 moist); light sandy clay loam; a few white carbonate filaments, emplaced on less white carbonate accumulations and in reddish-brown material; very hard, but softens readily on moistening; generally massive, with some subangular blocky parts; very few fine roots; reddish-brown parts noncalcareous or effervesces weakly, remainder effervesces strongly; clear wavy boundary.

K13b 69L250 157 to 183 cm. White (7.5YR 9/4 dry) or pink (7.5YR 8/4 and 7/4 moist) light sandy clay loam; massive; hard and very hard, except for a few zones laterally, of vertically oriented material that is slightly hard or soft; very few fine roots; effervesces strongly; clear smooth boundary.

K14b 69L251 183 to 190 cm. Dominantly white (7.5YR 9/4 dry) or pink (7.5YR 8/4 moist) with some parts less white; light sandy clay loam; massive; soft and slightly hard; few fine roots; a few pebbles (< 5 percent), more than above; softer than above, but sand grains are carbonate-coated; effervesces strongly; abrupt smooth boundary.

K2b 69L252 190 to 218 cm. About equal parts of white (7.5YR 9/4 dry) or pink (7.5YR 8/4 dry) and pink (7.5YR 7/4 dry) or brown (7.5YR 5.5/4 moist) sandy clay loam; massive; very hard in place, very and extremely hard when removed; a very few fine roots, less than above; common carbonate filaments; there are a very few root channels, 1-5 mm. diameter, filled with loose material; a few pebbles (< 5 percent); in places, a few pebbles rest on or in the very upper part of the K but there are also a few concentrations below; although this horizon is very hard, it does soften on moistening, and may be readily field-textured; a very few parts are light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 5/4 moist); most parts effervesce strongly; a few parts effervesce weakly.

SOIL CLASSIFICATION: Typic Haplargid; sandy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Onite, sandy subsoil variant SOIL Nos. S68Mex-7-3 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 68L1350-68L1357; 70L955, 70L956, 71L077

GENERAL METHODS: 1A, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)													3Alb Fine Clay <0.002	3B1coarse fragments Vol. 19-5 5-2	2A2 Pct < 19
		Total		Sand					Silt								
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.02-0.002)	(2-0.1)	<0.074				
Pct. of < 2 mm																	
Carbonate Not Removed - 3Al a, b, c																	
d/																	
0-5	A	79.8	12.2	8.0	9.6	10.3	8.7	27.7	23.6	8.9	3.3	50.2	56.2	32.3	10	5	16
5-8	A2	76.7	14.4	8.9	6.8	9.2	8.2	26.6	25.9	10.5	3.9	53.7	50.8	36.4	15	4	20
8-13	B1t	78.6	11.6	9.8	16.2	13.7	8.5	21.0	19.2	7.8	3.8	40.2	59.4	31.8	20	6	23
13-23	IIB2t	80.8	6.8	12.4	26.2	17.9	9.7	16.8	10.2	3.3	3.5	22.9	70.6	24.1	30	16	29
23-36	IIC1ca	83.9	6.1	10.0	13.8	23.2	17.7	21.1	8.1	3.5	2.6	21.6	75.8	20.1	30	15	28
36-51	IIC2ca	87.9	4.1	8.0	24.4	29.3	15.6	14.3	4.2	2.1	2.0	12.5	83.7	14.0	30	8	38
51-81	IIC3	90.0	2.4	7.6	24.0	27.9	16.9	17.3	3.9	1.3	1.0	12.9	86.1	11.6	25	6	33
81-117	IIC4	92.2	2.5	5.3	24.6	23.8	16.8	22.1	4.9	1.4	1.1	16.5	87.3	9.8	25	5	30
0-3	A2 f/	75.3	14.1	10.6	5.8	11.3	9.6	27.0	21.6	9.7	4.4	48.3	53.7	35.4			
3-10	B21t f/	75.2	13.3	11.5	11.7	12.2	8.5	24.1	18.8	10.0	3.3	44.1	56.4	34.1			
10-20	B22t f/	79.3	11.6	9.1	17.1	15.0	9.9	22.3	15.0	9.0	2.6	37.4	64.3	27.6			
Depth (cm.)	6Ala Organic carbon g/g Pct	Nitrogen Pct	C/N	6E1b 6E2a Carbonate as CaCO ₃ Pct	6C2a Ext. Iron as Fe Pct.	Bulk density			Water content			Composition Whole Material e					
						g/cc	h/ g/cc	g/cc	Pct.	Pct.	4B2 15- Bar Pct.	> 2mm. Pct.	Sand Pct.	Silt Pct.	Clay Pct.	Carbo nate a CaCO ₃ Pct.	
0-5	0.21			tr(s)	0.8			1.4				3.2	21	63	10	6	tr(s)
5-8	0.20			tr(s)	0.9			1.4				3.7	24	58	11	7	tr(s)
8-13	0.25			tr(s)	0.8			1.5				3.6	29	56	8	7	tr(s)
13-23	0.19			tr	0.8			1.5				4.3	45	46	4	5	tr
23-36	0.13			2	0.7			1.5				3.5	43	48	3	6	1
36-51				1	0.6			1.5				3.5	46	47	2	4	1
51-81				1	0.5			1.5				3.0	39	55	1	5	1
81-117				1	0.6			1.5				2.6	35	60	2	3	1
Depth (cm.)	Extractable bases				5A6a CEC NH ₄ OAc	Base saturation											
	Ca	Mg	Na	K		Pct.											
0-5	1.2	0.1	0.7	7.2													
5-8	1.3	0.1	0.7	7.9													
8-13	1.1	0.2	0.5	8.3													
13-23	1.3	tr	0.4	9.3													
23-36	1.4	0.1	0.3	6.2													
36-51	1.3	0.1	0.3	5.2													
51-81	1.4	0.3	0.3	5.1													
81-117	1.3	0.3	0.3	4.2													

- a/ Pretreatment of < 2 mm. with 0.1N NaOH.
- b/ 20-gram sample for < 2 mm.
- c/ Carbonate removed from the IIC1ca (68L1354) by Method 3A3. Coarse fragment percentages all inclusive of carbonate.
- d/ No > 19 mm. Hence, percentages of 19-5 and 5-2 for the < 76 mm. composition base the same as given.
- e/ Inclusive of < 19 mm.; no > 19 mm. present. Carbonate measured on fine earth and calculated to base inclusive of > 2 mm. Note that carbonate included in separates.
- f/ Satellite pedon 5 m to south.
- g/ 0.7 kg/m² to 36 cm (Method 6A).
- h/ Assumed bulk densities of moist fine-earth fabric for calculations.

Soil Classification: Typic Haplargid; sandy, mixed, thermic
 Series: Onite, sandy subsoil variant
 Pedon No.: S68NMex-7-3
 Location: In the NE 1/4 SW 1/4, Sec. 26, T2LS, R2E; 90 feet north of pedon S68NMex-7-4, Dona Ana County, N. M.
 Geomorphic Surface: Organ.
 Land Form: Crest of slight ridge sloping 1 percent to the west.
 Elevation: 4,310 feet.
 Parent Materials: Organ alluvium derived from monzonite.
 Vegetation: Scattered snakeweed, Yucca elata, and Mormon tea.
 Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, December 9, 1968.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. There are scattered coarse sand grains and fine monzonite pebbles on the surface.

A 68L1350 0 to 5 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) sandy loam, generally massive with weak tendency to platiness and single grain; most parts soft, a few parts loose; few roots; horizon has appearance of disturbance and mixing; noncalcareous; abrupt smooth boundary.

A2 68L1351 5 to 8 cm. Dominantly light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) with some parts light brownish-gray (10YR 6.5/2 dry) sandy loam; massive; soft; few roots; noncalcareous; clear smooth boundary.

B1t 68L1352 8 to 13 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 3.5/4 moist) sandy loam; massive; soft; no roots; some grains faintly stained with clay; noncalcareous; clear smooth boundary.

IB2t 68L1353 13 to 23 cm. Reddish-brown (5YR 5/4 dry, 5YR 4/4 moist); sandy loam; massive; slightly hard; few roots; sand grains stained with clay; noncalcareous except for lower 1 to 2 inches; abrupt wavy boundary.

IIC1ca 68L1354 23 to 36 cm. Light reddish-brown (6YR 6/4 dry) or reddish-brown (6YR 5/4 moist); gravelly loamy sand; massive; soft; very few roots; thin, continuous and discontinuous carbonate coatings on pebbles; most pebbles are less than 1/2 inch in diameter, with a few up to an inch diameter; effervesces strongly; clear wavy boundary.

IIC2ca 68L1355 36 to 51 cm. Dominantly reddish-brown (5YR 5/4 dry, 5YR 4/4 moist); gravelly sand; massive; slightly hard; no roots; alternating strata of fine gravel and coarse sand, about 1 cm. thick, and sand, up to 3 cm. thick; within the latter, individual layers are preserved that are about 2 mm. thick; carbonate is most prominent on the pebbly layers, carbonate occurs as thin pebble coatings in gravelly and coarse sandy layers, cannot be observed in fine sandy layers; effervesces strongly; abrupt smooth boundary.

IIC3 68L1356 51 to 81 cm. Dominantly reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) sand; massive; slightly hard and hard; alternating layers, as above, of fine pebbles and coarse sand, in layers about 1-2 cm. thick; finer sand layers ranging from 1-3 cm. thick; within these strata, smaller stratifications can be observed, as fine as 1-2 mm.; very thin carbonate coatings on some pebbles; effervesces weakly and strongly; no roots; clear wavy boundary.

IIC4 68L1357 81 to 117 cm. Dominantly reddish-brown (5YR 5.5/4 dry, 5YR 4/4 moist) with some parts less red; distinctly stratified, with alternating strata of (1) coarse and very coarse sand and very fine gravel and (2) dominantly medium and finer grades of sand; strata commonly range from 1/2 to 2 cm. thick, with a few thicker or thinner than that; massive; slightly hard; no roots; grains of some layers are clean, others stained with clay; effervesces weakly and strongly.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Bucklebar

SOIL Nos. S68Mex-7-4

LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska

LAB. Nos. 68L1358-68L1366, 70L953, 70L954, 71L076

GENERAL METHODS: 1A, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)													3A1B Fine Clay f/	3B1 Coarse fragments/2A2			
		Total														f/	> 2	19-5	5-2
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	0.02-0.002	0.02-0.002	(2-0.1)	(2-0.1)					
Pct. of < 2 mm																			
Carbonate Not Removed - 3A1 a, b, c																			
0-5	A	54.2	26.8	19.0	1.2	3.7	4.6	18.3	26.5	12.1	14.7	50.9	27.7	61.0	5.5	-	-	-	
5-15	A2	65.6	20.5	13.9	2.9	6.1	6.0	23.9	26.7	10.8	9.7	53.4	38.9	48.3	5.3	tr	tr	tr	
15-28	B1t	60.2	18.4	21.4	3.3	6.9	6.1	21.4	22.6	10.0	8.4	46.8	37.6	52.1	10.8	1	1	tr	
28-46	B2t	58.0	20.6	21.4	3.8	7.1	5.8	19.4	21.9	12.0	8.6	46.8	36.1	54.1	10.7	tr	tr	tr	
46-76	B3tca	56.5	26.5	17.0	3.5	4.0	3.0	17.4	28.6	17.6	8.9	58.9	27.9	60.4	8.7	tr	tr	tr	
76-130	C1ca	55.3	29.7	15.0	0.2	0.9	1.9	15.6	36.7	21.8	7.9	70.6	18.6	66.4	6.3	tr	tr	tr	
130-157	C2	80.9	10.6	8.5	0.3	1.0	3.2	42.3	34.1	7.6	3.0	75.5	46.8	34.4	3.3	tr	tr	tr	
157-193	B1cab	74.3	10.5	15.2	9.8	10.9	11.1	29.6	13.0	5.8	4.7	35.2	61.2	31.9	7.0	tr	tr	tr	
193-206	B2tcab	63.4	7.2	28.4	6.0	7.8	10.4	27.9	11.3	3.8	3.4	30.5	52.1	41.5	13.7	1	tr	1	
0-5	A2 d/	71.4	18.1	10.5	6.7	9.2	7.6	25.1	22.9	12.1	6.0	51.3	48.5	40.1		5	1	4	
5-16	B21t d/	69.6	17.7	12.7	5.8	8.8	7.7	24.4	22.9	12.4	5.3	51.2	46.7	41.9		8	1	7	
16-25	B22t d/	69.1	18.5	12.4	4.9	7.4	7.2	26.2	23.4	13.4	5.1	54.3	45.7	42.4		10	1	9	
Depth (cm.)	6A1a Organic carbon e/ Pct.	Nitrogen Pct.	C/N	6E1b Carbonate as CaCO ₃ Pct.	6C26 Ext. Iron as Fe Pct.	Bulk density			4D1 COLE	Water content			3A1c Water Disper- sible Clay Pct.	pH					
						4A1d g/cc	4A1h g/cc	g/cc		4B1c Pct.	4B2 Pct.	4C1 WRD		(:1)					
0-5	0.71			tr	1.0	1.4g					7.9	12.3							
5-15	0.43			tr	0.9	1.4g					5.5	9.3							
15-28	0.28			tr	1.0	1.5g					7.3	16.8							
28-46	0.29			tr	1.0	1.52	1.62	0.020	14.0	7.5	0.10	17.3							
46-76	0.20			3	0.9	1.5g				6.4		10.5							
76-130	0.12			3	0.9	1.5g				5.7		7.0							
130-157	0.08			1	0.8					3.7		tr							
157-193	0.08			1						5.7									
193-206	0.15			4						11.5									
Depth (in.)	Extractable bases				5A6a CEC	Base saturation													
	Ca	Mg	Na	K		NH ₄ OAc	Pct.	Pct.											
	2.7	0.2	2.0	17.1															
	1.6	0.1	1.2	12.3															
	2.0	0.2	1.2	14.5															
	2.1	0.1	1.1	14.3															
	2.1	0.2	0.7	11.2															
	2.4	0.2	0.5	10.3															
	1.8	0.2	0.4	7.2															
	2.6	0.3	0.6	10.2															
	5.4	0.4	0.9	18.6															

a/ Pretreatment with 0.1N NaOH.
 b/ 20-gram sample for < 2 mm.
 c/ Carbonate removed from the B3tca (68L1362), C1ca (68L1363), and the B2tcab (68L1366) by Method 3A3. Coarse fragment percentages for all horizons inclusive of carbonate.
 d/ Satellite pedon 8 m to north; not in Bucklebar series.
 e/ 3.3 kg/m² to 76 cm (Method 6A).
 f/ Carbonate removed for B3tca and horizons below.
 g/ Assumed for calculations.

Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic

Series: Bucklebar

Pedon No.: S68NMex-7-4

Location: In the NE 1/4 SW 1/4, Sec. 26, T21S, R2E; 90 feet south of pedon S68NMex-7-3, Dona Ana County, N. M.

Geomorphic Surface: Organ.

Land Form: Edge of broad drainageway, just south of slight ridge where pedon S68NMex-7-3 is located.

Elevation: 4,310 feet.

Parent Materials: Organ alluvium (drainageway facies), derived from monzonite, in upper 158 cm; possible intermediate-age sediment from 158 to 193 cm; Jornada II alluvium below 193 cm.

Vegetation: Scattered clumps of tobosa, burro grass, and snakeweed.

Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, December 10, 1968.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Smooth and barren between tobosa clumps.

A 68L1358 0 to 5 cm. Light brown (7.5YR 6/3 dry) dark brown (7.5YR 4/3 moist) loam; moderate thin and medium platy; soft; few roots; noncalcareous; abrupt smooth boundary.

A2 68L1359 5 to 15 cm. Pinkish-gray (7.5YR 6.5/2 dry) or dark brown (7.5YR 4/2 moist) heavy sandy loam; massive; slightly hard; few roots; noncalcareous; abrupt smooth boundary.

B1t 68L1360 15 to 28 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 4/3 moist) sandy clay loam; slightly redder in upper part; weak coarse prismatic, massive internally; hard and very hard; few roots; noncalcareous; clear wavy boundary.

B2t 68L1361 28 to 46 cm. Brown (7.5YR 5.5/4 dry; 7.5YR 4.5/4 moist); sandy clay loam; weak coarse prismatic, generally massive internally, with tendency to very weak medium subangular blocky; hard; few roots; few fine tubular pores, and scattered insect tunnels, 1/2 to 1 cm. diameter, some of which are partially to wholly filled with dark fine earth; noncalcareous; clear wavy boundary.

B3tca 68L1362 46 to 76 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist); sandy clay loam; weak coarse prismatic, breaking to very weak medium subangular blocky; hard; few fine roots; few carbonate filaments, occurring as linings on root channels; effervesces strongly; clear wavy boundary.

Clca 68L1363 76 to 130 cm. Reddish-brown (6YR 5.5/4 dry, 6YR 4/4 moist); loam; weak coarse prismatic breaking to weak medium blocky; few carbonate filaments; hard; very few roots, sedimentary strata are absent in most places, but laterally there are strata of loamy sand, several inches thick, that appear little disturbed; effervesces weakly; clear wavy boundary.

C2 68L1364 130 to 157 cm. Dominantly light reddish-brown (5YR 6/5 dry) or reddish-brown (5YR 4.5/4 moist); a nearly uniform bed of well-graded, light fine sandy loam, with several strata, 1/2 to 1 inch thick, of light fine sandy clay loam; mostly slightly hard, with some strata soft; very few roots; base of this deposit is marked by a thin, nearly continuous layer 1/4 to 1/2 inch thick, of platy, light sandy clay loam; mostly noncalcareous, though calcareous in a few places, particularly the finer strata; abrupt smooth boundary.

Blcab(?) 68L1365 157 to 193 cm. Yellowish-red (5YR 5/5 dry, 5YR 4/5 moist); light sandy clay loam; massive; hard; no roots; the upper several inches is in places noncalcareous; beneath is calcareous and there are a few carbonate filaments; clear smooth boundary.

B2tcab 68L1366 193 to 206 cm. Red (2.5YR 4.5/6 dry) or dark red (2.5YR 3.5/6 moist) with a few volumes of 5YR hue; heavy sandy clay loam; weak medium subangular blocky; hard; no roots; some peds have weakly reflective faces; scattered carbonate nodules and filaments; sand grains stained with clay; most effervesces strongly, with a few of the reddest parts noncalcareous; clear wavy boundary.

Kb&Btb 206 to 234 cm. Dominantly K-fabric in the form of carbonate nodules and cylindroids, but less than the 90 percent required for the K horizon; alternates with reddish-brown Bt fabric. Not sampled.

Clay Mineralogy (Method 7A2): A2 and B2t horizons. Clays are similar in the two horizons--small amounts of mica and trace to small amounts of kaolinite and an expandable 2:1 layer silicate component. The mica and kaolinite are well ordered.

SOIL CLASSIFICATION: Typic Haplargid; coarse-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Onite, thin solum variant SOIL Nos. S68Nmex-7-5 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 68L1367-68L1376

GENERAL METHODS: 1A, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)													Coarse fragments		
		Total				Sand					Silt				3B1 Vol. 250-2 < 250	e/ 76-5 Pct. of < 76	2A2 5-2 Pct. of < 76
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	<0.074			
Pct. of < 2 mm																	
Carbonate Not Removed - 3A1 a/ b/																	
0-5	A	77.3	13.8	8.9	6.4	8.5	8.4	30.6	23.4	9.2	4.6	52.7	53.9	34.1	10	1	16
5-13	B21t	76.0	14.1	9.9	7.3	7.6	8.2	29.7	23.1	9.8	4.3	52.0	52.9	35.3	10	1	16
13-23	B22t	72.6	15.1	12.3	9.6	9.3	7.3	25.7	20.7	9.5	5.6	46.5	51.9	37.9	10	3	14
Carbonate Removed - 3A3 a/ b/ c/																	
23-38	Cca	70.4	17.1	12.5	13.5	10.7	6.4	19.9	19.8	10.7	6.4	43.6	50.5	40.3	15	4	20
38-48	IB21cab	59.8	24.2	15.9	5.0	6.9	4.8	18.2	24.9	14.8	9.4	52.3	34.9	54.2	3	1	4
48-64	IB22cab	44.7	31.1	24.2	2.4	5.7	4.7	15.0	16.9	14.1	17.0	40.7	27.8	64.9	tr	tr	tr
64-86	IB1tb2	64.9	16.5	18.6	3.4	6.1	8.1	29.9	17.4	9.5	7.0	45.0	47.5	43.9	tr	tr	tr
86-104	IB2tb2	61.3	12.1	26.6	3.4	6.9	8.7	28.2	14.0	6.8	5.3	37.1	47.3	45.0	-	-	-
104-137	IB21b2	75.8	7.4	16.8	10.0	12.0	11.1	30.0	12.7	3.7	3.7	33.5	63.0	29.4	3	3	2
137-160	IB22tb2	73.1	6.9	20.0	5.3	7.8	9.9	34.0	16.1	3.9	3.0	40.1	57.0	33.6	1	1	1
Depth (cm.)	6A1a Organic carbon f/ Pct.	Nitrogen Pct.	C/N	6E1b Carbonate as CaCO ₃ Pct.	Bulk density			4D1 COLE g/cc	Water content		Composition Whole Material d						
					4A1d 1/3- Bar g/cc	4A1h Oven- Dry g/cc	4B2 15- Bar Pct.		NONCARBONATE				Carbon ate as CaCO ₃ Pct.				
					> 2mm.				Sand	Silt	Clay						
0-5	0.26			1	1.4			3.8	17	64	11	7	1				
5-13	0.21			tr	1.4			4.1	17	63	12	8	tr				
13-23	0.18			1	1.5			5.1	17	60	12	10	1				
23-38	0.21			4	1.59	1.66	0.014	5.4	24	52	12	9	3				
38-48	0.28			4	1.5			6.5	5	55	22	14	4				
48-64	0.30			5	1.5			9.2	tr	42	30	23	5				
64-86	0.15			2	1.6			6.7	tr	64	16	18	2				
86-104	0.15			4	1.6			10.0	-	58	12	26	4				
104-137	0.12			14				7.6	5	61	6	14	14				
137-160	0.03			1				8.0	2	71	7	19	1				
Depth (in.)	Extractable bases				Base saturation												
	Ca	Mg	Na	K	Pct.												
mg/100 g											Pct.		Pct.				
Depth (in.)	a/ Pretreatment of < 2 mm. with 0.1N NaOH.																
	b/ 20-gram sample for < 2 mm.																
	c/ Coarse fragment percentages inclusive of carbonate.																
	d/ Inclusive of coarse fragments, carbonate, and gypsum. Carbonate calculated from measurements on fine earth assuming no carbonate in > 2 mm. Slight error for upper three horizons as used fine earth separate percentages of carbonate-containing soil material.																
	e/ No > 19 mm.																
	f/ 3.2 kg/m ² to 104 cm (Method 6A).																

Soil Classification: Typic Haplargid; coarse-loamy, mixed, thermic
 Series: Onite, thin solum variant
 Pedon No.: S68NMex-7-5
 Location: In the NE 1/4 SW 1/4, Sec. 26, T21S, R2E, about 600 feet north of S68NMex-7-3; Dona Ana County, N. M.
 Geomorphic Surface: Organ.
 Land Form: Margin of ridge sloping 1 percent to the west.
 Elevation: 4,310 feet.
 Parent Materials: Monzonite-derived fan alluvium. Organ alluvium in upper 38 cm, intermediate-age sediment from 38 to 64 cm, Jornada II alluvium below 64 cm.

Vegetation: Scattered snakeweed, *Yucca elata*, dropseed and fluffgrass.
 Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, December 10, 1968.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. A few coarse sand grains and fine monzonite pebbles are scattered over the surface.

A 68L1367 0 to 5 cm. Brown (7.5YR 5.5/4 dry) or dark brown (7.5YR 3.5/4 moist); sandy loam; massive and single grain; soft and loose; few roots; noncalcareous; abrupt smooth boundary.

B21t 68L1368 5 to 13 cm. Reddish-brown (5YR 5/4 dry, 5YR 3.5/4 moist); sandy loam; massive; soft; few roots; sand grains stained with clay; noncalcareous; clear wavy boundary.

B22t 68L1369 13 to 23 cm. Reddish-brown (5YR 5.5/4 dry; 5YR 3.5/4 moist); sandy loam; massive; slightly hard; few roots; sand grains stained with clay; noncalcareous except for lower inch, which effervesces weakly; clear smooth boundary.

Cca 68L1370 23 to 38 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist); heavy sandy loam; massive; slightly hard and hard; very few roots; scattered carbonate filaments; pebbles and sand grains thinly and discontinuously carbonate-coated; effervesces strongly; clear smooth boundary.

IIB21cab 68L1371 38 to 48 cm. Reddish-brown (6YR 5.5/4 dry, 6YR 4/4 moist); clay loam; weak medium subangular blocky; slightly hard; very few roots; scattered carbonate filaments; effervesces strongly; clear wavy boundary.

IIB22cab 68L1372 48 to 64 cm. Reddish-brown (6YR 5.5/4 dry, 6YR 4/4 moist); clay loam; weak medium subangular blocky; slightly hard and hard; very few roots; scattered carbonate filaments; insect burrows and burrow fillings, 2 to 10 mm. diameter; a few burrows have carbonate accumulations, forming nodules; a few reddish brown volumes in lower part; effervesces strongly; clear smooth boundary.

IIB1tb2 68L1373 64 to 86 cm. Yellowish-red (5YR 5/5 dry, 5YR 4/5 moist); heavy sandy loam; very weak medium and coarse subangular blocky; slightly hard and hard; no roots; few carbonate filaments; many sand grains coated with clay; few fine tubular pores; effervesces weakly; clear wavy boundary.

IIB2tb2 68L1374 86 to 104 cm. Red (2.5YR 4/6 dry, 2.5YR 3.5/6 moist); with lesser volumes of 5YR hue; heavy sandy clay loam; weak coarse prismatic breaking to weak medium subangular blocky; hard; common carbonate filaments; few carbonate nodules in lower part; very few fine tubular pores; few insect burrows, 2 to 10 mm. diameter; effervesces weakly and strongly; no roots; clear wavy boundary.

IIB21b2 68L1375 104 to 137 cm. Dominantly pink (7.5YR 8/4 dry, 7.5YR 6.5/4 moist); with some volumes slightly darker and lighter than this and a few volumes reddish-brown (5YR 5/4 dry); heavy sandy clay loam; very hard; weak medium and coarse subangular blocky; no roots; sand grains commonly separated by carbonate; effervesces strongly; clear wavy boundary.

IIB22tb2 68L1376 137 to 160 cm. (Offset sample of pipe with Bt material.) Dominantly red (2.5YR 4/6 dry and moist); some parts reddish-brown (5YR 5/4 dry); sandy clay loam; weak medium subangular blocky; hard; sand grains stained with clay; no roots; few weakly expressed clay skins along cleavage planes and weak ped faces; pipe a foot wide at top and extends at least 24 inches into the K horizon; noncalcareous.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Dona Ana SOIL Nos. S68NMex-7-6 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 6811377-6811387, 701073

GENERAL METHODS: 1A, 1H1b, 2A1, 2B

Depth (cm)	Horizon	Size class and particle diameter (mm)													3B1 Coarse fragments 2A1		
		Total			Sand						Silt				Vol. 250-2	Wt.	
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	< 0.074		19-5	5-2
Pct. of < 2 mm															% < 250	Pct < 19mm	
Carbonate Removed for < 2 mm.																	
0-8	A	67.7	20.8	11.5	0.5	11.4	11.4	25.8	18.6	11.5	9.3	45.2	49.1	41.6	-	-	-
8-18	B1	64.9	17.9	17.2	1.5	13.3	10.7	22.9	16.5	9.0	8.9	39.6	48.4	43.6	tr	tr	tr
18-38	B21ca	65.1	17.1	17.8	4.7	15.4	10.6	19.7	14.7	8.6	8.5	35.2	50.4	42.3	1	1	1
38-58	B22tca	62.8	16.8	20.4	5.4	14.4	9.5	18.9	14.6	9.4	7.4	35.4	48.2	44.5	2	3	1
58-71	K1	68.8	10.8	20.4	4.6	12.5	10.6	25.0	16.2	5.0	5.8	36.5	52.5	39.0	1	1	1
71-94	K21	72.0	10.9	17.1	5.1	13.0	10.3	25.6	18.0	6.5	4.4	41.0	54.0	36.3	1	1	1
94-127	K22	65.2	10.9	23.9	3.6	11.7	10.1	24.1	15.6	6.3	4.6	36.8	49.5	42.2	tr	tr	tr
127-160	K23cs	65.0	10.8	24.2	3.7	10.8	10.1	25.3	15.1	5.4	5.4	35.5	49.9	42.0	tr	tr	tr
160-203	C1ca	74.3	12.9	12.8	5.0	14.4	13.0	23.8	18.7	6.6	6.3	38.4	56.2	34.3	1	7	7
203-231	IIC2ca	80.0	7.8	12.2	14.2	26.1	14.7	15.8	9.3	4.0	3.8	21.5	70.7	24.5	10	9	8
231-249	IIC3	92.6	2.8	4.6	24.7	34.8	14.8	13.6	4.7	1.7	1.1	11.5	87.9	9.6	20	10	21

Depth (cm)	6A1a Organic carbon c/ Pct.	Nitrogen Pct.	C/N	6E1b Carbonate as CaCO ₃ Pct.	6F1a Gypsum Pct.	Bulk density			4D1 COLE	Water Content		4C1 WRD	Composition Whole Material e/				
						4A1d 1/3-Bar g/cc	4A1h Oven-Dry g/cc	4B1c 1/3-Bar Pct.		4B2 15-Bar Pct.	NONCARBONATE			Carbonate as CaCO ₃ Pct.			
											> 2mm Pct.		Sand Pct.		Silt Pct.	Clay Pct.	
0-8	0.31			2				1.4			5.5	-	67	20	11	2	
8-18	0.39			5				1.4			7.4	tr	62	17	16	5	
18-38	0.32			7				1.46	1.53	0.017	15.7	0.12	2	59	16	16	7
38-58	0.32			9				1.6			8.2	4	54	15	18	9	
58-71	0.21			49				1.6			7.4	2	35	5	10	48	
71-94	0.08			32				1.7			6.6	2	49	7	11	31	
94-127	0.15			52				1.7			7.3	tr	32	5	11	52	
127-160	0.12			34	-			1.7			10.1	tr	tr			34	
160-203	0.07			6	20			1.6			7.5d	2	54	9	9	6	
203-231				6	11			1.5			5.7d	17	55	5	8	5	
231-249				1	5			1.4			2.1d	31	63	2	3	1	

Depth (cm)	Extractable bases				5B1a CEC	5A6a NH ₄ OAc	Base saturation	
	6O4c	6P2a	6Q2a				Pct.	Pct.
	Ca	Mg	Na	K				
0-8	1.0	0.1	1.1		12.0			
8-18	1.3	0.1	0.9		12.6			
18-38	1.5	0.2	0.6		12.1			
38-58	2.1	0.6	0.6		12.9			
58-71	2.2	1.1	0.5		9.4			
71-94	1.9	1.0	0.4		6.8			
94-127	1.4	1.0	0.2		5.1			
127-160	2.1	0.7	0.4		7.6			
160-203	0.8	0.2	0.4		7.6			
203-231	0.6	0.1	0.4		7.7			
231-249	0.4	0.1	0.3		4.4			

a/ Pretreatment of < 2 mm with 0.1N NaOH.
 b/ Composite sample from an area 100 m east that contains more burrograss than at this pedon and no shrubs are present.
 c/ 3.6 kg/m² to 94 cm (Method 6A).
 d/ Adjusted downward on assumption gypsum lost 1 1/2 molecules of water on oven drying.
 e/ Inclusive of coarse fragments, carbonate and gypsum.
 f/ Except for B21ca, these are estimates.
 g/ No > 19 mm. Coarse fragments on carbonate-containing basis.

Soil: Dona Ana

Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic

Pedon No.: S68NMex-7-6

Location: In the NW 1/4 NE 1/4, Sec. 4, T21S, R2E, 0.2 mile east of Jornada road, Dona Ana County, New Mexico

Geomorphic Surface. Jornada I, in position transitional to basin floor component of Jornada I.

Land Form: Basin floor, level. Elevation: 4,320 feet.

Parent Materials: Upper Camp Rice basin fill, noncalcareous sand and rounded pebbles of mixed composition, with possible minor addition of locally derived (mixed volcanics and monzonite) alluvium.

Vegetation: Burro grass, tarbush.

Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, December 11, 1968.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Cracked into plates, 2-5 cm in diameter and 2-3 mm thick, that are readily removed with fingers. A layer of loose reddish sand, 1-2 mm thick, occurs discontinuously on the surface.

A 68L1377 0 to 8 cm. Pinkish-gray (7.5YR 6/2 dry) or dark brown (7.5YR 4/3 moist) with a few parts of 5YR hue occurring as discontinuous thin (<1 mm) lenses; heavy sandy loam; weak thin to coarse platy; soft; very few roots; effervesces strongly; abrupt smooth boundary.

B1 68L1378 8 to 18 cm. Pinkish-gray (7.5YR 6/3 dry) or dark brown (7.5YR 4/3 moist) light sandy clay loam; generally massive, with a few parts weak medium subangular blocky; slightly hard; few roots; few fine tubular pores; effervesces strongly; clear smooth boundary.

B21ca 68L1379 18 to 38 cm. Light brown (7.5YR 6/4 dry) or dark brown (7.5YR 4/4 moist) sandy clay loam; weak medium subangular blocky; slightly hard and hard; few roots; few fine and very fine tubular pores; few to common carbonate filaments on ped faces; common insect tunnels, 2-5 mm diameter, some empty and some loosely filled with fine earth; effervesces strongly; clear smooth boundary.

B22tca 68L1380 38 to 58 cm. Light reddish-brown (6YR 6/4 dry) or reddish-brown (6YR 4.5/4 moist) sandy clay loam; weak medium prismatic breaking to weak medium subangular blocky; very hard; very few roots; about 10 percent by volume of reddish-brown material of 5YR hue, apparent remnants of a formerly continuous Bt fabric, in which sand grains are discontinuously coated with silicate clay; few insect tunnels, 4-5 mm diameter, filled with dark fine earth; few carbonate filaments; few fine and very fine tubular pores; effervesces strongly; clear smooth boundary.

K1 68L1381 58 to 71 cm. Dominantly pinkish-white (7.5YR 8/2 dry) or pink (7.5YR 7/4 moist) with lesser amount of light brown (7.5YR 6/3 dry) or brown (7.5YR 5/3 moist) and a very few stainings of 5YR hue on peds; clay loam; weak medium subangular blocky; slightly hard and hard, with some parts loose; carbonate occurs as nodules and discontinuous cylindrical; fine earth occurs loosely between some nodular forms; effervesces strongly; clear smooth boundary.

K21 68L1382 71 to 94 cm. Pinkish-white (7.5YR 8/2 dry) or pink (7.5YR 7/4 moist) with lesser amount pink (7.5YR 7.5/4 dry) or light brown (7.5YR 6/4 moist) clay loam; hard; weak medium subangular blocky, with some weak platiness; no roots; carbonate occurs in nodular and platy forms; most sand grains separated by carbonate; surfaces of a few nodules are discontinuously stained with material of 5YR hue; effervesces strongly; clear wavy boundary.

K22 68L1383 94 to 127 cm. Pink (7.5YR 8/4 dry, 7/4 moist) and pinkish-white (7.5YR 9/2 dry) or pink (7.5YR 8/4 moist) clay loam; weak and moderate medium subangular blocky; peds are very and extremely hard, but may be removed with knife; no roots; carbonate occurs in nodular and cylindrical forms, in which sand grains are widely separated by carbonate; effervesces strongly; clear wavy boundary.

K23cs 68L1384 127 to 160 cm. Pink (7.5YR 8/3 dry) or light brown (7.5YR 6/4 moist) with a few parts pinkish-white (7.5YR 9/2 dry) or pink (7.5YR 8/4 moist); light clay loam; weak medium subangular blocky; very hard, and less hard in place than K22; no roots; carbonate occurs throughout as grain coatings and many grains are separated by carbonate; few gypsum filaments; effervesces strongly; clear wavy boundary.

C1eacs 68L1385 160 to 203 cm. Pink (7.5YR 8/4 dry) or light brown (7.5YR 6.5/4 moist), gypsum-cemented material; massive; very hard; no roots; many sand grains separated by gypsum; laterally grades into material with less gypsum; some grains carbonate-coated; clear wavy boundary.

IIC2cacs 68L1386 203 to 231 cm. Light yellowish-brown (10YR 6/4 dry) or dark brown (10YR 4/3 moist) light sandy loam; massive; soft; no roots; very few carbonate nodules; effervesces strongly; clear wavy boundary.

IIC3 68L1387 231 to 249 cm. Light gray (10YR 7/2 dry) or light brownish-gray (10YR 6/2 moist) gravelly sand; massive and single grain; soft and loose; no roots; scattered gypsum crystals; effervesces weakly.

SOIL CLASSIFICATION: Ustollic Calciorthid; fine-silty, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Reagan SOIL Nos. S68RMex-7-7 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 68L1388-68L1399

GENERAL METHODS: 1A, 1E1b, 2A1, 2B

Depth (cm)	Horizon	Size class and particle diameter (mm)													3A1		a/		
		Total			Sand						Silt				3A1a	3B1 Coarse fragments		2A2	
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	< 0.075		< 0.0002	> 2		19-5
Pct. of < 2 mm																			
Carbonate Removed																			
0-5	A	33.7	38.7	27.6	0.5	3.1	2.8	10.6	16.7	16.1	22.6	40.1	17.0	76.6	2.7				
5-23	B21	29.0	33.1	37.9	0.3	2.3	2.1	9.4	14.8	14.0	19.1	35.7	14.1	79.9	7.8				
23-41	B22	30.5	35.8	33.7	0.4	3.0	2.3	9.5	15.3	16.1	19.7	38.2	15.1	78.7	11.6				
41-58	B23	34.3	31.7	34.0	1.3	3.9	2.7	10.2	16.2	14.9	16.8	38.3	18.1	75.2	9.1				
58-86	K2	42.7	24.1	33.2	0.9	6.2	4.4	14.5	16.7	10.2	13.9	36.9	26.0	65.6	13.3				
86-122	Bca1	34.3	28.8	36.9	0.3	2.4	2.2	10.5	18.9	10.4	18.4	36.9	15.4	76.4	12.1				
122-145	Bca2	25.2	34.4	40.4	0.3	1.3	1.9	7.5	14.3	10.2	24.2	29.6	10.8	83.8	12.7				
145-180	C	45.5	22.7	31.8	0.4	4.8	6.6	17.0	16.8	7.8	14.8	35.0	28.7	63.9	9.5				
180-201	IIIB1teab	79.2	6.3	14.5	1.5	19.4	17.3	28.5	12.5	2.8	3.5	31.7	66.7	26.0					
201-216	IIIB2teab	66.2	10.3	23.5	1.4	10.9	13.0	28.0	13.0	6.3	4.0	35.0	53.2	39.8					
216-226	IIIB3teab	62.7	14.4	22.9	1.3	8.6	10.8	25.8	16.2	7.4	7.0	32.2	46.5	45.1					
226-244	IIK2b	66.2	10.9	22.9	2.2	9.3	12.4	29.1	13.2	5.7	5.2	36.0	53.0	39.5					
Carbonate Not Removed																			
0-5	A	29.8	40.0	30.2	0.8	2.7	2.4	9.0	14.8	15.8	24.2	37.0	14.9	79.4					
5-23	B21	23.5	36.7	39.8	0.5	1.9	1.7	7.6	11.8	12.6	24.1	29.9	11.7	83.7					
23-41	B22	23.7	38.7	37.6	0.3	2.4	1.8	7.0	12.2	14.4	24.3	31.5	11.4	83.7					
41-58	B23	25.1	35.3	39.6	1.2	3.3	2.2	7.3	11.1	12.3	23.0	28.5	14.0	81.3		tr	tr	tr	
58-86	K2	28.0	32.0	40.0	0.5	4.2	2.8	9.1	11.5	7.9	24.1	25.7	16.5	78.0		tr	tr	tr	
86-122	Bca1	23.7	36.7	39.6	0.2	1.6	1.5	6.9	13.4	8.7	28.0	27.3	10.3	84.0					
122-145	Bca2	18.2	42.1	39.7	0.1	0.9	1.3	5.0	10.9	10.1	32.0	24.5	7.2	88.9					
145-180	C	37.7	29.2	33.1	0.2	4.0	5.2	13.8	14.5	8.1	21.1	31.2	23.2	70.5					
180-201	IIIB1teab	74.6	9.0	16.4	1.2	14.1	14.8	29.6	15.0	4.0	5.0	36.9	59.6	31.5		tr	tr	tr	
201-216	IIIB2teab	63.1	12.6	24.3	1.0	8.8	11.9	27.6	13.8	6.4	6.2	36.4	49.3	43.2		tr	tr	tr	
216-226	IIIB3teab	50.6	20.2	29.2	1.7	8.7	8.9	19.5	11.8	6.7	13.5	30.2	38.8	55.2		tr	tr	tr	
226-244	IIK2b	37.5	26.0	36.5	1.4	4.9	6.9	16.4	7.9	4.5	21.5	22.1	29.6	66.2		tr	tr	tr	
Depth (cm)	Organic carbon c/	Nitrogen	C/N	3A1c Water Dispersible Clay b/	Carbonate as CaCO ₃		Bulk density		4D1 COLE	Water Content		4C1 WRD	Composition Whole Material e/						
					6E1b <2mm. <0.002	3A1a mm.	4A1d 1/3-Bar	4A1h Oven-Dry		4E1c 1/3-Bar	4B2 15-Bar		NONCARBONATE				Carbonate as CaCO ₃		
					Pct.	Pct.	g/cc	g/cc		g/cc	g/cc		Ret.	Ret.	Ret.	Ret.	Ret.		
0-5	0.75			22.7	11	5				10.7									
5-23	0.68			28.7	17	8				13.7									
23-41	0.46			25.7	22	10				11.5									
41-58	0.43			25.9	29	14				10.4									
58-86	0.21			29.9	35	18				7.4									
86-122	0.11			26.5	34	15				10.2									
122-145	0.08			15.6	31	12				11.9									
145-180	0.02			21.4	21	9				9.9									
180-201				14.1	5	2				4.9									
201-216				19.3	3	tr				8.0									
216-226				24.7	17	9				8.2									
226-244				8.2	44	23				7.6									

- a/ Pretreatment of < 2 mm with 0.1N NaOH.
- b/ Carbonate not removed.
- c/ 5.3 kg/m² to 86 cm (Method 6A).
- d/ Assumed for calculations.
- e/ Inclusive of coarse fragments, carbonate and gypsum.

Soil: Reagan
 Soil Classification: Ustollic Calciorthid; fine-silty, mixed, thermic
 Pedon No.: S68NMex-7-7
 Location: The NE 1/4 SE 1/4, Sec. 10, T21S, R2E, Dona Ana County, New Mexico
 Geomorphic Surface: Petts Tank. Land Form: Basin floor, level or nearly level. Elevation: 4,300 feet.
 Parent Materials: Petts Tank sediments derived from limestone, calcareous sandstone and shale; and from mixed igneous rocks (see Remarks). Vegetation: Burro grass.
 Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, December 12, 1968.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. A discontinuous layer of drying platelets rests loosely on the surface. A dark algal crust occurs discontinuously on the surface of the plates. Beneath the loose plates, the surface is weakly cracked into polygons 2-8 cm diameter. Polygon surfaces have a smooth appearance.

A 68L1388 0 to 5 cm. Pinkish-gray (7.5YR 6/2 dry) or brown (7.5YR 4.5/2 moist) clay loam; weak coarse platy; slightly hard; roots common; effervesces strongly; abrupt smooth boundary.

B21 68L1389 5 to 23 cm. Light brown (7.5YR 6/3 dry) or brown (7.5YR 4.5/3 moist) clay loam; very weak coarse prismatic, breaking to moderate medium subangular blocky; hard; roots common; cicada burrows about 1/4 inch diameter, some of which extend laterally for several inches; some of burrows are empty, others are filled with loose material which may be the same color as the horizon, or darker; burrows have smooth, thin linings; effervesces strongly; clear wavy boundary.

B22 68L1390 23 to 41 cm. Brown (7.5YR 5.5/4 dry, 4/4 moist) clay loam; very weak medium prismatic, breaking to moderate medium subangular blocky; hard; roots common; cicada burrows as above; effervesces strongly; clear wavy boundary.

B23 68L1391 41 to 58 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 4.5/4 moist) light silty clay loam; upper part weak medium subangular blocky; lower part massive; hard; few roots; few carbonate nodules in lower part; some empty and some filled cicada burrows about 1/4 inch diameter; clear smooth boundary.

K2 68L1392 58 to 86 cm. Pink (7.5YR 7/4 dry) and light brown (7.5YR 6/4 moist) with common nodules of pinkish-white (7.5YR 8/2 dry) or light brown (7.5YR 6.5/4 moist); light silty clay loam; very weak medium and coarse subangular blocky; slightly hard and hard; few fine roots; effervesces strongly; clear wavy boundary.

Bca1 68L1393 86 to 122 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5.5/4 moist) heavy clay loam; moderate fine and medium subangular blocky; slightly hard and hard; very few fine roots; very few carbonate nodules or cylindroids descending from K2; effervesces strongly; clear wavy boundary.

Bca2 68L1394 122 to 145 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) clay loam; weak medium and coarse prismatic breaking to weak medium subangular blocky; slightly hard; very few fine roots; few fine tubular pores; few apparent burrow fillings; shaped like cicada burrows; effervesces strongly; clear wavy boundary.

C 68L1395 145 to 180 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5.5/4 moist) with few parts reddish-brown (5YR 5/4 dry); sandy clay loam, generally massive with some parts weak medium subangular blocky; hard; very few fine roots; effervesces strongly; clear smooth boundary.

IIB1tcab(?) 68L1396 180 to 201 cm. Reddish-brown (5YR 5/4 dry, 4/4 moist) sandy loam, with some discontinuous volumes of light sandy clay loam; massive; slightly hard; no roots; much of fabric is similar to the IIB2tcab, but there are occasional volumes and lenses of finer material in the upper part; effervesces weakly and strongly; clear wavy boundary.

IIB2tcab 68L1397 201 to 216 cm. Yellowish-red (5YR 5/5 dry) or reddish-brown (5YR 4/4 moist) sandy clay loam; massive; hard; no roots; sand grains coated with clay; few very fine tubular pores; few carbonate filaments and carbonate-coated grains; some parts noncalcareous, some parts effervesce weakly; clear smooth boundary.

IIB3tcab 68L1398 216 to 226 cm. Light reddish-brown (6YR 6/4 dry) or reddish-brown (6YR 5/4 moist) sandy clay loam; massive; hard; no roots; few carbonate nodules; effervesces strongly; abrupt smooth boundary.

IIR2b 68L1399 226 to 244 cm. White (7.5YR 9/4 dry) or pink (7.5YR 7/4 moist) clay loam; generally weak medium platy, some parts massive; very hard; no roots; darker colored material between some plates; effervesces strongly.

Remarks: The Bca1 and Bca2 notations designate two horizons that have structural development attributed to an early period of pedogenesis.

Petts Tank sediments (including "silt zone" in lower part) from 0 to 180 cm; possible intermediate age sediment from 180 to 201 cm; Upper Camp Rice basin fill below 201 cm.

Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic
 Series: Bucklebar
 Pedon No.: S68NMex-7-8
 Location: NE 1/4 Sec. 23, T23S, R1W, south bank of trench, Las Cruces Municipal Airport in pipe about 25 feet east of S61NMex-7-7.
 Geomorphic Surface: La Mesa (upper).
 Land Form: Relict basin floor, nearly level.
 Elevation: 4,400 feet.
 Parent Materials: Upper Camp Rice, basin-floor sediments consisting primarily of noncalcareous sand, with a few pebbles of mixed origin.
 Vegetation: Snakeweed, *Yucca elata*, mesquite, fluffgrass.
 Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, December 13, 1968
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Covered by spoil pile.

A 68L1400 0 to 5 cm. Reddish-brown (5YR 4.5/4 dry) and dark reddish-brown (5YR 3/4 moist) fine sandy loam; weak medium platy; slightly hard; no roots; noncalcareous; abrupt smooth boundary. (Not sampled because the horizon is overlain and disturbed by spoil pile. Sampled offset.)

Blt 68L1401 5 to 30 cm. Yellowish-red (5YR 4.5/6 dry) and dark reddish-brown (5YR 3.5/4 moist) fine sandy loam; weak very coarse prismatic, massive internally; hard; few roots; few insect burrows; noncalcareous; clear wavy boundary.

B2ltca 68L1402 30 to 48 cm. Yellowish-red (5YR 5.5/6 dry, 4/6 moist) and red (3YR 4.5/5 dry, 3/5 moist) sandy clay loam; weak very coarse prismatic breaking to weak coarse subangular blocky; hard; few roots; common fine carbonate filaments; effervesces strongly, clear wavy boundary.

B22tca 68L1403 48 to 79 cm. Red (3YR 4.5/5 dry, 3/5 moist) reddish-brown (5YR 5.5/4 dry, 4/4 moist) sandy clay loam; weak coarse prismatic breaking to moderate medium subangular blocky; hard; 10-20 percent 1/4 to 1/2 inch nonindurated carbonate nodules (segmented cylindroids); effervesces strongly; gradual wavy boundary.

B23tca 68L1404 79 to 114 cm. Yellowish-red (5YR 5.5/6 dry, 4/6 moist), heavy fine sandy loam; weak coarse and medium subangular blocky; hard; about 20 percent red (3YR 4.5/5 dry, 3/5 moist) blebs; about 5 to 10 percent carbonate nodules and vertical veins that occur as prism coatings; some parts effervesce weakly; some strongly calcareous and a few parts noncalcareous; abrupt smooth boundary.

K&B 68L1405 114 to 157 cm. About 70 percent of material with K-fabric, pink (7.5YR 8/4 dry) or light brown (7.5YR 6/4 moist) heavy sandy loam, and 30 percent of material with Bt-like fabric, reddish-brown (5YR 5.5/5 dry, 4/4 moist) sandy loam, occurring in nodular and cylindrical form, with abrupt boundaries to adjacent K-fabric; generally breaks out as massive; hard; no roots; some of material with reddish-brown, Bt fabric is noncalcareous; some parts effervesce weakly and the remainder effervesces strongly; clear wavy boundary.

K&B 157 to 188 cm. As above, but with about 65 percent of K fabric, 20 percent B fabric and about 15 percent of calcareous, C-like material which is light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) heavy sandy loam; massive; slightly hard and hard; no roots; most of horizon effervesces strongly, with some reddish brown volumes noncalcareous.

Clay Mineralogy, Method 7A2. Blt horizon. The clay contains moderate amounts of montmorillonite and mica plus a small amount of kaolinite. The montmorillonite is poorly ordered. K&B horizon. The clay contains a moderate amount of montmorillonite, plus small amounts of mica, kaolinite, and a chlorite-like mineral that resists collapse at 300° C. but does collapse at 500° C. Sepiolite was not identified in either horizon.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

SOIL Berino SOIL Nos. S68Rex-7-9 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 69L253-69L264, 70L987, 70L988

GENERAL METHODS: 1A, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)													3A1b Fine Clay <0.002 %	3B1 Coarse fragments Vol. % 250-2 <250	2A2 Pct of <19 mm.		
		Total					Sand											Silt	
		Sand (2-0.05) (0.05- 0.002)	SR (= 0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02 (0.02- 0.002)	Int. III (0.2-0.02)	Int. II	(2-0.1)	<0.074					
Carbonate Not Removed - 3A1 a, b																			
0-3	A2	62.4	20.7	16.9	1.1	5.1	7.8	29.8	18.5	7.1	13.6	43.9	43.9	46.5	3.5	-	-		
3-13	B21t	51.7	18.7	29.6	1.4	3.8	6.1	24.0	16.3	6.9	11.8	38.0	35.3	56.5	8.4	-	-		
13-28	B22t	60.0	14.7	25.3	6.0	7.5	7.7	24.7	14.2	6.2	8.5	35.3	45.8	47.0	11.1	2	2		
Carbonate Removed - 3A1 a, b																			
28-43	B23ta	65.6	12.5	21.9	3.7	6.8	9.3	30.5	15.3	6.7	5.8	39.9	50.3	41.4	8.6	4	4		
43-61	B2	63.7	8.8	27.5	2.8	6.4	9.4	31.2	13.8	5.1	3.7	37.2	49.9	42.1	12.3	1	1		
61-84	Bca	70.5	8.7	20.8	6.2	8.3	9.9	31.7	14.3	4.9	3.8	38.1	56.1	35.7	9.1	1	1		
84-107	K	72.0	8.7	19.3	4.3	6.8	9.4	35.1	16.4	4.8	3.9	42.5	55.6	35.2	8.6	2	2		
107-132	K	79.9	6.8	13.3	6.9	8.8	10.8	37.5	16.0	3.6	3.2	41.6	63.9	26.6	6.1	3	3		
132-157	C1ca	83.7	6.2	10.1	6.6	7.1	10.5	41.0	18.5	3.6	2.6	46.8	65.2	23.5	4.0	5	5		
157-185	C2ca	83.8	6.4	9.8	5.3	8.2	11.9	42.0	16.4	3.8	2.6	44.8	67.4	22.9	4.4	4	3		
Carbonate Not Removed - 3A1 a, b																			
0-8	C f	83.8	8.0	8.2	2.8	13.5	12.4	34.5	20.6	5.2	2.8	46.7	63.2	26.3		tr	tr		
8-14	A2 f	65.0	18.4	16.6	1.5	5.3	7.9	30.9	19.4	7.5	10.9	46.2	45.6	44.8		tr	tr		
0-36	B2g	55.6	18.5	25.9	3.0	4.7	7.1	26.1	14.7	8.8	9.7	39.6	40.9	51.2					
0-36	B2g	61.7	15.0	23.3	3.5	5.9	8.5	28.5	15.3	7.8	7.2	40.6	46.4	45.2					
Depth (cm.)	6A1a Organic carbon h, i Pct.	Nitrogen Pct.	C/N	6C2a Carbon as CaCO ₃ Pct.	Ext. Iron as Fe Pct.	Bulk density			4D1 COLE	Water content			Composition Whole Material d						
						4A1d 1/3- Bar g/cc	4A1h Oven- Dry g/cc	4A1i g/cc		4B1c 1/3- Bar Pct.	4B1d Pct.	4B1e Pct.	NONCARBONATE			Carbonate as CaCO ₃ Pct.			
0-3	0.29			tr(s)	0.9														
3-13	0.32			tr(s)	1.0														
13-28	0.36			tr	1.0														
28-43	0.28			3	0.9														
43-61	0.21			19	0.5														
61-84	0.11			12	0.5														
84-107				13	0.4														
107-132				11	0.4														
132-157				7	0.6														
157-185				4	0.6														
0-8				tr(s)	0.6														
8-14				tr(s)	0.7														
0-36	0.35 g																		
0-36	0.31 h																		
Depth cm	Extractable bases				5A6a CEC NH ₄ OH meq/100 g	Base saturation													
	602d Ca	6P2a Mg	6Q2a Na	6Q2a K		Pct.	Pct.												
0-3	2.8	0.2	1.3	14.1															
3-13	3.6	0.2	1.4	19.5															
13-28	3.5	0.2	1.1	16.8															
28-43	3.6	0.2	0.9	13.1															
43-61	5.0	0.3	0.8	13.0															
61-84	5.1	0.4	0.7	11.9															
84-107	4.8	0.4	0.7	11.1															
107-132	4.1	0.4	0.5	8.2															
132-157	3.9	0.3	0.4	6.6															
157-185	3.8	0.1	0.3	6.4															
Depth (in.)	<p>a. Pretreatment of < 2 mm. with 0.1N NaOH.</p> <p>b. 20-gram sample for < 2 mm.</p> <p>c. Carbonate removed for all horizons.</p> <p>d. Inclusive of coarse fragments, carbonate, and gypsum.</p> <p>e. Little or no > 19 mm.</p> <p>f. See morphological description.</p> <p>g. Composite of 12 samples taken with barrel auger from barren area just north of west end of trench. 2.0 kg/m² (Method 6A).</p> <p>h. Composite from area just north of east end of trench in area with scattered clumps of tobaso. 1.8 kg/m² (Method 6A).</p> <p>i. 3.2 kg/m² to 84 cm (Method 6A).</p> <p>j. Assumed bulk density of moist fine-earth fabric for calculations.</p>																		

Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic

Series: Berino

Pedon No.: S68NMex-7-9

Location: In the NE 1/4 SW 1/4, Sec. 26, T21S, R2E, about 110 feet north of S68NMex-7-5, Dona Ana County, N. M.

Geomorphic Surface: Jornada II.

Land Form: Alluvial-fan piedmont sloping 1 percent to the west.

Elevation: About 4,310 feet.

Parent Materials: Jornada II alluvium derived from monzonite.

Vegetation: Barren where complete pedon was sampled; the pedon from which the two offset samples were taken had tobosa and a few burrograss clumps.

Collected by: L. H. Gile, February 25, 1969.

Described by: L. H. Gile.

Soil Surface. Smooth and barren; cracked into polygons 5 to 10 cm. diameter. A very few sand grains and fine pebbles are scattered over the surface.

A2 69L253 0 to 3 cm. Brown (7.5YR 5.5/3 dry) or dark brown (7.5YR 4/3 moist) heavy sandy loam; weak medium platy; soft; very few roots; noncalcareous; abrupt smooth boundary.

B21t 69L254 3 to 13 cm. Reddish-brown (5YR 5/4 dry, 5YR 3.5/4 moist) sandy clay loam; weak coarse prismatic breaking to weak medium subangular blocky; slightly hard; few roots; pebbles and sand grains stained with clay; a few termite tunnels, 1 to 2 cm. diameter, with smooth linings and occasional termites; noncalcareous; clear smooth boundary.

B22t 69L255 13 to 28 cm. Reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) sandy clay loam; weak coarse prismatic breaking to weak medium subangular blocky; hard; very few roots; sand grains and the few pebbles are stained with clay; noncalcareous; clear wavy boundary.

B23tca 69L256 28 to 43 cm. Reddish-brown (5YR 5.5/4 dry, 5YR 4.5/4 moist) sandy clay loam; weak coarse prismatic breaking to weak medium subangular blocky; very hard; very few roots; some insect burrow fillings, 1 to 2 cm. diameter; some sand grains and pebbles stained with clay; very few carbonate nodules; some fine pebbles thinly carbonate-coated; few very fine tubular pores; effervesces strongly; clear wavy boundary.

K2 69L257 43 to 61 cm. Dominantly pink (7.5YR 8/4 dry) or light brown (7.5YR 6/5 moist) with smaller amount light brown (7.5YR 6/4 dry) and some colors intermediate between the above; sandy clay loam; mainly weak medium subangular blocky, with some massive parts; breaks out as clusters of nodules and massive parts, 2 to 5 cm. diameter; nodular parts hard and very hard, massive parts soft and slightly hard; very few roots; few insect burrow fillings, 1 to 2 cm. diameter; effervesces strongly; clear wavy boundary.

Bca 69L258 61 to 84 cm. Dominantly light reddish-brown (6YR 6/4 dry) or reddish-brown (6YR 5/5 moist) light sandy clay loam; massive; hard; very few fine roots; few nodules of white (10YR 9/2 dry); common very fine tubular pores; effervesces strongly; clear wavy boundary.

K 69L259 and 69L260 84 to 107 and 107 to 132 cm. Dominantly (about 90 percent) pink (7.5YR 7.5/4 dry) or light brown (7.5YR 6/4 moist) with few nodules white (7.5YR 9/2 dry) and a very few volumes, reddish-brown (5YR 5/4 dry) sandy clay loam; massive; extremely hard; very few roots; few fine and very fine tubular pores; effervesces strongly; abrupt wavy boundary.

Clca 69L261 132 to 157 cm. Light brown (7.5YR 6.5/4 dry) or brown (7.5YR 5.5/4 moist) sandy loam; massive; hard and slightly hard; no roots; very few carbonate nodules; scattered pebbles, in strata that appear little disturbed, have partial carbonate coatings; laterally this horizon has tongues of parts like the overlying horizon; effervesces strongly; abrupt wavy boundary.

C2ca 69L262 157 to 185 cm. Light reddish-brown (6YR 6/4 dry) or reddish-brown (5YR 5/4 moist) sandy loam; massive; soft; no roots; a very few carbonate nodules; some weak stratification; both Clca and C2ca have occasional pockets and lenses a few cm. diameter with fine gravel, but overall horizon contains less than 10 percent gravel (fine); one lens of 5YR hue that is distinctly redder and of higher chroma than adjacent horizons (5YR 5.5/5 dry) is about an inch thick in the upper part of this horizon and rises to the west; effervesces strongly.

The pedon described above occurs in one of the common barren areas which are interspersed among the vegetated zones. At the sample site, the western part of the pit is cut in one of the barren spots and the eastern part is cut in a tobosa-burrograss stand. A thin, but distinct A2 horizon is preserved beneath a youthful sandy deposit in the vegetated zone. Offset samples of the youthful deposit and the A2b were taken for purposes of comparison, three feet east of the sampled pedon.

C 69L263 0 to 8 cm. Reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) loamy sand; massive; soft; roots common; sandy strata are apparent in places, but in other places have been displaced by roots; noncalcareous; abrupt smooth boundary.

A2 69L264 8 to 14 cm. Pinkish-gray (7.5YR 6/3 dry) dark brown (7.5YR 4/3 moist) heavy sandy loam; a few parts reddish-brown (5YR 5/4 dry) weak fine and medium platy; slightly hard; few roots; noncalcareous; abrupt smooth boundary to underlying B21t sampled laterally.

Clay Mineralogy (Metnod 7A2: B22t, Bca, and C2ca horizons. Clay mineral suites are similar throughout--small amounts of mica and kaolinite plus a small component of poorly ordered montmorillonite. Treatment of the B22t sample with 0.1N NaOH had little effect on the crystalline clays. Buffer treatment of the Bca and C2ca samples increased apparent crystalline quality of clays--probably because of carbonate removal.

SOIL CLASSIFICATION: Ustollic Haplargid; fine, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Headquarters, clayey subsoil variant SOIL No. S69NMex-7-8 LOCATION Dona Ana County, New Mexico

phase Lincoln, Nebraska LAB. Nos. 69L1147-69L1156

SOIL SURVEY LABORATORY
GENERAL METHODS: 1A, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Size class and particle diameter (mm)											3A1					
		Total				Sand				Silt			3A1a	3B1 Coarse fragments	A2			
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)				(2-0.1)	< 0.074	< 0.0002
Pct. of < 2 mm																		
Carbonate Removed																		
0-6	C	42.3	35.5	22.2	0.0	0.8	2.2	13.5	25.8	19.1	16.4	54.3	16.5	73.6	8.7	-	-	-
6-10	A2	39.5	32.9	27.6	0.2	0.8	2.5	15.3	20.6	14.3	18.6	45.5	18.9	72.0	12.0	tr	-	tr
10-23	B2lt	25.9	27.9	46.2	0.1	0.5	2.0	12.4	10.8	6.2	21.7	25.6	15.0	79.3	24.3	-	-	-
23-49	B22t	19.3	28.7	52.0	0.0	0.4	1.5	9.2	8.2	5.9	22.8	20.5	11.1	84.6	24.2	-	-	-
49-79	B23t	15.6	36.1	48.3	0.0	0.3	1.0	6.9	7.5	9.4	26.7	21.8	8.1	88.3	19.3	-	-	-
79-89	Cca	6.4	63.9	29.7	0.0	0.1	0.2	0.8	5.3	34.9	29.0	40.7	1.1	98.1	18.6	-	-	-
89-107	B21cab	3.9	47.8	48.3	0.0	0.0	0.2	0.8	2.8	10.0	37.8	13.5	1.1	97.9	-	-	-	-
107-125	B22cab	2.7	47.2	50.1	0.0	0.0	0.1	0.7	1.9	11.8	35.4	14.2	0.8	98.6	-	-	-	-
125-138	IIC	44.9	38.3	16.8	0.2	0.6	0.8	6.4	36.9	29.0	9.3	70.8	8.0	80.3	-	-	-	-
0-38	composite a/														tr	-	tr	
Depth (cm.)	6A1a Organic carbon	Nitrogen	C/N	6C2a Ext. Iron as Fe	6E2a Carbonate as CaCO ₃	Bulk density			4D1 COLE	Water content			4C1 WRD	Composition Whole Soil				
						4A1d 1/3-Bar	4A1h Oven-Dry	g/cc		4E1c 1/10-Bar	4E1c 1/3-Bar	4B2 15-Bar		Noncarbonate			Carbonate as CaCO ₃	
						g/cc	g/cc	Pct.		Pct.	Pct.	Sand		Silt	Clay			
0-6	1.95			tr(s)			1.4c							42	36	22	tr(s)	
6-10	1.26			tr(s)			1.4c							39	33	28	tr(s)	
10-23	0.86			2			1.5c							26	27	45	45	
23-49	0.54			3			1.47	1.74	0.058	32.1	29.8	16.1	0.21	19	28	50	3	
49-79	0.54			4			1.45	1.73	0.061	33.6	31.1	16.6	0.22	15	35	46	4	
79-89	0.49			5			1.5c					11.7		6	61	28	5	
89-107	0.42			7			1.5c					16.1		4	44	45	7	
107-125	0.37			5			1.5c					16.8		3	45	47	5	
125-138	0.12			2								7.0		44	38	16	2	
0-38	0.78			3								15.3						
Depth (cm.)	5B3a 6N4c Ca	Extractable bases			5B4a 6Q2a Sum	Cat. Exch. Cap.		8E1 Resistivity ohms-cm	8A1a Elec. Cond. cm	8D5 Total Sol. Salts ppm	5D2 Exch. Na Pct.	6F1a Sol. Na me/l	8A1 Water at Sat. Pct.	6F1a Gypsum Pct.	Base saturation			
		6O4c Mg	6P2a Na	6Q2a K		5A6a NH ₄ OAc	Base saturation											
		mg/100 g	mg/100 g	mg/100 g		mg/100 g	Pct.											
0-6		3.0	0.0	2.2			23.2											
6-10		2.9	0.0	1.9			22.4											
10-23		3.3	0.1	2.4	26.0		27.3											
23-49		5.6	0.7	1.7			28.7											
49-79		5.1	2.0	1.5	31.1		28.2	1220	1.02	320	6	6.4	48.6					
79-89		5.3	2.4	0.9			22.1	870	2.22	680	8	14.5	46.8					
89-107		7.2	4.2	1.3	39.3		29.5	370	6.02	2800	8	33.8	55.5					
107-125		7.2	4.6	1.4	43.7		29.3	490	5.93	2400	9	35.5	53.5					
125-138		3.6	1.3	0.5			11.9	1600	1.71	360	8	11.6	30.9					
0-38																		
Depth (cm.)	Ratios to Clay 8D2			Ext. Iron	15-Bar Water	NH ₄ OAc CEC												
0-6				0.46														
6-10				0.37														
10-23				0.32	0.59													
23-49				0.31														
49-79				0.34	0.58													
79-89				0.39														
89-107				0.33	0.61													
107-125				0.34	0.58													
125-138				0.42														
0-38																		

- a/ 12 auger holes, 8 cm. diameter, spaced 125 cm. apart were composited from a bare area 40 m. to the north. 4.1 kg/m² (Method 6A).
- b/ 10 kg/m² to 107 cm (Method 6A).
- c/ Assumed for calculations.

Soil Classification: Ustollic Haplargid; fine, mixed, thermic
 Series: Headquarters, clayey subsoil variant.
 Pedon No.: S69NMex-7-8
 Location: SE 1/4 SW 1/4, Sec. 26, T21S, R2E, 250 feet south of pedon S68NMex-7-4, Dona Ana County, New Mexico.
 Geomorphic Surface: Organ.
 Land Form: Broad drainageway sloping 1 percent to the west.
 Elevation: 4,320 feet.
 Parent Materials: Organ alluvium (drainageway facies) derived from monzonite (see Remarks).
 Vegetation: Tobosa. Sampling site is in a fairly continuous tobosa strip ranging from about 5 to 15 feet wide, with barren strips and patches on either side; the strips are commonly oriented approximately at right angles to the drainage.
 Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, November 21, 1969.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. A fairly dense stand of tobosa clumps, with occasional barren spots between clumps, ranging from 10 to 40 cm. wide.

C 69L1147 0 to 6 cm. Dominantly brown (10YR 5.5/3 dry) or dark brown (10YR 3.5/3 moist), loam; a few strata of 7.5YR hue; weak thin and very platy; stratified; soft and slightly hard; few roots; effervesces weakly; abrupt smooth boundary.

A2 69L1148 6 to 10 cm. Light brownish-gray (10YR 6.5/2 dry) or dark brown (10YR 4/3 moist) loam; some parts massive, other parts are weak medium and thin platy; few roots; hard; some parts effervesce weakly and others are noncalcareous; abrupt smooth boundary.

B21t 69L1149 10 to 23 cm. Brown (7.5YR 4.5/4 dry) or dark brown (7.5YR 3.5/4 moist) light clay; weak very coarse prismatic, generally massive internally but with some weak medium blocky; very hard; roots common; effervesces strongly; clear wavy boundary.

B22t 69L1150 23 to 49 cm. Brown (7.5YR 5/3 dry) or dark brown (7.5YR 4/3 moist) clay; weak very coarse prismatic, breaking to weak medium and coarse, angular and subangular blocky; very hard; few roots; some peds have smooth, weakly reflective surfaces and some have slickensides; prisms range from about 10 to 20 cm. wide; cracks are most apparent in this horizon and range from about 1 mm. to 2 cm. wide; effervesces strongly; clear wavy boundary.

B23t 69L1151 49 to 79 cm. Brown (7.5YR 5/4 dry) or dark brown (7.5YR 4/3 moist) clay; weak very coarse prismatic breaking to weak coarse angular blocky; in places the blocks break into coarse plates; very hard; few roots; edges of wedges and plates are apparent in faces of broken fragments; many of these wedges and plates adhere to each other; they are horizontal or nearly so, and range from about 1/2 to 2 cm. wide; effervesces strongly; clear wavy boundary.

Cca 69L1152 79 to 89 cm. Pale brown (10YR 6/3 dry) or brown (10YR 4.5/3 moist) silty clay loam; weak coarse prismatic, breaking to weak coarse platy; plates are a primary feature of the materials, and outlines of sedimentary strata can still be seen; hard; a few roots; common fine and very fine tubular pores; the horizon breaks readily into plates ranging from about 1/2 to 1 cm. diameter; common carbonate filaments on surfaces of plates and prisms; effervesces strongly; few roots; clear smooth boundary.

B21cab 69L1153 89 to 107 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) with some coatings and fillings of reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) silty clay loam; weak medium prismatic breaking to weak medium subangular blocky; hard; common carbonate filaments; common fine and very fine tubular pores; effervesces strongly; clear wavy boundary.

B22cab 69L1154 107 to 125 cm. Dominantly light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) with coatings and fillings of reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) silty clay loam; weak medium prismatic breaking to weak medium subangular blocky; very hard; very few roots; a few patches and filaments of gypsum on ped faces; effervesces strongly; abrupt smooth boundary.

IIC 69L1155 125 to 138 cm. Light brown (7.5YR 6/5 dry) or brown (7.5YR 4.5/4 moist) fine sandy loam; massive; slightly hard; no roots; few fine tubular pores, some of which are lined with clay, darker than above; effervesces strongly.

Remarks: The C horizon (0 to 6 cm.) is interpreted as a youthful deposit that partially buried the tobosa, then was eroded between the clumps. A buried soil associated with the Jornada II surface occurs below 138 cm.

Micromorphology, Method 4E1b. The B21t horizon was examined in thin section. The sand grains are set in a matrix that shows relatively uniform interference color with no evidence of long-range stress orientation of clay. Particles of carbonate < 20 microns across are fairly uniformly distributed; their high birefringence may largely mask interference color of the oriented silicate clay. Some parts contain little carbonate and the preferred orientation of the silicate clay is apparent. Most sand grains have thin coatings of oriented silicate clay that are fairly continuous. Some sand grains have relatively thick, patchy coatings of reddish-brown clay. These grains may have been deposited with these coatings; their origin may be the B horizon of a former soil. Occasional grains of rather fresh biotite are present. Segregation of hydrous iron oxides into sand-size diffuse volumes is fairly pronounced. Discrete reddish-brown particles < 20 microns diameter of high relief are numerous.

SOIL CLASSIFICATION: Ustollic Haplargid; loamy-skeletal, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Coxwell, shallow variant SOIL Nos. STORMex-7-1 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 70L241-70L246

GENERAL METHODS: 1A, 1B1b, 2A1, 2B

Depth (cm.)	Horizon	Soil class and particle diameter (mm)													3A1b		3B2		2A2	
		Total			Sand					Silt					3A1b <0.0002	3B2 Vol.	20-5	5-2		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (= 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	0.02-0.002	0.2-0.02	(2-0.1)	<0.074					250-2	Pct. of 20-5
0-5	A2	72.4	18.1	9.5	8.3	11.3	9.4	24.0	19.4	13.5	4.6	47.6	53.0	38.0	4.7	20	19	16		
5-11	B1t	67.3	17.4	15.3	12.1	11.3	8.4	20.2	15.2	12.1	5.3	39.5	52.0	40.5	7.5	20	12	18		
11-21	B2t	61.7	14.5	23.8	15.0	13.1	7.8	14.7	11.1	9.0	5.5	28.6	50.6	44.5	17.3	45	34	28		
21-52	B3tca																			
52-93	B1tca																			
93-118	B2t																			
Depth (cm.)	6A1a Organic carbon a/ Pct.	Nitrogen Pct.	C/N	6B2a Carbonate as CaCO ₃ Pct.	Bulk density		Water content			pH										
					b/		4B2 15- Bar			8C1a (1:1)										
					g/cc	g/cc	Pct.	Pct.	Pct.	Pct.	Pct.									
0-5	0.41			-(a)		1.4				3.6		7.2								
5-11	0.52			-(a)		1.4				5.4		7.6								
11-21	0.57			tr(a)		1.5				8.8		7.7								
21-52	0.15					1.8														
52-93	0.04																			
93-118																				
Depth (cm.)	5B4a Extractable bases					Cat. Exch. Cap.		Base saturation												
	6B2e Ca	6Q2d Mg	6P2a Na	6Q2a K	Sum	5A6a NH ₄ OAc														
	mg/100 g						Pct.	Pct.												
0-5	6.1	1.4	0.1	0.6	8.2	8.0														
5-11	10.1	1.8	0.1	0.5	12.5	11.6														
11-21	14.2	2.4	0.1	0.5	17.2	15.3														
21-52																				
52-93																				
93-118																				
Depth (cm.)	Ratios to Clay SDI																			
	Ext. Iron	15-Bar Water	NH ₄ OAc CEC																	
0-5		0.38	0.84																	
5-11		0.35	0.76																	
11-21		0.37	0.64																	
21-52																				
52-93																				
93-118																				

a/ 1.9 kg/m² to 52 cm (Method 6A).

b/ Bulk densities of moist fine-earth fabric (upper three horizons) and of whole soil (fourth horizon) assumed for calculations.

Soil Classification: Ustollic Haplargid; loamy-skeletal, mixed, thermic
 Series: Coxwell, shallow variant
 Pedon No.: S70NMex-7-1
 Location: In the NE 1/4 SW 1/4, Sec. 36, T21S, R3E, 150 feet east of road, Dona Ana County, New Mexico.
 Geomorphic Surface: Jornada (undifferentiated) pediment.
 Land Form: Crest of slight ridge sloping about 5 percent to the west.
 Elevation: 5,240 feet.
 Parent Materials: Monzonite bedrock.
 Vegetation: Snakeweed, *Yucca baccata*, pricklypear, fluffgrass, blue grama, cholla, beargrass.
 Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, April 6, 1970.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. About 30 percent covered with monzonite and dike rock fragments (including some quartz) ranging from about 1/2 to 3 cm. diameter.

A2 70L241 0 to 5 cm. Brown (7.5YR 5/3 dry) or dark brown (7.5YR 3.5/3 moist) sandy loam; massive; slightly hard; few roots; noncalcareous; abrupt smooth boundary.

B1t 70L242 5 to 11 cm. Reddish-brown (6YR 5/4 dry) or dark reddish-brown (6YR 3.5/4 moist) heavy sandy loam; massive; slightly hard; roots common; coatings of reddish-brown silicate clay on sand grains and fine pebbles; noncalcareous; clear smooth boundary.

B2t 70L243 11 to 21 cm. Red (2.5YR 4/6 dry) or dark red (2.5YR 3.5/6 moist) gravelly sandy clay loam; moderate fine and very fine crumb; slightly hard to very hard; roots common; reddish clay coatings on gravel fragments; breaks out as aggregates of fine earth and bedrock fragments mainly less than 3 cm. in diameter; the reddish color has permeated many of the bedrock fragments; a few fragments are white (10YR 8/2 dry), light yellowish-brown (10YR 6/4 dry), pink (7.5YR 7/4 dry) and dark grayish-brown (2.5Y 4/2 dry); noncalcareous; clear wavy boundary.

B3tca 70L244 21 to 52 cm. Dominantly white (10YR 8/2 dry) or very pale brown (10YR 7/3 moist) and dark grayish-brown (2.5Y 4/2 dry) monzonite bedrock that is easily removed with a knife; massive; horizon has cracks, most of which are in two major directions, nearly vertical and horizontal; the nearly vertical ones are about 2 to 10 cm apart, and quite continuous vertically, extending to the bottom of the pit; these cracks are 1/2 to 1 mm wide and are discontinuously filled with fine earth; the horizontal cracks range from about 1/2 cm to about 10 cm apart; some of the thinner rock material between cracks is platy or blocky, with most plates and blocks being 1/2 to 2 cm thick; a smaller number of cracks are diagonal, with directions between the first two; most bedrock fragments extremely hard, a few are hard or very hard; interiors of some fragments stained red (2.5YR 4/6) or reddish brown (5YR and 2.5YR 4/4 and 5/4 dry); carbonate filaments on surfaces of some fragments; a few roots between fragments; surface of some fragments effervesces strongly, interiors noncalcareous; gradual irregular boundary.

R1tca 70L245 52 to 93 cm. Dominantly white (10YR 9/2 dry, 10YR 8/2 moist) with some dark grayish-brown (2.5Y 4/2 dry) monzonite bedrock; the two major directions of cracks in the B3tca horizon also are apparent here; the nearly vertical ones are most distinct and common, ranging from about 2 to 10 cm apart; the cracks are only about 1/2 mm wide and the material is very tightly fitted; these cracks are continuous with and descend from cracks in the overlying horizon; the horizontal cracks are about 7 to 20 cm apart, and tend to be somewhat wider than the vertical cracks, ranging from about 1 to 3 mm wide; massive; extremely hard; very few roots; the surfaces are stained with reddish brown clay, and there are also scattered carbonate filaments, and a few black filaments and coatings; surfaces of fragments generally noncalcareous but in places effervesce strongly; gradual wavy boundary.

R2t 70L246 93 to 118 cm. Dominantly white (10YR 9/2 dry, 10YR 8/2 moist) with some dark grayish-brown (2.5Y 4/2 dry) monzonite bedrock, with smaller amount stained reddish brown than above; organization controlled by bedrock and by the cracks; the bedrock is massive; extremely hard; very few roots; some bedrock surfaces stained reddish brown; surfaces along a few cracks effervesce weakly, with areas between them noncalcareous.

Sand mineralogy, Method 7B1.

The very fine sand (0.05-0.1 mm) and the 2-0.1 mm from the B2t horizon were examined. A regular grain mount was prepared of the former. Thin sections were prepared of the latter. A wafer of the 2-0.1 mm was prepared, broken into fragments which were remounted. In this manner, orientation by size and shape was randomized. The point or line intercept procedure was used. The mica in the very fine sand was adjusted downward by 80 percent relative to correct for the platy shape of the grains, thereby making the results more nearly volume percentages.

The very fine sand contains 35 percent quartz 45 percent feldspar, 10 percent microcrystalline aggregates, 3 percent opaques, 2 percent hornblende, 1/2 percent biotite, and 2 percent miscellaneous minerals, mostly pyroxene, epidote, zircon, and garnet. The feldspar are mostly orthoclase and albite, with about one-third plagioclase of

intermediate calcium composition. The microcrystalline aggregates consist largely of sericitized feldspar. A minority are reddish brown and appear earthy. Most of the mica flakes exhibit very pale yellow interference color. A substantial minority of the discrete feldspar or quartz grains has relatively thick, patchy coatings of reddish brown silicate clay.

The 2-0.1 mm consists of 20 percent quartz (maximum), 50 percent feldspar, 15 percent microcrystalline aggregates, 10 percent opaques, 8 percent mica, one percent hornblende, and a trace of miscellaneous minerals. The quartz percentage would contain some plagioclase of intermediate calcium content, and is therefore a maximum figure.

(Continued)

Coxwell, shallow variant 70-1, continued

70-1 (cont.)

Clay mineralogy (Method 7A2c)

The A2 (70L241) contains small amounts of mica, kaolinite, and montmorillonite. The B1t (70L242) contains small amounts of mica, kaolinite and montmorillonite. The B2t (70L243) contains a small to moderate amount of mica, and small amounts of kaolinite and montmorillonite. The B3tca (70L244) contains a moderate amount of montmorillonite, and small amounts of mica and kaolinite. The R1tca (70L245) contains a moderate to abundant amount of montmorillonite, small amounts of mica and kaolinite, and a trace of vermiculite. The R2t (70L246) contains a moderate amount of montmorillonite and mica, a moderate amount of vermiculite (or vermiculite-chlorite) a small amount of kaolinite and possibly some calcite.

Mica flakes were hand picked from crushed rock fragments of the R2t (70L246). Mica and quartz were identified by X-ray diffraction. The mica flakes were then heated in a H₂O₂ solution and the flakes decanted. Mica dominates. A moderate amount of a 14Å mineral is present. The mineral expands partially upon solvation with glycerol. A broad 24Å peak is present which indicates regularly alternating 14 and 10 angstrom minerals (mica and chlorite, vermiculite, or montmorillonite).

Micromorphology, Method 4Elb

The fabric of the B2t mostly consists of fine pebbles and sand. Plasma adheres to these skeletal grains. Some bodies consist of single large skeletal grains and adhering plasma. Others consist of several skeletal grains and associated plasma. And still others--these are usually <0.25 mm across--consist largely of plasma within which may be set one or more small skeletal grains. Most of these units tend to be crudely circular in outline. Many of the skeletal grains have thin, incomplete coatings of silicate clay. The preferred orientation of the silicate clay is moderate to weak. Plasma away from the surfaces of the skeletal grains exhibits weak preferred orientation of the clay; the optical domains are small, mostly less than 0.05 mm.

Most of the books of mica appear fairly altered, but the overall optical properties of biotite are retained. The hornblende looks rather fresh. Inclusions of mica in the larger skeletal grains are fairly common. In some instances, the mica books at the periphery of the skeletal grain appear more altered than those away from the periphery, but the difference is not consistent. Skeletal grains of sericitized feldspar are common. The fine-grain matrix contains a sprinkling of thin small grains that would appear to be the mica inclusions from the sericitized feldspar. But these grains are not abundant, and those that are present may be in part an artifact of the grinding operation.

In the B3tca of a nearby pedon, bodies of moved clay are strongly expressed. Many of the mica books contain moved clay in cleavage planes; these bodies of moved clay would act to force the mica books apart on swelling when wetted. These bodies of moved clay exhibit only moderate internal preferred orientation of the clay and are deeply reddish brown in color.

In the R1tca horizon, no definite bodies of moved clay were observed. Occasional cracks contain a deep brown, clayey material that is isotropic. Patches of sericitized feldspar are abundant. Books of mica are common. Many of these books contain opaques. They commonly are found in the parting planes of the books and commonly are elongated. The feldspar grains tend to be larger than the quartz grains.

Cementation (Hodgson, 1974)

15 pieces 3 cm across were selected from the stronger part of the R1tca horizon and allowed to stand in water overnight. The mean impact energy withstood was 0.4 joules with a range of from 0.2 to 0.6. For comparison, the comparable values were 2.3 and 1.8 to 2.3 joules for 7 pieces of monzonite bedrock from a deep exposure in San Agustin Pass.

SOIL CLASSIFICATION: Typic Haplargid; coarse-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Onite SOIL Nos. S70RMex-7-5 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 70L186-70L201 May, 1971

GENERAL METHODS: 1A, 1B1b, 2A1, 2B

Depth (cm)	Horizon	Size class and particle diameter (mm)													3A1			a/			e/		
		Total				Sand				Silt					3A1a	3B1	Course fragments	2A2					
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	< 0.074					< 0.0002	Vol. 250-2	20-5	5-2	
Pct. of < 2 mm																		Pct. of < 250			Pct. of < 20mm		
Carbonate Removed for < 2 mm																							
0-6	A2	72.4	15.3	12.3	1.8	5.2	10.7	37.0	17.7	8.6	6.7	48.3	54.7	36.4	3.3	1	tr	1					
6-16	B21t	67.7	15.4	16.9	1.8	5.3	9.3	33.8	17.5	8.8	6.6	47.1	50.2	39.6	7.4	tr	tr	tr					
16-32	B22t	58.8	21.3	19.9	4.3	6.0	6.8	24.3	17.4	11.0	10.3	44.1	41.4	49.7	7.9	tr	tr	tr					
32-47	B31tca	66.1	19.6	14.3	2.1	5.3	6.4	29.4	22.9	12.7	6.9	55.1	43.2	45.3	5.8	4	2	5					
47-74	B32ca	74.1	15.6	10.3	9.1	8.6	8.2	28.1	20.1	10.6	5.0	48.8	54.0	35.8	4.3	8	4	9					
74-87	C1ca	61.4	27.9	10.7	0.9	2.6	3.9	21.3	32.7	22.4	5.5	70.7	28.7	56.3	5.3	2	1	3					
87-157	2C 2	87.4	7.0	5.6	2.7	9.5	18.7	43.3	13.2	4.7	2.3	40.2	74.2	17.9	3.3	5	4	5					
157-169	3C 3	55.6	25.5	18.9	1.0	4.6	5.9	19.4	24.7	15.5	10.0	52.6	30.9	58.7	6.7	tr	tr	tr					
169-189	3B21th	59.0	18.8	22.2	0.7	4.8	7.7	26.1	17.7	9.9	8.9	44.8	41.3	48.9	7.8	tr	tr	tr					
189-215	3B22tca	46.1	27.5	26.4	1.3	3.5	4.8	18.9	17.6	15.5	12.0	45.0	28.5	62.9	10.3	tr	tr	tr					
215-239	3B3tcah	49.6	28.8	21.6	1.0	3.0	4.1	21.8	19.7	18.0	10.8	52.2	29.9	60.6	3.7	tr	tr	tr					
239-255	3B3tcah2	69.6	14.7	15.7	3.0	7.3	8.3	33.3	17.7	9.9	4.8	48.2	51.9	37.9	8.1	2	1	3					
255-268	3B2tcah	48.2	7.6	44.2	2.1	6.5	7.8	22.9	8.9	4.0	3.6	26.2	39.3	55.2	25.9	tr	tr	tr					
268-278	3B2b2	51.4	7.9	40.7	0.8	5.3	8.0	25.8	11.5	4.4	3.5	31.1	39.9	53.0	21.9	tr	tr	tr					
87-157	2C 2 b/	88.0	7.3	4.7	0.1	1.7	6.7	56.3	23.2	6.2	1.1	65.1	64.8	21.2			tr	tr					
87-157	2C 2 b/	95.2	1.9	2.9	7.7	19.8	27.1	35.1	5.5	1.4	0.5	20.4	89.7	6.7			8	15					

Depth (cm)	6A1a		SC2b Ext. Iron as Fe	pH 8C1a 1:1	6E1b 6E2a Carbonate as CaCO3	Bulk density				Water content				Composition Whole Soil				
	Organic carbon d/ Pct.	Nitrogen Pct.				4A1d 1/3-Bar g/cc	4A1h Oven Dry g/cc	4D1 COLE	4B1c 1/10 Bar Pct.	4B1c 1/3 Bar Pct.	4B2 15-Bar Pct.	4C1 WRD	Noncarbonate			Car-bon-ate a CaCO3 Pct/		
										> 2 mm Pct	Sand Pct	Silt Pct	Clay Pct					
0-6	0.22	0.7	8.1	tr(s)		1.4c						4.6		1	72	15	12	tr(s)
6-16	0.20	0.3	8.0	tr(s)		1.5c						5.9		tr	68	15	17	tr(s)
16-32	0.23	0.9	7.3	tr(s)		1.5c						7.1		tr	59	21	20	tr(s)
32-47	0.16	0.2	8.1	1		1.5c						5.5		7	61	18	13	1
47-74	0.08	0.8	2.2	1		1.5c						4.2		13	64	13	9	1
74-87	0.08	0.3	2.3	3		1.5c						4.8		4	57	26	10	3
87-157	0.01		8.4	tr								2.6		9	74	6	5	tr
157-169	0.08		8.5	1.0								6.9		tr	54	23	19	1
169-189	0.08		8.4	tr								8.3		tr	59	19	22	tr
189-215	0.15		8.4	4								10.2		tr	45	26	25	4
215-239	0.08		8.4	5		1.51	1.65		20.6	20.5		9.0	.18	tr	47	27	21	5
239-255	0.04		8.7	tr		1.42	1.56		25.3	23.1		6.2	.24	4	67	14	15	tr
255-268	0.08		8.0	4		1.51	1.69		22.6	20.0		15.7	.07	tr	47	7	42	4
268-278	0.09		8.3	40			1.71					15.5		tr	31	5	24	40

- a/ Pretreatment of < 2 mm with 0.1 N NaOH.
- b/ See under remarks in pedon description.
- c/ Assumed for calculations.
- d/ 1.9 :g/m² to 37cm.
- e/ No > 20 mm.

Soil Classification: Typic Haplargid; coarse-loamy, mixed, thermic
 Series: Onite
 Pedon No.: S70NMex-7-5
 Location: NW 1/4 SW 1/4, Sec. 26, T21S, R2E, about 700 feet north of pedon S70NMex-7-6, Dona Ana County, New Mexico.
 Geomorphic Surface: Organ.
 Land Form: Broad crest of very slight ridge sloping one percent to the west.
 Elevation: 4,300 feet.
 Parent Materials: Organ alluvium derived from monzonite in upper 169 cm; Isaacks' Ranch alluvium from 169 cm to 239 cm; Jornada II alluvium from 239 to 278 cm.
 Vegetation: Pluffgrass, *Yucca elata*, Mormon tea, snakeweed, few mesquite.
 Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, April 10, 1970.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. A few sand grains and coarse pebbles of monzonite are scattered over the surface.

A2 70L186 0 to 6 cm. Brown (7.5YR 5.5/3 dry) or dark brown (7.5YR 3.5/3 moist) sandy loam; weak medium platy and massive; soft; few roots; noncalcareous; clear wavy boundary.

B21t 70L187 6 to 16 cm. Reddish-brown (5YR 5.5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) heavy sandy loam; massive; slightly hard; few roots; reddish-brown clay coatings on sand grains; few insect tunnels, 3 to 5 mm diameter, some filled with dark fine earth; noncalcareous; clear wavy boundary.

B22t 70L188 16 to 32 cm. Reddish-brown (5YR 5.5/4 dry) or dark reddish-brown (5YR 3.5/4 moist) heavy sandy loam; generally massive, with some weak medium subangular blocky parts; slightly hard; few roots; sand grains coated with reddish-brown clay; few insect tunnels, more than above, 1 to 5 mm diameter, some empty and some filled with fine earth; few fine tubular pores; noncalcareous; clear wavy boundary.

B31tc 70L189 32 to 47 cm. Reddish-brown (5YR 5.5/5 dry; 5YR 4/4 moist) sandy loam; less clay than above; weak medium subangular blocky; slightly hard; few roots; few fine tubular pores; common insect tunnels 1 to 10 mm diameter, some empty and some filled with fine earth; some sand grains stained with clay; common carbonate filaments; most effervesce strongly, with a few parts noncalcareous; clear wavy boundary.

B32ca 70L190 47 to 74 cm. Light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 5/4 moist) light sandy loam, with occasional thin lenses of loamy sand; massive; slightly hard; few roots; discontinuous carbonate coatings on sand grains; carbonate filaments few to common; effervesces strongly; clear wavy boundary.

C1ca 70L191 74 to 87 cm. Light reddish-brown (6YR 6/4 dry) or reddish-brown (6YR 4.5/4 moist) sandy loam; massive; strata visible in parts of the horizon; hard; very few roots; common carbonate filaments; larger sand grains coated with carbonate; very few fine tubular pores; effervesces strongly; clear wavy boundary.

IIC2 70L192 87 to 157 cm. Horizon consists dominantly of two parts: (1) a finer part, light reddish-brown (5YR 6/5 dry) or reddish-brown (5YR 5/5 moist) quite uniform fine sand; massive; slightly hard; no roots; most effervesce weakly, a few parts noncalcareous; thickness of discrete lenses ranges from about 1 mm to 5 cm, with some weak stratifications being apparent even in these thicker lenses; a few strata, 1-5 mm thick, with higher proportions of coarse and very coarse sand, separate these finer strata; (2) strata in which there is a larger proportion of coarser sand grains; light reddish-brown (5YR 6/5 dry) or reddish-brown (5YR 5/5 moist) sand; massive; soft; noncalcareous or effervesces weakly; there are also small volumes of light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) fine sandy loam occurring as layers ranging from about 1 mm to 3 cm in thickness; slightly hard; no roots; a few carbonate filaments; most strata occur quite continuously across the sample pit; effervesces strongly; abrupt smooth boundary. (See Remarks)

IIC3 70L193 157 to 169 cm. Similar to above in stratification but contains only finer strata, mainly two kinds: (1) light brown (7.5YR 6/5 dry) or brown (7.5YR 5/5 moist) fine sandy loam; breaks out as massive, or weak medium platy parts; hard; no roots; common empty insect galleries about 2 cm high and up to 1 cm wide in cross section; a few carbonate filaments; effervesces strongly; few very fine tubular pores; weak stratification, thinner than 1 mm, occurs in bands 1 to 3 cm in thickness; these strata grade abruptly to: (2) bands of reddish-brown (5YR 5/5 dry; 5YR 4/5 moist) fine sand; occur in strata 2-3 cm thick; slightly hard; no roots; effervesces weakly in upper part but lower strata, one of which rests on the buried Bt, is noncalcareous; abrupt smooth boundary.

IIB21tb 70L194 169 to 189 cm. Reddish-brown (5YR 5.5/4 dry; 5YR 4.5/4 moist) heavy sandy loam; weak coarse prismatic, breaking to very weak coarse subangular blocky; hard; no roots; sand grains coated with silicate clay; few fine and medium pores; a few empty insect tunnels up to 5 mm diameter; noncalcareous except for a few prism faces which effervesce weakly in places and which have a few carbonate filaments in a few spots; clear wavy boundary.

IIB22tcab 70L195 189 to 215 cm. Reddish-brown (6YR 5.5/4 dry; 6YR 4/4 moist) sandy clay loam; weak coarse prismatic, breaking to weak medium subangular blocky; hard; no roots; some sand grains stained with clay; few fine tubular pores; common carbonate filaments; a few empty insect burrows up to 5 mm diameter, some filled with fine earth; effervesces strongly; clear wavy boundary.

IIB3tcab 70L196 215 to 239 cm. Light reddish-brown (6YR 6/4 dry) or reddish-brown (6YR 4.5/4 moist) sandy clay loam; weak coarse prismatic breaking to weak medium subangular blocky; hard; no roots; few carbonate nodules and filaments; few fine and very fine tubular pores; effervesces strongly; clear wavy boundary.

IIB1tcab2 70L197 239 to 255 cm. Reddish-brown (5YR 5/4 dry; 5YR 4/4 moist) heavy sandy loam; massive; hard and very hard; no roots; clay coatings on sand grains; few fine tubular pores; few carbonate filaments; most parts effervesce weakly, a few parts noncalcareous; clear wavy boundary.

IIB2tcab2 70L198 255 to 268 cm. Dominantly reddish-brown (4YR 4/5 dry and moist) a few parts reddish brown (5YR 5/4 and 5YR 4/4 dry) heavy clay loam; moderate fine and medium subangular blocky; very hard; no roots; sand grains coated with silicate clay; a few carbonate nodules in lower part; many peds have smooth reflective faces; some reddish parts are noncalcareous or effervesce weakly, rest effervesce strongly; clear wavy boundary.

IIC2b2 70L199 268 to 278 cm. Dominantly pink (7.5YR 8/4 dry) or light brown (7.5YR 6.5/4 moist) and light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) with a few parts reddish-brown (5YR 5/4 and 5YR 4/4 dry) heavy clay loam; weak medium subangular blocky; very hard; no roots; few very fine tubular pores; effervesces strongly.

Remarks: Particle-size distribution of the finer and the coarser parts of the IIC2 horizon has been determined. See samples 70L200 and 70L201

SOIL CLASSIFICATION: Typic Haplargid; coarse-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Onite SOIL Nos. S70NMex-7-6 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 70L202-70L213 May, 1971

GENERAL METHODS: 1A, 1B1a, 2A1, 2B

Depth (cm)	Horizon	Size class and particle diameter (mm)													3A1		a/		3A1a	3B1	Coarse fragments 2A2	
		Total													3A1a	3B1	Coarse fragments 2A2					
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02	Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	< 0.074				< 0.0002			Vol. 250-2	% < 250
													Carbonate Removed for < 2 mm									
0-6	A2	77.7	9.7	12.6	1.1	9.9	11.8	36.2	18.7	7.3	2.4	48.3	59.0	30.0	5.5	tr	tr	tr				
6-15	B1t	77.0	9.3	13.7	1.3	9.6	12.7	36.7	16.7	7.3	2.0	46.2	60.3	29.5	6.2	tr	tr	tr				
15-34	B2lt	71.1	12.8	16.1	5.9	10.2	11.4	31.4	12.2	8.2	4.6	38.5	58.9	33.9	9.2	tr	tr	tr				
34-41	B2tca	70.4	14.2	15.4	6.7	8.7	9.3	30.3	15.4	9.7	4.5	43.5	55.0	36.3	8.5	tr	tr	tr				
41-74	B3ca	75.1	12.5	12.4	5.6	8.5	10.9	35.3	14.8	8.5	4.0	44.0	60.3	30.6	6.2	5	1	8				
74-104	2Cca	86.4	7.2	6.4	12.3	16.3	15.3	32.4	10.1	5.0	2.2	31.8	76.3	17.4	3.5	30	14	29				
104-120	3B1cab	67.9	21.3	10.8	3.5	7.0	8.4	28.8	19.3	14.0	7.3	51.9	48.6	40.9		tr	tr	tr				
120-136	3B2tca	75.2	11.6	13.2	4.7	10.7	11.6	33.6	14.6	7.4	4.2	42.0	60.6	30.8		tr	tr	tr				
136-165	3B2tca	73.3	8.2	18.5	2.0	7.5	10.9	37.7	15.2	5.5	2.7	42.8	58.1	32.3		tr	tr	tr				
165-194	3B3tca	78.9	8.0	13.1	2.9	6.4	10.9	41.7	17.0	5.9	2.1	47.8	61.9	27.3		1	tr	2				
194-215	3B3tca	81.7	7.0	11.3	3.1	7.7	11.9	41.7	17.3	5.0	2.0	47.3	64.4	24.7		5	6	8				
0-38	b/	75.8	10.2	14.0	2.3	11.0	12.6	34.8	15.1	7.2	3.0	42.3	60.7	30.0			tr	tr				

Depth (cm)	6A1a Organic carbon	Nitrogen	C/N	6C2b Ext. Iron as Fe Pct.	6G1b 6E2a Carbonate as CaCO ₃ Pct.	8C1a pH (1:1)	Bulk density				Water content				Composition Whole Material				
							4A1d 1/3-Bar	4A1h Oven Dry	4D1 COLE	4B1c 1/10 Bar	4B1c 1/3 Bar	4B2 15-Bar	4C1 WRD	Noncarbonate			Carbonate		
							g/cc	g/cc		Pct.	Pct.	Pct.	Pct.	> 2mm	Sand	Silt		Clay	Pct.
0-6	0.15			0.8	tr(s)	8.1	1.4	1.63	.020	17.8	16.5	4.4	.19	tr	77	10	13	tr(s)	
6-15	0.15			0.9	-(s)	8.0	1.54	1.66	.050	25.4	25.1	4.4	.28	tr	77	9	14	-(s)	
15-34	0.15			0.9	tr(s)	8.0	1.44	1.66	.050	25.4	25.1	6.2	.28	tr	71	13	16	tr(s)	
34-41	0.18			0.8	4	8.3	1.5	1.59	.012	18.4	17.1	6.5	.17	tr	67	14	15	4	
41-74	0.11			0.7	6	8.3	1.5	1.59	.012	18.4	17.1	5.3	.17	9	63	11	11	6	
74-104	0.04			0.7	2	8.5	1.6					2.8		33	56	5	4	2	
104-120	0.04			2		8.6	1.6					4.4		tr	66	21	11	2	
120-136	0.04			tr		8.6	1.64	1.72	.016	16.0	15.1	4.6	.18	tr	75	12	13	tr	
136-165	0.07			tr		8.5	1.65	1.82	.034	18.2	18.2	7.5	.18	tr	73	8	19	tr	
165-194	0.01			1		8.4	1.7					6.2		2	76	8	13	1	
194-215	0.04			4		8.2						5.5		14	67	6	9	4	
0-38	b/	0.18			tr	8.1													

Depth (cm.)	Extractable bases 5B4a				8A H ₂ O at Sat.	Cat. Exch. Cap.		Water extract from saturated paste 8A1								
	6O2d	6P2a	6Q2a			5A2a NaOAc	5A1a NH ₄ OAc	6N1b	6O1b	6P1a	6Q1a	6I1a CO ₃	6J1a HCO ₃	6K1a Cl	6L1a SO ₄	8A1a Electrical conductivity
	Ca	Mg	Na	K		meq/100 g	meq/100 g	Ca	Mg	Na	K	meq/liter	meq/liter	meq/liter	meq/liter	μmho/cm
0-6	1.6	0.0	1.1				8.4									
6-15	1.5	0.0	0.6				8.9									
15-34	2.2	tr	0.6				11.6									
34-41	2.7	tr	0.5				10.3									
41-74	2.7	0.1	0.4				8.3									
74-104	2.0	0.1	0.2				4.6									
104-120	3.5	0.4	0.4				7.3									
120-136	3.6	0.5	0.4				7.8									
136-165	5.3	0.9	0.5				11.0									
165-194	4.5	1.1	0.3		25.4		9.3	4.6	4.4	13.8	0.2	0	3.1	6.0	13.4	2.02
194-215	4.3	1.2	0.3		27.4		7.6	15.0	13.6	23.5	0.3	0	2.4	18.2	29.0	4.22

a/ Pretreatment of < 2 mm with 0.1 N NaOH.
 b/ Composite sample; see under remarks in pedon description.
 c/ 1.6 kg/m² to 104 cm.
 d/ No > 20 mm.

Soil Classification: Typic Haplargid; coarse-loamy, mixed, thermic
 Series: Onite
 Pedon No.: S70NMex-7-6
 Location: SW 1/4 SW 1/4, Sec. 26, T21S, R2E, about 900 feet north of pedon S70NMex-7-7, Dona Ana County, N. M.
 Geomorphic Surface: Isaacks' Ranch.
 Land Form: Broad crest of very slight ridge on alluvial fan sloping one percent to the west.
 Elevation: 4,300 feet.
 Parent Materials: Isaacks' Ranch alluvium derived from monzonite in upper 104 cm; Jornada II alluvium from 104 to 215 cm.
 Vegetation: Snakeweed, Mormon tea, *Yucca elata*.
 Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, April 13, 1970.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. A discontinuous layer of loose reddish-brown sand occurs on the surface. There are a very few fine monzonite pebbles.

A2 70L202 0 to 6 cm. Reddish-brown (5YR 5/4 dry; 5YR 4/4 moist) with some parts slightly gray; sandy loam; massive and weak medium platy; soft; very few roots; noncalcareous; abrupt smooth boundary.

Blt 70L203 6 to 15 cm. Reddish-brown (5YR 5/4 dry; 5YR 4/4 moist) sandy loam; weak very coarse prismatic, massive internally; slightly hard and hard; few roots; sand grains coated with silicate clay; a few insect burrows 1 to 10 mm diameter, some empty and some filled with fine earth; noncalcareous; clear wavy boundary.

B2lt 70L204 15 to 34 cm. Reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) heavy sandy loam; weak very coarse prismatic, breaking to very weak medium subangular blocky; hard; few roots; sand grains stained with clay; few insect tunnels, 1 to 10 mm diameter, some empty and some filled with fine earth; noncalcareous; clear wavy boundary.

B22tca 70L205 34 to 41 cm. Light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 5/4 moist) heavy sandy loam; weak medium prismatic breaking to weak medium subangular blocky; hard; few roots; a few insect tunnels; some empty and some filled with fine earth; some sand grains stained with clay; a few carbonate filaments; effervesces strongly; clear wavy boundary.

B3ca 70L206 41 to 74 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) heavy sandy loam; massive; hard; few roots; a few carbonate nodules and filaments; a few pebbles thinly coated with carbonate; a few very hard masses, 5 to 10 cm diameter, irregularly shaped, occur in the lower 10 cm, are slightly lighter in color and contain more carbonate than overlying matrix; a few insect tunnels, 2 to 10 mm diameter, some empty and some filled with fine earth; effervesces strongly; clear wavy boundary.

IICca 70L207 74 to 104 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) loamy coarse sand; massive; soft; very few roots; thin discontinuous carbonate coatings on sand grains and pebbles, and a few nodules in upper part; very few roots; effervesces strongly; abrupt wavy boundary.

IIIB1cab 70L208 104 to 120 cm. Light reddish-brown (6YR 6/4 dry) or reddish-brown (6YR 5/4 moist) heavy fine sandy loam; weak coarse prismatic, breaking to weak medium and coarse subangular blocky; very hard; no roots; a very few insect tunnels 2 to 10 mm diameter, some empty and some filled with fine earth; a few carbonate filaments and a very few carbonate nodules; few fine tubular pores; effervesces strongly; clear wavy boundary.

IIIB21cab 70L209 120 to 136 cm. Reddish-brown (5YR 6/5 dry) or yellowish-red (5YR 4/5 moist) heavy sandy loam; weak coarse prismatic, massive internally; hard; very few roots; a few parts less red and softer, in upper part of horizon; silicate clay coatings on sand grains; a few carbonate filaments and discontinuous carbonate coatings on prism faces; a very few empty insect tunnels (5 to 10 mm diameter) with smooth linings; generally effervesces weakly, with a few parts noncalcareous; clear wavy boundary.

IIIB22cab 70L210 136 to 165 cm. Reddish-yellow (5YR 6/6 dry) or yellowish-red (5YR 5/6 moist) heavy sandy loam; weak coarse prismatic, breaking to weak medium subangular blocky; very hard; no roots; silicate clay coatings on sand grains; common carbonate filaments and a few nodules; discontinuous carbonate coatings on prism faces; a few empty insect burrows, 5 to 10 mm diameter, with smooth linings; generally noncalcareous between carbonate accumulations, effervesces weakly in a few places; clear wavy boundary.

IIIB31cab 70L211 165 to 194 cm. Reddish-yellow (5YR 6/6 dry) or brown (5YR 5/5 moist) fine sandy loam; massive to very weak subangular blocky; very hard; no roots; silicate clay coatings on sand grains; a few carbonate filaments; mainly noncalcareous, a few parts weakly calcareous; clear wavy boundary.

IIIB32cab 70L212 194 to 215 cm. Light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) light fine sandy loam; massive; very hard; no roots; a few carbonate filaments and nodules; sand grains discontinuously coated with carbonate; most parts effervesce strongly, a few parts effervesce weakly.

Remarks: A composite sample, 0 to 38 cm, was taken and is partially analyzed under laboratory number 70L213. This composite sample consists of eleven 8-cm diameter auger holes at 40-cm intervals, parallel to the sample face of the pit.

SOIL CLASSIFICATION: Typic Haplargid; fine-loamy, mixed, thermic

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL Berino SOIL Nos. STORMex-7-7 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 701214-701228 May, 1971

GENERAL METHODS: 1A, 1E1a, 2A1, 2B

Depth (cm)	Horizon	Size class and particle diameter (mm)													3A1			a/		
		Total				Sand				Silt					3A1a	3B1 Coarse fragments		2A2		
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	0.05-0.02 (0.02-0.002)	Int. III (0.2-0.02)	Int. II (2-0.1)	< 0.074	< 0.0002		> 2	d/20-5		5-2	
Pct. of < 2 mm																				
Carbonate Removed for < 2 mm																				
0-7	A2	51.3	27.2	21.5	1.4	5.7	6.3	21.7	16.2	14.0	13.2	43.5	35.1	56.8	4.6		tr	tr		
7-18	B21t	51.9	17.5	30.6	3.0	6.1	6.2	22.6	14.0	8.5	9.0	36.4	37.9	54.4	13.2		2	3		
18-34	B22t	53.4	17.3	29.3	4.1	7.3	6.9	21.6	13.5	9.5	7.8	36.1	39.9	52.8			1	3		
34-49	B23tca	47.9	15.4	36.7	2.6	5.9	5.8	20.8	12.8	8.4	7.0	33.9	35.1	57.8	17.4		1	4		
49-71	K2	50.3	18.4	31.3	0.8	3.4	4.9	22.9	18.3	11.4	7.0	44.7	32.0	58.5	14.2		tr	5		
71-100	K3	40.5	29.8	29.7	0.4	1.8	3.0	17.1	18.2	15.2	14.6	45.4	22.3	68.6	11.4		-	tr		
100-129	Bca	42.8	28.3	28.9	0.3	1.4	2.0	18.1	21.0	13.9	14.4	48.7	21.8	66.7	9.3		-	tr		
129-153	Bcab-1	22.2	36.6	41.2	0.1	0.9	2.6	9.0	10.6	12.9	23.7	30.0	11.6	83.2	18.7		-	tr		
153-170	Bcab-2	22.2	33.4	44.4	1.3	2.0	2.0	8.8	8.1	9.8	23.6	23.9	14.1	81.8	18.1		-	tr		
170-182	B1tcab	49.0	20.3	30.7	3.2	6.3	5.8	20.2	13.5	8.4	11.9	34.7	35.5	57.2	12.8		tr	tr		
182-195	B2tcab	40.6	15.7	43.7	0.9	4.0	6.0	18.2	11.5	8.2	7.5	31.1	29.1	64.6	23.4		tr	tr		
195-215	K1b2	58.4	14.3	27.3	2.1	6.7	8.5	25.8	15.3	8.0	6.3	39.2	43.1	48.7	16.7		tr	tr		
215-242	K2b2	67.0	10.8	22.2	2.3	8.3	10.8	31.1	14.5	6.2	4.6	39.0	52.5	38.8	12.7		tr	tr		
0-18	A2/B21t b/	49.1	17.1	33.8	1.8	5.5	6.4	22.6	12.8	7.9	9.2	34.2	36.3	56.4	17.6		tr	tr		
0-18	A2/B21t b/	50.6	17.9	31.5	3.1	6.0	6.3	21.7	13.5	9.5	8.4	36.2	37.1	55.6	17.6		tr	tr		
Depth (cm)	6A1a Organic carbon e/ Pct.	Nitrogen Pct.	C/N	6C2b Ext. Iron as Fe Pct.	6E1b 6E2a Carbonate as CaCO3 Pct.	8C1a pH (1:1)	Bulk density				Water content				pH					
							4A1d 1/3-Bar g/cc	4A1h Oven Dry g/cc	4D1 COLE	4B1c 1/10 Bar Pct.	4B1c 1/3 Bar Pct.	4B2 15-Bar Pct.	4C1 WRD	8C1a (1:1)						
0-7	0.81			1.0	tr(a)	8.2	1.3f	1.61	.040	26.3	26.1	8.3					8.2			
7-18	0.54			1.1	1	8.1	1.43	1.71	.031	23.0	22.1	10.1	.22				8.1			
18-34	0.38			0.9	4	8.1	1.56	1.71	.031	23.0	22.1	9.9	.19				8.1			
34-49	0.30			1.0	10	8.1	1.53	1.71	.037	24.1	22.1	12.6	.14				8.1			
49-71	0.27			0.7	23	8.2	1.7f					10.3					8.2			
71-100	0.08			0.8	24	8.6	1.7f					10.3					8.6			
100-129					10	8.8	1.6					11.2					8.8			
129-153					7	8.5						16.0					8.5			
153-170					7	8.2						16.8					8.2			
170-182					2	8.3						11.0					8.3			
182-195					3	8.3						16.5					8.3			
195-215					14	8.5						10.1					8.5			
215-242					25	8.4						8.6					8.4			
0-18	0.45				tr	7.6														
0-18	0.51				1	7.9														
Depth (cm)	Extractable bases				5B1a 5A6a CEC MEq/100g	Saturation Extract 8A1										(Saturated Paste)				
	Ca	Mg	Na	K		8A1A EC	6N1B Ca	6O1B Mg	6P1A Na	6Q1A K	6I1A CO3	6J1A HCO3	6K1a Cl	6L1A SO4	6M1A NO3	8E1 Rest Ohm-cm	8C1B pH	8A H2O Pct		
0-7		2.1	tr	1.8	18.7															
7-18		2.5	0.1	1.3	19.0															
18-34		2.9	0.1	0.9	15.9															
34-49		4.4	0.3	0.9	19.0															
49-71		4.4	0.5	0.7	14.6															
71-100		5.9	1.4	0.6	15.1	0.68	0.9	0.7	5.9	0.1	0	4.2	0.0	2.7		2100	8.1	38.2		
100-129		6.9	2.1	0.7	16.7	0.82	0.7	0.6	7.3	0.1	0	3.9	0.0	3.9		1900	8.2	38.8		
129-153		9.9	3.1	1.0	24.1	1.58	1.5	1.6	13.1	0.1	0	3.1	1.9	10.3		1100	8.1	49.2		
153-170		10.4	3.7	1.0	25.7	2.98	4.6	4.7	22.6	0.1	0	3.3	3.3	23.0		660	7.9	51.2		
170-182		7.2	3.1	0.7	17.5	2.30	2.9	3.1	18.4	0.1	0	3.1	2.9	17.0		1100	8.0	34.8		
182-195		10.6	3.4	1.1	25.9	1.72	1.6	1.7	14.1	0.1	0	3.3	0.7	11.1	0.8	1000	8.0	50.0		
195-215		5.4	2.5	0.6	13.9	2.11	3.0	2.8	17.1	0.1	0	2.4	0.0	19.7		1200	8.2	36.2		
215-242						2.98	4.7	4.4	25.4	0.1	0	2.6	0.0	30.8		1100	8.1	31.9		

- a/ Pretreatment with 0.1 N NaOH.
- b/ See remarks in pedon description.
- c/ Inclusive of > 2 mm, carbonate, and gypsum.
- d/ No > 20 mm.
- e/ 4.6 kg/m² to 100 cm.
- f/ Assumed for calculations.

70-7

Soil Classification: Typic Haplargid; fine-loamy, mixed, thermic
Series: Berino

Pedon No.: S70NMex-7-7

Location: SW 1/4 SW 1/4, Sec. 26, T21S, R2E, 375 feet north-northeast of section corner, Dona Ana County, N. M.

Geomorphic Surface: Jornada II.

Land Form: Alluvial-fan piedmont sloping one percent to the west. Elevation: 4,300 feet.

Parent Materials: Jornada II alluvium derived from monzonite to 129 cm; Jornada II silty basin-fill unit from 129 to 170 cm; Jornada I basin fill from 170 to 242 cm.

Vegetation: Thick stand of tobosa and burrograss, west half of pit, where sampled; east half of pit mainly burrograss; nearby there are a very few snakeweed and *Yucca elata*, with scattered barren areas.

Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, April 14, 1970.

Described by: L. H. Gile and R. B. Grossman.

Soil Surface. Surface is weakly crusted and has a thin, discontinuous layer of loose, reddish sand.

A2 70L214 0 to 7 cm. Light brown (8YR 6/3 dry) or dark brown (8YR 4/3 moist) heavy sandy loam; massive and weak coarse platy; slightly hard; few roots; upper 1 to 2 cm effervesces weakly, remainder noncalcareous; abrupt smooth boundary.

B21t 70L215 7 to 18 cm. Reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) sandy clay loam; weak medium and coarse prismatic, breaking to weak medium subangular blocky; hard; roots common; sand grains coated with silicate clay; few fine tubular pores; mainly noncalcareous, with a few parts that effervesce weakly; abrupt smooth boundary.

B22t 70L216 18 to 34 cm. Reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) sandy clay loam; weak medium and coarse prismatic, breaking to weak medium subangular blocky; very hard; few roots; sand grains coated with silicate clay; few very fine tubular pores; very few insect burrows, 5 to 10 mm diameter, filled with dark fine earth; effervesces strongly; clear wavy boundary.

B23tca 70L217 34 to 49 cm. Dominantly reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) with a very few parts red (2.5YR 4/6 dry); light clay; weak medium and coarse prismatic, breaking to weak medium subangular blocky; very hard; few roots; sand grains coated with silicate clay; a few carbonate nodules and filaments in the lower part of the horizon; a few insect burrows 2 to 10 mm diameter, filled with dark grayish fine earth; effervesces strongly; clear wavy boundary.

K2 70L218 49 to 71 cm. Dominantly pink (7.5YR 8/4 dry, 7.5YR 7/4 moist) and light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) with a very few parts reddish-brown (5YR 5/4 dry, 5YR 4/4 moist) heavy clay loam; weak medium prismatic, breaking to weak and moderate medium subangular blocky, with small amount of very weak coarse platy; very hard; very few fine roots; effervesces strongly; clear wavy boundary.

K3 70L219 71 to 100 cm. Dominantly light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 5/4 moist) with common carbonate nodules colored pink (7.5YR 9/4 dry, 7.5YR 8/4 moist) and pink (7.5YR 8/4 dry, 7.5YR 7/4 moist) clay loam; weak medium prismatic, breaking to weak medium subangular blocky; very hard; very few roots; very few tubular pores; effervesces strongly; clear wavy boundary.

Bca 70L220 100 to 129 cm. Light reddish-brown (5YR 6/5 dry) reddish brown (5YR 4.5/5 moist) clay loam; weak medium prismatic, breaking to moderate medium subangular blocky; hard; no roots; few very fine tubular pores; few carbonate nodules and filaments; effervesces strongly; clear wavy boundary.

Bcab-1 70L221 129 to 153 cm. Reddish-brown (5YR 5.5/4 dry, 5YR 4/4 moist) with some lighter colored parts 5YR 6.5/4 dry, 5YR 5/4 moist, in intricate pattern; silty clay loam; weak medium prismatic, breaking to moderate medium subangular blocky; hard; no roots; a very few carbonate nodules and filaments; few patchy dark coatings on some ped faces; few very fine tubular pores; effervesces strongly; clear wavy boundary.

Bcab-2 70L222 153 to 170 cm. Dominantly reddish-brown (5YR 5/4 dry; 5YR 4/4 moist) with lesser amount light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 5/4 moist) in places occurring in intricate pattern; silty clay loam; weak medium subangular blocky; hard; no roots; common black filaments (Mn? Fe?); a few carbonate filaments and nodules; few very fine tubular pores; effervesces strongly; clear wavy boundary.

Bltcab2 70L223 170 to 182 cm. Dominantly yellowish-red (5YR 5/6 dry; 5YR 4/6 moist) with smaller amount reddish-brown (5YR 5.5/4 dry; 5YR 4/4 moist) clay loam; weak medium subangular blocky; very hard; no roots; silicate clay coatings on sand grains; a very few pebbles; common black (Mn? Fe?) filaments; a few carbonate filaments and fine nodules; a few very fine and fine tubular pores; upper part effervesces weakly, lower part mainly noncalcareous; clear wavy boundary.

B2tcab2 70L224 182 to 195 cm. Yellowish (4YR 5.5/6 dry; 4YR 4/6 moist) clay loam; moderate to medium and fine subangular blocky; hard; no roots; silicate clay coatings on sand grains; a few black (Mn? Fe?) filaments, less than above and below; some peds have very smooth reflective faces; a few carbonate filaments and nodules; a very few very fine tubular pores; most parts effervesce weakly, a few parts noncalcareous; clear wavy boundary.

K1b2 70L225 195 to 215 cm. Dominantly light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) white (7.5YR 9/4 dry) or pink (7.5YR 8/4 moist) and small amount of reddish-yellow (5YR 6/6 dry) clay loam; weak medium subangular blocky; very hard; no roots; common black (Mn? Fe?) filaments on and within peds; discontinuous apparent clay coatings of reddish-yellow (5YR 6/6 dry) occur in places on high-carbonate parts; effervesces strongly; clear wavy boundary.

K2b2 70L226 215 to 242 cm. Dominantly pink (5YR 8/4 dry) or light reddish-brown (5YR 6.5/4 moist) with smaller amounts light reddish-brown (5YR 6/4 dry) or reddish-brown (5YR 5/4 moist) clay loam, weak medium subangular blocky; hard; no roots; a few black filaments; carbonate separates many sand grains; effervesces strongly.

Remarks: Two composite samples to 18 cm were taken. Sample 70L227 is a composite of ten 8-cm diameter sugar holes in a grid with a spacing between holes of 1-1/2 meters. This composite is from a nearby barren area. The other sample was taken in the same manner, but from an area with tobosa grass where there has been little covering by sand.

SOIL CLASSIFICATION: Petrocalcic Ustollic Paleargid; loamy-skeletal, mixed, thermic, shallow U. S. DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE

SOIL Terino SOIL Nos. STONMex-7-8 LOCATION Dona Ana County, New Mexico

SOIL SURVEY LABORATORY Lincoln, Nebraska LAB. Nos. 70L229-70L240, 70L087 May, 1971

GENERAL METHODS: 1A, 1B1b, 2A1, 2B

Depth (cm)	Horizon	Size class and particle diameter (mm)											3A1		3A1a	3B1	Coarse fragments 2A2	
		Total				Sand				Silt			Clay	3A1a				3B1
		Sand (2-0.05)	Silt (0.05-0.002)	Clay (< 0.002)	Very coarse (2-1)	Coarse (1-0.5)	Medium (0.5-0.25)	Fine (0.25-0.1)	Very fine (0.1-0.05)	Int. III (0.05-0.02)	Int. II (0.02-0.002)	Int. I (2-0.1)						
Pct. of < 2 mm											Carbonate Removed for < 2 mm and > 2 mm							
0-5	A2	60.1	25.7	14.2	4.6	4.9	3.9	24.4	22.3	16.6	9.1	56.1	37.8	51.1	5.0			39
5-18	B21t	50.9	19.5	29.6	6.9	5.0	3.1	18.3	17.6	14.1	5.4	44.3	33.3	58.0	12.1			76
18-28	B22t	45.8	22.1	32.1	9.2	4.3	2.3	14.4	15.6	14.6	7.5	40.3	30.2	62.2	20.2			80
28-46	B23tca	42.3	23.4	34.3	9.9	3.6	2.0	12.2	14.6	15.0	8.4	38.4	27.7	65.5	24.2			82
46-64	K2m	57.3	17.5	25.2	22.4	8.4	4.2	12.8	9.5	10.9	6.6	26.7	47.8	47.3	14.2			71
64-82	K31	72.1	14.3	13.6	24.3	13.3	6.6	16.8	11.1	9.2	5.1	30.9	61.0	33.3	8.9			68
82-121	K32	66.3	17.6	16.1	20.6	12.2	5.9	15.0	12.6	11.1	6.5	33.0	53.7	40.1	8.8			82
121-159	K33	74.0	14.5	11.5	22.4	17.6	8.1	16.2	9.7	9.1	5.4	28.4	64.3	30.4	6.2			74
159-179	C	80.6	10.4	9.0	21.3	30.0	12.1	12.3	4.9	5.7	4.7	16.6	75.7	23.6	4.3			75
46-64	K2m b/	56.1	18.3	25.6	19.6	10.5	4.5	12.3	9.2	10.6	7.7	27.5	46.9	48.5	14.8			81
													2A2 Coarse fragments		3B2		3B1	
													c/ Vol.		75-20		20-5	
													e/ 250-2		5-2		5-2	
													f/ 250		g/ < 75			
0-15	d/	60.2	24.9	14.9	6.8	5.5	4.2	23.6	20.1	17.0	7.9	53.6	40.1	49.2	40	19	30	10
15-38	d/	54.2	22.4	23.4	6.6	6.2	3.7	20.4	17.3	15.1	7.3	46.4	36.9	54.2	75	51	26	8
46-64	d/														50	24	46	8
64-82	d/														55	20	39	15
82-159	d/														75	29	40	12
159-179	d/														65	10	46	22
Depth (cm)	6A1a Organic carbon h/ Pct.	Nitrogen Pct.	C/N	6E1b Carbonate as CaCO ₃ Pct.	Bulk density			4B2 Bar Pct.	Composition Whole Material g/									
					k/ g/cc	g/cc	g/cc		Depth e/ (cm)	NONCARBONATE > 2mm. Sand Pct.	Silt Pct.	Clay Pct.	Carbonate as CaCO ₃ Pct.					
0-5	0.27			tr(s)				5.7	0-15	59	25	10	6	tr				
5-18	0.53			tr(s)				8.7	15-38	85	8	3	3	1				
18-28	0.76			tr				11.2	46-64	56	9	3	4	28				
28-46	0.81			6				13.2	64-82	63	16	3	3	15				
46-64	0.16			63					82-159	83	9	2	1	5				
64-82	0.09			41					159-179	77	18	2	2	1				
82-121	0.10			29														
121-159	0.08			25														
159-179				4				4.7										
46-64 b/	0.09			78														
46-64 c/	0.53			86														
0-15	0.40 i			tr														
15-38	0.77 i			4														
Depth (cm)	Extractable ions				5B4a CEC	5A6a NH ₄ OAc	Base saturation											
	Ca	Mg	Na	K			6C1a pH (1:1)	Pct.	Pct.									
0-5	2.0	tr	1.1	12.4					7.8									
5-18	2.5	0.1	1.4	18.3					7.8									
18-28	3.3	0.1	1.1	23.1					8.0									
28-46	3.7	0.2	0.9	21.4					7.9									
46-64	1.1j	0.2j	0.3j	3.9j														
64-82	1.5j	0.2j	0.4j	5.1j														
82-121	1.7j	0.3j	0.4j	5.1j														
121-159	2.4j	0.5j	0.3	3.1j														
159-179	4.0	1.7	0.3	7.1					8.2									
46-64 b/	1.9j	0.1j	0.4j	5.8j														

a/ Pretreatment of < 2 mm with 0.1 N NaOH; Method 1B4, 70L233-237, 70L240. b/ See remarks in pedon description.
 c/ 5 percent > 75 mm in K33; none in other horizons; no > 250 mm.
 d/ Large samples obtained for > 20 mm; uppermost two from across 6 m of pit face; samples 70L238, 70L239.
 e/ Sampling depths from which large samples for > 20 mm obtained.
 f/ Carbonate coatings. See remarks in pedon description. The calculated organic carbon for the carbonate-free material is 4 percent.
 g/ Inclusive of > 2 mm, carbonate and gypsum. Depths determined by zones from which large samples obtained for > 20 mm. Weighted average separate percentages calculated from horizon data where needed.
 h/ 1.5 kg/m² to 46 cm (Method 6A). i/ 1.1 kg/m² to 38 cm (Method 6A).
 j/ The determinations were made on the whole sample, inclusive of coarse fragments, which was ground to pass 2 mm. The values may be put on a carbonate-containing < 2 mm basis by first adjusting the 20-2 mm as a percent of the < 20 mm to a carbonate-containing basis and then dividing by the proportion of material exclusive of the > 2 mm, expressed on a part per part basis. For example, the extractable magnesium for sample 70L234, expressed on a carbonate-containing < 2 mm basis, would be 3.1 re. The CEC as calculated the same way would be 10.4 me. Such calculations are subject to some error since the > 2 mm percentage is not the same for the subsample treated to remove the carbonate and the one prepared for chemical characterization.
 k/ Assumed values for moist fine-earth fabric for calculations.

Soil Classification: Petrocalcic Ustollic Paleargid; loamy-skeletal, mixed, thermic, shallow
 Series: Terino
 Pedon Nos.: S70NMax-7-8
 Location: The SE 1/4 SW 1/4, Sec. 17, T23S, R3E, 600 feet east of road, Dona Ana County, New Mexico
 Geomorphic Surface: Jornada I.
 Land Form: Broad crest of ridge on alluvial-fan piedmont sloping 3 percent to the west.
 Elevation: 4,500 feet.
 Parent Materials: Jornada I alluvium derived from rhyolite.
 Vegetation: Creosotebush, ratany, fluffgrass, zinnia, Mormon tea, few clumps three-awn, snakeweed.
 Collected by: L. H. Gile, R. B. Grossman, and J. W. Hawley, April 16, 1970.
 Described by: L. H. Gile and R. B. Grossman.

Soil Surface. About 90-95 percent covered with desert pavement of rhyolite pebbles, mainly from 1/2 to 3 cm diameter, a few up to 10 cm diameter.

A2 70L229 0 to 5 cm. Light brown (7.5YR 6/3 dry) or dark brown (7.5YR 4/3 moist) very gravelly fine sandy loam; weak medium and thin platy; soft; few roots; few parts slightly redder than above; noncalcareous; abrupt smooth boundary.

B2lt 70L230 5 to 18 cm. Yellowish-red (4YR 4.5/5 dry; 4YR 3.5/5 moist) very gravelly sandy clay loam; weak fine and very fine crumb; soft; roots common; reddish-brown and red clay coatings on pebbles and sand grains; noncalcareous; clear wavy boundary.

B22t 70L231 18 to 28 cm. Red (2.5YR 4/6 dry) or dark red (2.5YR 3.5/6 moist) very gravelly heavy sandy clay loam; breaks out as medium subangular blocky parts with included pebbles; fine earth breaks to weak fine and very fine crumb; slightly hard; roots common; coatings of red clay on pebbles; a few pebbles in lower part have thin, discontinuous carbonate coatings; noncalcareous, except for lower part, which effervesces weakly and strongly; clear wavy boundary.

B23tca 70L232 28 to 46 cm. Dominantly reddish-brown (5YR 5/4 dry; 5YR 4/4 moist) very gravelly heavy sandy clay loam; a few parts red (2.5YR 4/6 moist); breaks out as weak medium subangular blocky, with included pebbles, and as weak fine crumb; soft; fine roots common; some pebbles and sand grains partially coated with reddish-brown clay, mainly on pebble tops; pebbles thinly carbonate-coated, with most carbonate on bottoms of pebbles; effervesces strongly; abrupt wavy boundary.

K2m 70L233 36 to 46 cm. (offset sample) The upper part, which ranges from about 1 to 10 cm in thickness, is dominantly light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) with some parts redder; carbonate-cemented material; in places there is a laminar horizon up to 1/2 cm thick; massive; extremely hard; few roots; tends to be continuously indurated; pebbles widely separated by carbonate; the lower part has dominant color of reddish-yellow (5YR 7/6 dry; 5YR 5.5/6 moist) with parts less yellow than this; massive; slightly to extremely hard; a few roots; effervesces strongly; abrupt smooth boundary to underlying K2m which is the top of the Km between the indurated zones, and is the K22m where this horizon is above it.

This horizon is present over much of the north face of the pit but is usually absent on the south side.

K2m 70L234 46 to 64 cm. Dominantly very pale brown (10YR 8/3 dry; 10YR 7/3 moist) carbonate-cemented material, with thin (1-5 mm) laminar horizon in upper part; massive; extremely hard; very few roots; pebbles widely separated by carbonate; some pebbles have coatings of white (10YR 9/2 dry; 10YR 8/2 moist) other coatings are light yellowish-brown (2.5Y 6/4 dry) or light olive brown (2.5Y 5/4 moist); effervesces strongly; clear wavy boundary.

K31 70L235 64 to 82 cm. Dominantly pink (7.5YR 8/4-7/4 dry) or light brown (7.5YR 6/4 moist) and brown (7.5YR 5/4 moist) discontinuously carbonate-cemented material; massive; very hard to soft; few roots; a few parts are not cemented at all and have thin, partial coatings of reddish-brown fine earth; pebbles thinly coated with carbonate and there are scattered carbonate-cemented clusters; 2.5Y coatings also occur on pebbles in this horizon; effervesces strongly; clear wavy boundary.

K32 70L236 82 to 121 cm. Dominantly very pale brown (10YR 8/3 dry; 10YR 7/3 moist) weakly carbonate-cemented material; massive; hard; no roots; smaller parts light brown (7.5YR 6/4 dry) or brown (7.5YR 5/4 moist) very gravelly sandy loam; soft; loose; the two types of morphology occur in nearly horizontal lenses ranging from about 5 to 15 cm thick; a few pebbles are carbonate-free; effervesces strongly; clear wavy boundary. (Note: this sample offset about 6 feet to the west to get a more typical K horizon; the K31 and K2m sampled in place.)

K33 70L237 121 to 159 cm. Dominantly pink (7.5YR 7/4 dry) or brown (7.5YR 5.5/4 moist) weakly carbonate-cemented material occurring as lenses 5-10 cm thick; some of the coatings are 2.5Y 6/4 dry; a few coatings of 7.5YR 6/4 dry; pebbles separated by carbonate; the above alternates with lesser amounts of lenses of light brown (7.5YR 6/4 dry) or brown (7.5YR 4.5/4 moist) very gravelly loamy sand; massive; soft; no roots; pebbles have thin, discontinuous carbonate coatings; effervesces strongly; clear and abrupt wavy boundary.

C 70L238 159 to 179 cm. Pale brown (10YR 6.5/3 dry) or dark brown (10YR 4/3 moist) very gravelly sand; massive; soft; no roots; some pebbles in a lens 3-4 cm thick have thin, partial carbonate coatings and some have a very few gypsum crystals on bottoms of pebbles; generally noncalcareous or effervesces weakly.

Remarks: A composite sample was taken from 0-15 and from 15-38 cm for organic carbon and coarse fragments. The samples are 70L238 and 70L239, respectively.

In places the upper part of the K2m appears to be intermediate between a K2 horizon and a B2 horizon. A sample of this material was taken for analysis under 70L240.

Carbonate coatings of 2.5Y hue are analyzed under 70L087. These samples were obtained by abraiding the coated surface with a rotating electric drill.

(Continued)

Terino 70-8, continued

70-8 (cont.)

Mineralogy (Method 7B). Counts of 300 grains were made on the 0.1-0.05 mm (very fine sand, abbreviated vfs) and on the 0.25-0.1 mm (fine sand, fs). The microcrystalline aggregates are mostly fragments of groundmass of rhyolite; orthoclase is the dominant feldspar with albite and microcline present. Minerals of the epidote group are the dominant component of the ferromagnesian minerals.

	Quartz %	Feldspar		Microcrystalline Aggregates %	Ferromagnesian Minerals %	Opakes %
		IR < 1.550 %	IR = 1.550 %			
70L029, vfs	42	20	6	27	3	2
70L030, vfs	41	29	3	21	3	3
70L030, fs	47	23	3	28	tr	tr
70L032, vfs	38	24	3	22	1	1
70L032, vfs	38	28	3	29	1	1
70L037, vfs	39	23	2	33	2	1
70L037, fs	39	24	2	34	tr	1

SOIL CLASSIFICATION-TYPIC MAPLARGID
 COARSE-LOAMY, MIXED, THERMIC
 SERIES - - - - -ONITE, DEEP PETROCALCIC PHASE
 SOIL NO - - - - - S72NMEX-7-1 COUNTY - - - DONA ANA
 GENERAL METHODS- - -1A,1B1B,2A1,2B SAMPLE NOS. 72L547-72L553

U. S. DEPARTMENT OF AGRICULTURE
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 LINCOLN, NEBRASKA

DEPTH CM	HORIZON	PARTICLE SIZE ANALYSIS, LT 2MM, 3A1, 3A1A, 3A1B													RATIO		
		SAND 2- .05	SILT .05- .002	CLAY LT .0002	CLAY LT .0002	VCOS 2- 1	CORS 1- .5	MEDS .5- .25	FNES .25- .10	VFNS .10- .05	COSI .05- .02	FNSI .02- .002	VFSI .005- .002	TEXT SAND 2- 1	INTR -2- -02	FINE CLAY TO CLAY	NOM- CO3- CLAY
CARBONATE REMOVED																	
000-5	A	83.2	6.6	10.2	5.3	2.4	10.5	18.2	38.1	14.0	4.7	1.9		69.2	38.9	52	.40
005-26	B2TCA	80.9	7.1	12.0	6.7	1.8	9.6	18.1	37.5	13.9	4.8	2.3		67.0	38.5	56	.42
026-40	K8BT	74.2	6.5	19.3	13.0	3.9	10.6	17.2	31.9	10.6	4.3	2.2		63.6	31.0	67	.46
040-61	K11	76.9	5.8	17.3	13.1	2.3	10.0	17.8	35.2	11.6	3.6	2.2		65.3	33.4	76	.50
061-86	K12	80.5	4.7	14.8		1.8	9.7	18.4	39.0	11.6	2.9	1.8		68.9	35.2		.52
086-111	K13	82.2	4.2	13.6		2.8	11.8	19.0	37.6	11.0	2.2	2.0		71.2	32.4		.57
111-118	K2&K2M	76.3	5.4	18.3		2.9	11.8	18.5	31.8	11.3	1.4	4.0		65.0	29.2		.57

DEPTH CM	PARTICLE SIZE ANALYSIS, MM, 38, 381, 382				BULK DENSITY				WATER CONTENT				CARBONATE			
	GT 2	GT 75	GT 20-5	GT 5-2	4A1D 1/3	4A1M OVEN	4D1 COLE	4B1C 1/10	4B1C 1/3-	4B2 15-	4C1 WRD	6E1B LT	3A1A LT	8C1A 1/1	8C1E 1/2	
000-5	0	0	TR	1	23	1				4.1		3		8.4	7.9	
005-26	0	0	TR	1	25	1				5.0		4		8.4	7.9	
026-40	0	0	TR	1	30	2				8.9		17		8.5	7.9	
040-61	0	0	TR	1	27	1				8.7		13		8.9	8.0	
061-86	0	0	TR	1	24	1				7.7		9		8.4	8.1	
086-111	0	0	2	1	21	3				7.8		11		8.5	8.2	
111-118	0	0	TR	1	28	2				10.4		38		8.8	8.3	

DEPTH CM	ORGANIC MATTER		IRON		PHOS				EXTRACTABLE BASES SB4A-				ACTY		AL		CAT EXCH		RATIO		RATIO		CA		(BASE SAT)	
	6A1A ORG	6A1A CARB	C/N	6C2A EXT	6S1A TOTL	6N2E CA	6O2D MG	6P2A NA	6Q2A K	SUM	6M1A BACL	6G1D KCL	6A3A EXTB	6A6A NHAC	6D1 CA	6D3 CA	6E1B NHAC	6E1B CA	6E1B CA	6E1B CA	8D1 TO	8D3 TO	SF PCT	5C3 PCT	5C1 EXTB	5C1 NHAC
000-5	0.05			0.2			8.1C	1.6C	0.2	0.8	10.7										7.3					
005-26	0.13			0.2			7.8C	2.0C	0.2	1.0	11.0										7.9					
026-40	0.15			0.2			9.2C	3.6C	0.9	0.8	14.5										10.9					
040-61	0.08			0.2			7.4C	4.1C	1.9	0.4	13.8										10.3					
061-86	0.04			0.1			7.9C	3.7C	2.2	0.2	14.0										8.2					
086-111	0.04			0.1			6.3C	3.7C	3.4	0.2	13.6										6.7					
111-118	0.11			0.1			6.1C	3.5C	3.7	0.2	13.5										5.5					

DEPTH CM	(SATURATED PASTE)				NA		SALT		GYP		SATURATION				EXTRACT				ATTERBERG	
	8E1 REST	8C1B PH	8A H2O	8D2 ESP	5E SAR	8D5 TOTL	6F1A SOLU	8A1A PPM	6N1B PCT	6O1B CM	6P1A MEQ	6Q1A LITER	6I1A CO3	6J1A MCO3	6K1A CL	6L1A SO4	6M1A NO3	4F1 LQID	4F2 PLST	
000-5	5100	8.1	19.5	3		60		0.50	3.2	0.9	0.1	0.6								
005-26	4700	8.0	21.8	3		70		0.47	2.4	0.9	0.2	0.8								
026-40	3300	8.3	31.3	7	4	120		0.59	1.0	0.6	4.0	0.2								
040-61	3000	8.4	33.0	17	11	160		0.76	0.4	0.3	6.3	TR								
061-86	960	8.2	39.6	17	8	910		3.33	8.0	7.0	21.0	0.1								
086-111	580	8.3	46.3	25	11	1800		5.32	10.5	12.5	36.0	0.1								
111-118	680	8.5	36.9	36	18	1600		5.75	4.3	9.3	46.7	0.1								

- (A) ESTIMATED.
- (B) 1.3 KG/M SQ TO 111 CM (METHOD 6A).
- (C) METHOD 6N4E FOR CA AND 6O4C FOR MG.
- (D) CARBONATE-FREE BASIS; OTHER DATA ON CARBONATE-CONTAINING BASIS.

Soil Classification: Typic Haplargid, coarse-loamy, mixed, thermic.

Series: Onite, deep petrocalcic phase

Pedon No: S72NMex-7-1

Location: The SE 1/4 SE 1/4 Sec. 31, T23S, R1E, 0.3 km east of road; about 0.6 km southeast of pedon S61(65)NMex-7-8.

Geomorphic Surface: La Mesa (lower).

Land Form: Relict basin floor; level.

Elevation: 4200 feet.

Parent Materials: Upper Camp Rice Formation (fluvial facies), consisting mostly of noncalcareous sand, with a few rounded pebbles of mixed lithology.

Vegetation: Barren area between mesquite-covered coppice dunes.

Collected by: L. H. Gile, April 25, 1972.

Described by: L. H. Gile.

Soil Surface. Desert pavement of about 30% fine, rounded pebbles (quartz, chert, rhyolite and similar igneous rocks) and carbonate-cemented nodules. Most of the pebbles are from 1/2 to 3 cm in diameter; the nodules range from 1 to 5 mm in diameter. The surface is weakly crusted and breaks out as soft, smooth-topped plates about 2 mm thick and 2 to 5 cm across.

A 72L547 0-5 cm. Reddish brown (5YR 5/4, dry) (5YR 4/4, moist) fine sandy loam; mostly weak very fine crumb, with weak fine platy in the upper 2 mm; soft; very few roots; effervesces strongly; abrupt smooth boundary.

B2tca 72L548 5-26 cm. Reddish brown (5YR 5/4, dry) (5YR 4/4, moist) heavy fine sandy loam; weak fine and medium subangular blocky; slightly hard, very friable; few roots; some grains coated with oriented clay; scattered termite tunnels 2-3 mm diameter, some empty and some filled with fine earth; few carbonate filaments; effervesces strongly; clear wavy boundary.

K & Bt 72L549 26-40 cm. Reddish brown (5YR 5/4, dry) (5YR 4/4, moist) with common carbonate nodules (about 60% of the horizon) mostly colored pink (5YR 8/3, dry) or reddish yellow (5YR 7/6, moist) with some less red; light sandy clay loam; nodules weak fine and medium subangular blocky; between nodules the structure is very fine crumb; soft; nodules range from slightly hard to very hard, with most being very hard; friable; few roots; nodules range mostly from 1/2 cm to about 2 cm diameter; some grains coated with oriented clay; effervesces strongly; clear wavy boundary.

K11 72L550 40-61 cm. About equal parts of light brown (7.5YR 6.5/4, dry) or brown (7.5YR 5.5/4, moist) and pink (7.5YR 8/4, dry, 7.5YR 7/4, moist) with about 5% reddish brown (5YR 5/4, dry, 5YR 4/4, moist) Bt material, in which sand grains are coated with oriented clay; sandy clay loam; weak medium and coarse subangular blocky; very hard, friable; few roots, carbonate-impregnated throughout; sand grains in light-colored parts separated by carbonate; effervesces strongly; clear wavy boundary.

K12 72L551 61-86 cm. Similar to above except slightly more light-colored material, and fewer roots.

K13 72L552 86-111 cm. Dominantly pinkish white (7.5YR 8/2, dry) or pinkish gray (7.5YR 7/2, moist) with few parts slightly darker or lighter than this; light sandy clay loam; harder in place than above; very weak medium subangular blocky; very hard, friable; no roots; sand grains separated by carbonate; laterally in places this horizon grades into a Btca horizon in which the reddish brown, Bt material is dominant; effervesces strongly; clear wavy boundary.

K2 & K2m 72L553 111-118 cm. Dominantly white (10YR 8/2, dry) or very pale brown (10YR 7/4, moist) discontinuously carbonate-cemented material; most parts take water readily and have texture of heavy sandy loam; other parts, mostly the discontinuous laminar horizon (about 1 mm thick) do not; very and extremely hard; difficult to remove with pickaxe; breaks out as plates ranging from 5-20 cm across and 1-5 cm thick; sand grains separated by carbonate; a few roots on the surface of this horizon, and a very few fine roots penetrate it along cracks and holes; crack fillings coated white (10YR 9/2, dry, 10YR 8/2, moist); effervesces strongly.

SOIL CLASSIFICATION-TYPIC HAPLARGID
COARSE-LOAMY, MIXED, THERMIC
SERIES - - - - -ONITE, DEEP PETROCALCIC PHASE

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE, NTSC
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA

SOIL NO - - - - - S72NMEX-7-2 COUNTY - - - - - DONA ANA

GENERAL METHODS- - - - - 1A, 1B1B, 2A1, 2B SAMPLE NOS. 72L554-72L560

DEPTH CM	HORIZON	PARTICLE SIZE ANALYSIS, LT 2MM, 3A1, 3A1A, 3A1B													RATIO	
		SAND 2- -05 -002	SILT -05 -002	CLAY LT -002	CLAY LT -0002	VCOS 1	CORS .5	MEDS .25	FNES .10	VFNS .05	COSI .02	FNSI .002	VFSI .005	TEXT SAND -2- -02	INTR II .02	FINE CLAY TO
		CARBONATE REMOVED														
00-4	A	77.4	9.4	13.2	4.6	2.6	9.6	16.0	34.5	14.7	6.0	3.4	62.7	38.8	35	.38
4-20	B1CA	78.8	8.6	12.6	6.2	1.8	9.6	16.9	37.3	13.2	5.8	2.8	65.6	38.1	49	.41
20-46	B21TCA	76.4	8.3	15.3	9.4	2.7	10.2	17.2	34.9	11.4	5.7	2.6	65.0	34.6	61	.43
46-65	B22TCA	75.3	6.6	18.1	12.9	3.5	10.3	17.2	34.4	9.9	4.4	2.2	65.4	31.2	71	.48
65-89	K11	78.9	5.5	15.6	11.3	2.1	8.7	18.8	39.4	9.9	3.6	1.9	69.0	33.1	72	.52
89-121	K12	83.6	4.1	12.3		1.3	9.3	20.1	43.4	9.5	1.7	2.4	74.1	32.8		.58
121-130	K2EK2M	84.4	3.9	11.7		1.8	7.6	17.0	47.0	11.0	2.4	1.5	73.4	37.3		.51

DEPTH CM	PARTICLE SIZE ANALYSIS, MM, 3B, 3B1, 3B2													BULK DENSITY				WATER CONTENT				CARBONATE			
	GT 2 PCT	GT 75 PCT	75-20 PCT	20-5 PCT	5-2 PCT	LT 20-2 PCT	LT 1/3- PCT	OVEN DRY G/CC	COLE G/CC	4B1C PCT	4B1C PCT	4B2 PCT	4C1 CM	6E1B PCT	3A1A PCT	8C1A 1/1	8C1E 1/2								
00-4	0	0	2	2	29	4						5.0			1		8.3	7.8							
4-20	0	0	TR	TR	27	1						5.2			3		8.3	7.8							
20-46	0	0	TR	1	29	1						6.5			5		8.3	7.8							
46-65	0	0	1	1	29	2						8.7			7		8.4	8.0							
65-89	0	0	TR	1	25	1						8.1			12		8.4	7.9							
89-121	0	0	TR	1	20	1						7.1			8		8.6	8.0							
121-130	0	0	TR	1	20	2						6.0			36		8.8	8.1							

DEPTH CM	ORGANIC MATTER 6A1A ORGNB/ CARB PCT	IRON C/N 6C2A EXT FE PCT	PHOS (EXTRACTABLE BASES 5B4A-)				ACTY		AL		(CAT EXCH)		RATIO		RATIO		CA		(BASE SAT)	
			651A TOTL CA	6N2E CA	6O2D MG	6P2A NA	6Q2A K	SUM EXTB / 100	6H1A BACL TEA	6G1D KCL EXT	5A3A EXTB ACTY	5A6A NHAC	8D1 NHAC TD	8D3 CA TD	5F NHAC PCT	5C3 ACTY PCT	5C1 NHAC PCT			
00-4	0.31	0.3	10.4C	1.5C	0.2	0.9	13.0						10.5							
4-20	0.23	0.3	10.4C	1.3C	0.2	0.6	12.5						9.4							
20-46	0.23	0.3	10.1C	1.9C	0.6	0.4	13.0						10.6							
46-65	0.23	0.3	10.4C	2.9C	1.8	0.3	15.4						12.3							
65-89	0.11	0.1	7.9C	2.9C	2.4	0.2	13.4						9.4							
89-121	0.08	0.1	6.3C	2.9C	2.9	0.2	12.3						7.4							
121-130	0.15	TR	6.3C	2.2C	2.8	0.1	11.4						4.6							

DEPTH CM	(SATURATED PASTE)		NA 502 ESP	NA SAR	SALT TOTL SOLU PPH	GYP 6F1A PCT	SATURATION EXTRACT										ATTERBERG			
	8E1 REST DMM- CM	8C1B PH CM					8A H2O PCT	6A1A EC CM	6M1B CA CM	6O1B MG CM	6P1A NA CM	6Q1A K CM	6J1A CO3 CM	6K1A CL CM	6L1A SO4 CM	6M1A NO3 CM	4F1 LMT	4F2 PLST INOX		
00-4	3500	8.0	20.1	2	80		0.65	4.8	0.9	0.2	0.4									
4-20	3800	7.8	21.5	2	70		0.53	4.0	0.7	0.2	0.3									
20-46	3200	7.9	26.9	5	3	120	0.69	2.5	0.6	3.3	0.1									
46-65	1600	8.0	33.9	11	7	430	1.89	3.6	1.3	11.7	0.1									
65-89	1100	8.2	40.5	18	10	710	2.56	3.9	2.0	16.5	0.1									
89-121	940	8.2	33.9	24	15	1000	4.17	4.3	3.9	31.0	0.1									
121-130	910	8.4	31.1	24	24	1200	5.23	5.3	5.3	54.5	0.1									

- (A) ESTIMATED.
- (B) 2.7 KG/M SQ TO 111 CM (METHOD 6A).
- (C) METHOD 6M4E FOR CA AND 6O4C FOR MG.
- (D) CARBONATE-FREE BASIS; OTHER DATA ON CARBONATE-CONTAINING BASIS.

Soil Classification: Typic Haplargid, coarse-loamy, mixed, thermic.

Series: Onite, deep petrocalcic phase

Pedon No.: S72NMex-7-2

Location: In the NE 1/4 SW 1/4 Sec. 30, T23S, R1E, about 70 m east of road and 1 km north of pedon S61 (65) NMex-7-8. About 4 m west of S72NMex-7-3.

Geomorphic surface: La Mesa (lower).

Land Form: Relict basin floor; level.

Elevation: 4200 feet.

Parent Materials: Upper Camp Rice Formation (fluvial facies), consisting mostly of noncalcareous sand, with a few rounded pebbles of mixed lithology.

Vegetation: Small mesquite on scattered low dunes; barren between dunes.

Collected by: L. H. Gile, April 27, 1972.

Described by: L. H. Gile.

Soil Surface: The surface is covered with about 20% fine, rounded pebbles--mostly quartz, chert, rhyolite, and granite. Most of the pebbles range from 1/2 to 3 cm diameter, with a few slightly smaller or larger. There are a few small carbonate nodules about 1 cm in diameter.

A 72L554 0-4 cm. Light brown (7YR 6/4, dry) or brown (7YR 5/4, moist) fine sandy loam; weak fine platy in upper 1-2 mm, weak very fine crumb below; soft; very few roots; effervesces strongly; abrupt smooth boundary.

B1ca 72L555 4-20 cm. Light brown (7YR 6/4, dry) or brown (7YR 4.5/4, moist) fine sandy loam; compound very weak coarse prismatic and weak fine and medium subangular blocky; slightly hard, very friable; few roots; common termite tunnels, some empty and some filled with fine earth; a few carbonate filaments; the few pebbles have thin, discontinuous carbonate coatings; effervesces strongly; clear wavy boundary.

B2ltca 72L556 20-46 cm. Dominantly light brown (7YR 6/4, dry) or brown (7YR 4.5/4, moist) heavy sandy loam; compound very weak coarse prismatic and weak coarse subangular blocky; slightly hard, very friable; few roots; a few carbonate filaments and a very few carbonate nodules, about 1 cm diameter; about 5% reddish brown; termite tunnels as above; effervesces strongly; clear wavy boundary.

B22tca 72L557 46-65 cm. Dominantly light brown (7YR 6/4, dry) or brown (7YR 4.5/4, moist) with about 25% pink (7.5YR 8/3, dry, 7.5YR 7/4, moist) and about 15% yellowish red (5YR 5.5/6, dry, 5YR 4.5/6, moist); light sandy clay loam; compound very weak coarse prismatic and weak medium subangular blocky; generally hard, with a few carbonate-cemented parts very hard, friable; common carbonate nodules and cylindroids; sand grains in yellowish red parts coated with clay; few termite tunnels, less than above; few roots; generally effervesces strongly, yellowish red parts effervesce weakly or are noncalcareous; clear wavy boundary.

K11 72L558 65-89 cm. Dominantly pink (7.5YR 8/4, dry) or light brown (7.5YR 4/4, moist) with lesser amount 7.5YR 4/4, dry, 7.5YR 5/4, moist, and a few reddish brown parts; light sandy clay loam; weak coarse subangular blocky; very hard, friable; few fine roots; laterally there are about 5% reddish brown volumes, as vertical cylindroids a few cm long; common white carbonate filaments on ped faces; about 90% K-fabric, in which carbonate coatings on sand grains are essentially continuous; effervesces strongly; clear wavy boundary.

K12 72L559 89-121 cm. Dominantly pink (7.5YR 8/4, dry) or light brown (7.5YR 6/4, moist) with a few parts slightly darker and lighter; heavy sandy loam; weak coarse subangular blocky; very hard, friable; very few fine roots, which rest on, or are only slightly above the underlying K2m horizon; about 5% reddish brown material, mostly cylindroids that descend from the overlying horizon; about 90% of K-fabric; effervesces strongly except for the reddish brown material, which effervesces weakly or is noncalcareous; abrupt wavy boundary.

K2 & K2m 72L560 121-130 cm. Dominantly pink (7.5YR 9/3, dry, 7.5YR 8/3, moist) and pink (5YR 7/4, dry) or reddish brown (5YR 5/4, moist) with small amount 5YR 5/4 dry, 5YR 4/4, moist, heavy sandy loam; very hard but softens markedly on moistening; a discontinuous laminar horizon, extremely hard (the K2m) cannot be textured and does not soften noticeably on moistening; effervesces strongly.

SOIL CLASSIFICATION-TYPIC MAPLARGID
COARSE-LOAMY, MIXED, THERMIC
SERIES - - - - -SONOITA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE, NTSC
NATIONAL SOIL SURVEY LABORATORY
LINCOLN, NEBRASKA

SOIL NO - - - - - S72NMEX-7-3 COUNTY - - - DONA ANA

GENERAL METHODS- - -1A, 1B19, 2A1, 2B

SAMPLE NOS. 72L561-72L568

DEPTH CM	HORIZON	PARTICLE SIZE ANALYSIS, LT 2MM, 3A1, 3A1A, 3A1B													RATIO		
		SAND 2- .05	SILT .05- .002	CLAY LT .002	FINE CLAY .0002	VCOS 1	CDRS .5	MEDS .25	FNES .10	VPNS .05	CDSI .02	FNSI .002	VFSI .002	TEXT SAND 2- .01	INTR II .02	FINE CLAY TO CLAY	NON- CO3- 15- CLAY BAR TO CLAY
CARBONATE REMOVED																	
00-4	A	80.7	6.3	13.0	3.9	3.1	10.4	17.3	36.9	13.0	3.7	2.6	67.7	35.4	30		.33
4-23	B11TCA	79.4	7.2	13.4	5.4	2.4	9.4	16.8	37.7	13.1	4.4	2.8	66.3	37.0	40		.31
23-57	B12TCA	80.9	8.5	10.6	6.3	2.3	9.7	17.3	37.7	13.9	6.4	2.1	67.0	40.1	59		.46
57-82	B13TCA	84.9	6.5	8.6	6.2	3.2	11.8	20.0	38.5	11.4	4.8	1.7	73.5	35.5	72		.44
82-104	B14TCA	80.4	6.1	13.5	9.8	2.6	10.4	18.7	37.5	11.2	4.7	1.4	69.2	34.9	73		.41
104-131	B21TCA	74.7	4.6	20.7	14.0	2.7	9.7	16.9	36.0	9.4	3.6	1.0	65.3	31.0	68		.43
131-154	B22TCA	79.9	3.7	16.4	11.9	2.6	9.4	17.5	40.1	10.3	3.4	.3	69.6	34.1	73		.43
154-186	B3TCA	83.9	3.6	12.5	9.2	2.6	10.2	18.5	42.0	10.6	3.4	.2	73.3	35.3	74		.43

DEPTH CM	PARTICLE SIZE ANALYSIS, MM, 38, 381, 382										BULK DENSITY				WATER CONTENT				CARBONATE			
	GT 2	GT 75	75-20 PCT	20-5 PCT	5-2 PCT	LT/20 .074	20-2 PCT	1/3- BAR	OVEN DRY	4A10 G/CC	4A1M G/CC	4D1 G/CC	4B1C 1/10	4B1C 1/3-	4R2 15-	4C1 WRD	6E1B LT	3A1A LT	8C1A 1/1	8C1E 1/2		
00-4	0	0	1	1		2											TR		8.3	7.8		
4-23	0	0	1	1		2											TR		8.3	7.8		
23-57	0	0	1	1		2													8.1	7.8		
57-82	0	0	1	1		1													8.2	7.8		
82-104	0	0	1	1		1													8.1	7.7		
104-131	0	0	1	1		2													8.3	7.8		
131-154	0	0	TR	1		1													8.4	7.9		
154-186	0	0	TR	1		1													8.5	7.9		

DEPTH CM	ORGANIC MATTER 6A1A ORGN CARB PCT	IRON C/N 6C2A EXT FE PCT	PHOS 651A EXT TOTL PCT	EXTRACTABLE BASES 584A- -)				ACTY SUM EXTB TEA K G/100	AL 6M1A KCL EXTB NHAC ACTY G-	(CAT EXCH) 5A3A 5A6A NHAC NHAC ACTY	RATIO 8D1 8D3 CA TO CLAY	RATIO 8D3 TO NHAC	CA SAT NHAC PCT	(BASE SAT) 5F SC3 EXTB NHAC PCT
				6M2E CA	6O2D MG	6P2A NA	6Q2A K							
00-4	0.23	0.3		8.3C	1.2C	0.2	0.9	10.6					10.7	
4-23	0.27	0.3		10.1C	1.2C	0.2	0.6	12.1					10.4	
23-57	0.15	0.3		8.9C	1.1C	0.2	0.3	10.5					8.3	
57-82	0.11	0.3		7.8C	1.4C	0.3	0.3	9.8					7.0	
82-104	0.05	0.4		8.4C	2.3C	0.7	0.4	11.8					10.2	
104-131	0.04	0.3		11.4C	4.2C	1.3	0.5	17.4					15.1	
131-154	0.01	0.3		9.1C	3.7C	1.4	0.4	14.6					12.5	
154-186	0.06	0.3		6.1C	2.7C	1.7	0.3	10.8					9.6	

DEPTH CM	(SATURATED PASTE)		NA 502 ESP PCT	NA SAR	SALT TOTL SOLU PPH	GYP 6F1A PCT	SATURATION EXTRACT 8A1- - - - -)										ATTERBERG	
	8E1 REST OHM- CH	8C1B PH					8A H2O	8D5 EC	6N1B CA	6O1B MG	6P1A NA	6Q1A K	6I1A CO3	6J1A MCO3	6K1A CL	6L1A SO4	6M1A NO3	4F1 LOID
00-4	3600	8.0	19.8	2	90	0.75	5.0	0.9	0.1	0.6								
4-23	3600	7.9	20.8	2	80	0.57	4.2	0.7	0.2	0.2								
23-57	2000	7.7	22.6	2	260	1.72	14.8	2.6	1.3	0.1								
57-82	1800	7.7	19.9	3	360	2.59	20.0	5.0	3.6	0.2								
82-104	1800	7.7	22.7	5	310	2.04	10.5	4.0	6.7	0.2								
104-131	1600	7.9	34.3	7	5	1.22	2.9	1.4	6.9	0.1								
131-154	1800	7.9	29.4	9	7	1.25	2.1	1.1	8.4	0.1								
154-186	2000	8.0	24.4	15	10	1.72	1.8	1.2	11.9	0.1								

(A) ESTIMATED.
 (B) 2.2 KG/M SQ TO 111 CM (METHOD 6A).
 (C) METHOD 6M4C FOR CA AND 6O4C FOR MG.
 (D) CARBONATE-FREE BASIS; OTHER DATA ON CARBONATE-CONTAINING BASIS.

Soil Classification: Typic Haplargid, coarse-loamy, mixed, thermic.

Series: Sonoita

Pedon No.: S72NMex-7-3

Location: In the NE 1/4 SW 1/4 Sec. 30, T23S, R1E, about 74 m east of road and 1 km north of pedon S61(65)NMex-7-8. About 4 m east of S72NMex-7-2, and in the center of a large pipe.

Geomorphic Surface: La Mesa (lower).

Land Form: Relict basin floor; level.

Elevation: 4200 feet

Parent Materials: Upper Camp Rice Formation (fluvial facies), consisting mostly of noncalcareous sand, with a few rounded pebbles of mixed lithology.

Vegetation: Mesquite on scattered low dunes; barren between dunes.

Collected by: L. H. Gile, April 28, 1972.

Described by: L. H. Gile.

Soil Surface. The surface is covered with about 20% of fine, rounded pebbles, mostly quartz, chert, rhyolite, and granite. Most of the pebbles range from about 1/2 to 3 cm diameter.

A2 72L561 0-4 cm. Brown (7.5YR 5.5/4, dry, 7.5YR 4.5/4, moist) fine sandy loam; mostly weak fine and medium platy, with some weak very fine crumb; soft; very few roots; upper 1-2 mm effervesces strongly, noncalcareous below; abrupt smooth boundary.

B11tca 72L562 4-23 cm. Brown (7YR 5/4, dry) or dark brown (7YR 4/4, moist) fine sandy loam; massive; slightly hard, very friable; few roots; silicate clay coatings on sand grains; few insect tunnels, 1-5 mm diameter, empty, a few short carbonate filaments in spots; generally noncalcareous, but effervesces weakly in the carbonate accumulations and in the lower part of the horizon; clear wavy boundary.

B12tca 72L563 23-57 cm. Brown (7YR 5/4, dry) or dark brown (7YR 4/4, moist) fine sandy loam; very weak medium subangular blocky; slightly hard, very friable; few roots; a few carbonate filaments; some grains have coatings of oriented clay; scattered insect burrows, 1/4 - 1 cm diameter, some empty and some filled with dark fine earth; effervesces strongly; clear wavy boundary.

B13tca 72L564 57-82 cm. Yellowish red (5YR 5.5/6, dry, 5YR 4/6, moist) light fine sandy loam; weak medium subangular blocky; slightly hard, very friable; very few roots; silicate clay coatings on grains in low-carbonate parts; a few carbonate filaments; a few pebbles, with thin, discontinuous carbonate coatings; a few carbonate nodules, mostly in lower part; common fine tubular pores; few empty insect burrows; most parts effervesce strongly, a few parts effervesce weakly; clear wavy boundary.

B14tca 72L565 82-104 cm. Reddish yellow (5YR 6/6, dry) or yellowish red (5YR 4.5/6, moist) fine sandy loam; weak medium subangular blocky; very hard, friable; very few fine roots; a few carbonate filaments; a few small carbonate cylindroids start in this horizon and descend into horizons beneath; oriented clay coatings on grains in low-carbonate parts; few empty insect burrows; generally effervesce weakly and strongly, a few parts noncalcareous; clear wavy boundary.

B21tca 72L566 104-131 cm. Dominantly yellowish red (5YR 5/4, dry, 5YR 4/6, moist) sandy clay loam; moderate coarse and medium subangular blocky; very hard, friable; few fine roots; one dead shrub root about 1/2 cm. thick; few empty insect tunnels 1/4 to 1/2 cm across, some empty, some filled with dark fine earth; common carbonate filaments and ped coatings; a few carbonate cylindroids; sand grains in low-carbonate parts coated with oriented clay; common fine tubular pores, some empty but others lined or filled with carbonate; generally effervesces weakly and strongly, with a few ped interiors noncalcareous; clear wavy boundary.

B22tca 72L567 131-154 cm. Yellowish red (5YR 5.5/6, dry, 5YR 4.5/6, moist) heavy fine sandy loam; moderate coarse and medium subangular blocky; very hard; friable; very few fine roots; sand grains in low-carbonate parts coated with oriented clay; common carbonate filaments and coatings on peds; carbonate cylindroids, generally soft, descend from overlying horizon; laterally there is a zone about 10 cm across, filled with soft sand, and old krotovina; insides of most peds noncalcareous, outsides of many effervesce strongly; clear wavy boundary.

B3tca 72L568 154-186 cm. Dominantly reddish yellow (5YR 6/6, dry) or yellowish red (5YR 5/6, moist) fine sandy loam, with some parts slightly redder; weak coarse subangular blocky; very hard, friable; no roots; oriented clay coatings on sand grains in low-carbonate parts; some ped faces discontinuously coated with clay that is slightly darker than above; carbonate filaments and discontinuous coatings on some peds, and a few vertical carbonate cylindroids; coatings and cylindroids descend from horizon above; a few elliptical zones, 5-12 cm across, are sand, noncalcareous, massive and soft, and appear to be old krotovinas; generally noncalcareous, but there is strong effervescence in zones of carbonate accumulation.

209. Descriptions of soils at Soil Moisture Sites A-G.

Site A

Soil: Canutio, loamy subsoil variant.

Classification: Typic Torriorthent, coarse-loamy, mixed, thermic.

Soil Surface: About 50% covered with rhyolite and monzonite pebbles, most of which range from 1-2 cm in diameter, with a few up to 3 cm diameter.

A2 0-4 cm. Pinkish gray (7.5YR 6/3, dry) or dark brown (7.5YR 4/3, moist) fine sandy loam, mainly weak fine platy structure and soft, with some parts a loose mass of soft fine crumbs; very few roots; noncalcareous; mildly alkaline; abrupt smooth boundary.

B 4-20 cm. Light brown (7.5YR 5.5/4, dry) or dark brown (7.5YR 4/4, moist) gravelly sandy loam; massive, slightly hard, friable; very few roots; clay coatings on sand grains and pebbles; occasional very gravelly lenses up to about 5 cm thick and 40 cm long; effervesces weakly in the lower 2 cm of the horizon where scattered pebbles have carbonate coatings on their undersides, otherwise, noncalcareous; mildly alkaline; clear wavy boundary.

2C1ca 20-33 cm. Light brown (7.5YR 6/4, dry) or brown (7.5YR 4.5/4, moist) very gravelly sandy loam; massive; soft, very friable; very few roots; thin carbonate coatings on pebbles; effervesces strongly; moderately alkaline; clear wavy boundary.

3C2ca 33-52 cm. Light brown (7.5YR 6/4, dry) or brown (7.5YR 4.5/4, moist) gravelly sandy loam; weak medium subangular blocky structure; slightly hard, friable; very few roots; a few carbonate filaments; pebbles and sand grains thinly carbonate-coated; effervesces strongly; moderately alkaline; clear wavy boundary.

3C3ca 52-67 cm. Light brown (7.5YR 6/4, dry) or brown (7.5YR 4.5/4, moist) gravelly light sandy loam; massive; soft, very friable; very few roots; thin, discontinuous carbonate coatings on pebbles and sand grains; several pockets and lenses of very gravelly materials ranging from 5-25 cm in diameter; in places the lower 1-2 cm is a fine gravelly loamy sand; effervesces strongly; moderately alkaline; abrupt and clear wavy boundary.

3Btcab 67-80 cm. Reddish brown (5YR 5/4, dry; 5YR 4/4, moist) gravelly light sandy clay loam; weak medium and fine subangular blocky structure; slightly hard; friable, very few fine roots; clay coatings on sand grains and pebbles; common carbonate filaments; pebbles thinly coated with carbonate; generally effervesces strongly; a few parts effervesce weakly; moderately alkaline; abrupt wavy boundary.

4K & Ccab 80-102 cm. Dominantly pinkish white (7.5YR 8/2, dry) or pink (7.5YR 8/4, moist) with lesser amounts of light brown (7.5YR 6/4, dry) or brown (7.5YR 5/4, moist) gravelly to very gravelly sandy loam; massive; slightly hard and hard, friable, and firm; no roots; grains in light-colored volumes are separated by carbonate; grains in darker-colored material are

usually in contact but do have a few thin discontinuous carbonate coatings; in places, texture is a gravelly sand in the lower 2 cm; effervesces strongly; moderately alkaline; abrupt smooth boundary.

5Btcab2 102-123 cm. Reddish brown (5YR 5/4, dry; 5YR 4/4, moist) gravelly sandy clay loam; weak medium and fine subangular blocky structure; hard, friable, and firm; no roots; clay coatings on sand grains; common carbonate filaments and pebble coatings; effervesces strongly in most places, a few areas effervesce weakly or are noncalcareous; moderately alkaline; abrupt smooth boundary to underlying petrocalcic horizon.

Remarks: The increase in clay from A to B is too slight for an argillic horizon. The B horizon is too thin for a cambic horizon since the carbonate maximum starts at 20 cm (Soil Survey Staff, in press). There is not enough carbonate for a calcic horizon. The soil may be a Torrifulvent, but analyses of similar horizons in similar positions indicate that both amounts and irregular decrease in organic carbon are questionable for a Fluvent. Therefore, the soil is considered to be a Torriorthent. The soil from 0 to 67 cm has formed in Organ alluvium and is less than 5000 years old. The buried soil from 67 to 102 cm is considered to be of Isaacks' Ranch age and is thought to have formed largely during latest Pleistocene. The second buried soil, below 102 cm and including the petrocalcic horizon, is considered to be of Jornada II age formed entirely during late Pleistocene.

Site B

Soil: Stellar, wedgy subsoil variant

Classification: Ustollic Haplargid, fine, mixed, thermic.

Soil Surface: There are scattered small depressions, commonly 20-30 cm deep and 10-40 cm in diameter, but in places linear and ranging up to several meters long. Tubes extend from some of the depressions into the Bt horizon.

A2 0-7 cm. Light gray (10YR 7/2, dry) or grayish brown (10YR 4.5/2, moist) loam; weak fine and very fine crumb in upper part, weak medium subangular blocky and coarse platy below; slightly hard and hard, friable; common roots; effervesces strongly; moderately alkaline; abrupt smooth boundary.

Blt 7-15 cm. Light brown (7.5YR 6/4, dry) or brown (7.5YR 5/4, moist) heavy clay loam in upper part, clay in lower part; weak medium subangular blocky structure, very and extremely hard, firm; common roots; effervesces strongly; moderately alkaline; clear smooth boundary.

B21t 15-43 cm. Brown (7.5YR 5/4, dry) or dark brown (7.5YR 4/4, moist) clay; moderate medium and coarse blocky structure; blocks separated by an irregular network of cracks up to 0.5 cm in diameter; this material easier to remove than that below; common roots; extremely hard, very firm; effervesces strongly; clear wavy boundary.

B22t 43-75 cm. Brown (7.5YR 5/4, dry) or dark brown (7.5YR 4/4, moist) clay; dominantly moderate coarse platy and wedgy, with some weak medium subangular blocky structure; plates and wedges nearly horizontal ranging from about 0.5-2

argillic horizons and that lack the plates and wedges in the Bt horizon. Prior to development of the plates and wedges, the described soil is thought to have had an argillic horizon similar to that of the adjacent soils. Therefore, part of the clay in the present platy and wedgy horizon is considered to be of illuvial origin, accumulated earlier in the history of the soil. Vertical cracks of the described width in the B2lt horizon developed only after the pit had been open and the soil had dried for several days. The soil was fairly dry when the pit was dug in May 1971, with no effective rain since August 1970.

Site C

Soil: Stellar

Classification: Ustollic Haplargid, fine, mixed, thermic.

Soil Surface: The soil surface between grass clumps is cracked into smooth-topped polygons ranging from 1-5 cm in diameter. Cracks between polygons range from 0.5-1 mm in width. The topmost part of the polygons is readily removed and disengages as a plate ranging from about 2-8 mm in diameter. The soil surface as a whole is very smooth with virtually no microrelief.

A2 0-5 cm. Light gray (10YR 7/2, dry) or dark brown (10YR 4/3, moist) clay loam; weak fine and medium platy; slightly hard, very friable; few roots; few fine and very fine tubular pores; effervesces strongly; moderately alkaline; abrupt smooth boundary.

A3 5-9 cm. Light brown (7.5YR 6/3, dry) or dark brown (7.5YR 4/3, moist) clay loam; weak fine subangular blocky structure; hard, friable; common roots, about 1 mm in diameter; horizon becomes redder in lower part; generally noncalcareous, effervesces weakly in places; mildly alkaline; abrupt smooth boundary.

B2lt 9-23 cm. Reddish brown (6YR 5/4, dry; 6YR 4/4, moist) clay; compound weak medium prismatic and weak medium and fine subangular blocky structure; very hard, firm; common roots, about 1 mm in diameter; sand grains coated with clay; noncalcareous; mildly alkaline; clear wavy boundary.

B22t 23-44 cm. Reddish brown (6YR 5/4, dry; 6YR 4/4, moist) heavy clay loam; weak coarse prismatic, breaking to weak medium subangular blocky structure; very hard, firm; few roots, about 1 mm diameter; sand grains coated with clay; effervesces strongly; moderately alkaline; clear wavy boundary.

B23tca 44-67 cm. Reddish brown (5YR 5/4, dry; 5YR 4/4, moist) clay; compound weak coarse prismatic and weak medium and coarse subangular blocky structure; very hard, firm; few roots, 0.5-1 mm in diameter; some ped faces have smooth, reflective faces; a few fine hard carbonate nodules ranging from 1-3 mm in diameter; sand grains coated with clay; effervesces strongly; moderately alkaline; clear smooth boundary.

B24tca 67-87 cm. Reddish brown (5YR 5/4, dry; 5YR 4/4, moist) clay, with a few spots slightly redder; compound weak coarse prismatic and weak medium and coarse subangular blocky structure; very hard, firm; very few roots; sand grains coated with clay; a few fine carbonate nodules ranging from 1-5 mm in diameter; a few carbonate filaments; some ped surfaces have smooth reflective faces; effervesces strongly; moderately alkaline; clear smooth boundary.

cm thick and up to 5 cm long; extremely hard, very firm; a few roots ranging from about 0.5-1 mm thick; slickensides on some ped faces; blocks, plates, and wedges tightly packed and difficult to remove with a hammer; a few vertical cracks ranging from < 0.5-1 mm in width extend into this horizon from the overlying horizon, and there are also cracks, commonly horizontal or nearly so, about 0.5 mm or less in width, between the structural units; effervesces strongly; moderately alkaline; clear smooth boundary.

K & B 75-90 cm. Dominantly pink (7.5YR 8/4, dry) or light brown (7.5YR 5/4, dry) or dark brown (7.5YR 4/4, moist) clay; dominantly weak medium subangular and angular blocky, but both high-carbonate parts (light-colored) and low-carbonate parts (dark-colored) are usually arranged in roughly vertical strips ranging from 1-10 mm in diameter; a few wedges and plates, 1-2 cm thick and 2-4 cm long; very hard, firm; very few roots; a few carbonate filaments; a few hard carbonate modules; harder than underlying horizons; effervesces strongly; moderately alkaline; clear smooth boundary.

K2 90-112 cm. Dominantly pinkish white (7.5YR 8/2, dry) or light brown (7.5YR 6/4, moist) with lesser amounts of light brown (7.5YR 6/4, dry) or brown (7.5YR 5/4, moist) silty clay loam; weak medium subangular blocky structure; hard, firm; no roots; light colored, high-carbonate zones occur in irregular masses between which are darker-colored zones lower in carbonate; few very fine tubular pores; effervesces strongly; moderately alkaline; clear wavy boundary.

Bcacs 112-133 cm. Light brown (7.5YR 6/4, dry) or brown (7.5YR 5/4, moist) heavy clay loam; compound weak medium prismatic and weak and moderate, fine and medium subangular blocky structure; hard, firm; no roots; few carbonate nodules, 1-5 mm in diameter; powdery, fine gypsum crystals on ped surfaces in a few places; common very fine tubular pores; moderately alkaline; effervesces strongly; clear wavy boundary.

Bltcacsb 133-152 cm. Dominantly light brown (7.5YR 6/4, dry) or brown (7.5YR 5/4, moist) with a few parts reddish brown (5YR 5/4, dry; 5YR 4/4, moist) heavy clay loam; weak medium subangular blocky structure; hard, firm; no roots; a few powdery discontinuous gypsum coatings on ped faces; common fine and very fine tubular pores some of which are lined with reddish brown material; effervesces strongly; moderately alkaline; clear wavy boundary.

B2tcacsb 152-163 cm. Reddish brown (5YR 5/4, dry; 5YR 4/4, moist) clay loam; weak fine and medium subangular blocky structure; hard, firm; no roots; black (Mn? Fe?) filamentary coatings on many ped faces; few gypsum filaments; a few carbonate filaments and nodules; many ped faces smooth and reflective; generally effervesces strongly, but a few parts noncalcareous; moderately alkaline.

Remarks: Some of the clay in the Bt horizon is thought to be of sedimentary origin, placed by movement of clay-laden water into the holes and along cracks in the Bt horizon when it is dry. However, this soil is considered to have an argillic horizon on the following evidence: (1) there is an increase in clay from A to B; (2) although no thin sections were made of the B horizon, judging from thin sections of similar materials, the required amount of oriented clay is present; and (3) the horizon may be traced laterally to soils of the same surface, of the same age, and only a few meters away that do have demonstrable

K & Bt 87-118 cm. About equal parts of high-carbonate material, pinkish white (7.5YR 8/2, dry) or light brown (7.5YR 7/4, moist) with parts whiter, and parts containing less carbonate, light brown (7.5YR 6/4, dry) or brown (7.5YR 5/4, moist) and reddish brown (5YR 5/4, dry; 5YR 4/4, moist) clay loam; weak medium subangular blocky structure; dominantly hard, firm; very few roots; carbonate occurs as nodular and cylindroidal forms and as masses of irregular shape with consistence ranging from slightly to very hard; effervesces strongly; moderately alkaline; clear wavy boundary.

K21 118-134 cm. Dominantly pinkish white (7.5YR 8/2, dry), pink (7.5YR 7/4, moist), or light brown (7.5YR 6/4, moist) with lesser amount pink (7.5YR 7/4, dry, a few stainings of pink (5YR 8/4 dry) or reddish brown (5YR 5/4, dry) heavy clay loam; weak medium and coarse platy structure; hard, firm; no roots; effervesces strongly; moderately alkaline.

Remarks: Only the upper subhorizon of the thick K horizon is described here. See Appendix for description and laboratory data for the full thickness of a similar pedon (60-21).

Site D

Soil: Reagan.

Classification: Ustollic Calciorthid, fine-silty, mixed, thermic.

Soil Surface: The surface is cracked into polygons ranging from about 1-3 cm in diameter. Most cracks between polygons are less than 0.5 mm wide. Fragments of loose drying platelets, 1-2 mm thick, occur on the surface around the grass clumps. Tops of polygons are easily removed as plates which range from about 2-8 mm thick. A few pebbles of mixed lithology occur near the moisture blocks. Most pebbles range from about 1-2 cm in diameter; a few range up to 4 cm in diameter. There is very little microrelief in the surface as a whole.

A 0-4 cm. Light brownish gray (10YR 6.5/2, dry) or dark brown (10YR 4.5/3, moist) clay loam; weak fine and medium platy structure; slightly hard; few and common roots; few very fine tubular pores; effervesces strongly; moderately alkaline; abrupt smooth boundary.

A3 4-10 cm. Light brownish gray (10YR 6.5/2, dry) or dark brown (10YR 4/3, moist) silty clay loam; weak coarse subangular blocky structure; very hard, firm; few fine and very fine tubular pores; common roots; effervesces strongly; moderately alkaline; clear smooth boundary.

B1 10-26 cm. Light brown (7.5YR 6/4, dry) or brown (7.5YR 5/4, moist) clay loam; weak fine and medium subangular blocky structure; slightly hard and hard, friable; common roots, 0.5-1 mm thick; few very fine tubular pores; effervesces strongly; moderately alkaline; clear wavy boundary.

B21ca 26-53 cm. Light brown (7.5YR 6/4, dry) or brown (7.5YR 4.5/4, moist) silty clay loam; compound weak medium prismatic and weak fine and medium subangular blocky structure; hard, friable; few roots; few carbonate filaments; a few insect burrows, 0.5-1 cm diameter, most filled or partly filled with fine earth; effervesces strongly; moderately alkaline; clear wavy boundary.

B22ca 53-79 cm. Light brown (7YR 5.5/4, dry; 7YR 4/4, moist) heavy clay loam; compound moderate medium prismatic and weak medium subangular blocky structure; hard, friable; few fine roots, about 0.5 mm in diameter; few fine and very fine tubular pores; effervesces strongly; moderately alkaline; clear smooth boundary.

K & B 79-95 cm. Dominantly pink (7.5YR 7/4, dry; 7.5YR 5/4, moist) heavy clay loam, common carbonate nodules, very pale brown (10YR 9/3-7/3, dry); weak medium and fine subangular blocky structure; slightly hard and hard, friable; very few fine roots; moderately alkaline; effervesces strongly; clear wavy boundary.

B2tcab 95-122 cm. Dominantly reddish brown (5YR 5/5 and 5YR 5/4, dry; 5YR 4/5 and 5YR 4/4, moist) with some parts light brown (7.5YR 6/4, dry) sandy clay loam; compound weak medium prismatic and weak fine and medium subangular blocky structure; hard, friable; no roots; sand grains in reddish brown parts stained with clay; common carbonate nodules and cylindroids, 0.5-2 cm diameter, ranging from slightly to very hard; reddish brown parts effervesce weakly, rest effervesce strongly; moderately alkaline; clear smooth boundary to underlying K2b horizon.

Remarks: The B2 horizon was not examined in thin section. However, judging from microscopic observations of similar horizons, it seems questionable that the 1% of oriented clay required for the argillic horizon (Soil Survey Staff, in press) is present, and this soil is therefore considered to be a Calciorthid. The buried soil rises to the west as the Stellar soil and is more deeply buried to the east. The soil surface was described inside the enclosure containing the moisture blocks because of trampling by cattle outside the enclosure.

Site E

Soil: Algerita, deep gypsum phase.

Classification: Typic Calciorthid, fine-loamy, mixed, thermic.

Soil Surface: Weakly crusted between grass clumps.

C 0-3 cm. Light brown (8YR 6.5/4, dry) or brown (8YR 5/4, moist) light fine sandy loam; single grain; loose; no roots; effervesces strongly; moderately alkaline; abrupt smooth boundary.

A1 3-12 cm. Light gray (10YR 7/2, dry) or brown (10YR 5/3, moist) heavy fine sandy loam; massive and weak medium platy structure; hard, friable; few roots; common fine and medium tubular pores; effervesces strongly; moderately alkaline; abrupt smooth boundary.

B11 12-31 cm. Light gray (10YR 7/2, dry) or brown (10YR 5/3, moist) clay loam; compound weak coarse prismatic and weak medium subangular blocky structure; very hard, firm; few roots between grass clumps, common beneath clumps; few fine and medium tubular pores; a few insect burrows, 0.5-1 cm in diameter, some empty and some filled with fine earth; effervesces strongly; moderately alkaline; clear wavy boundary.

B12 31-50 cm. Pinkish gray (7.5YR 6.5/3, dry) or brown (7.5YR 5/3, moist)

light sandy clay loam; compound weak medium prismatic and weak medium subangular blocky structure; very hard, firm; very few roots; very few fine tubular pores; an occasional carbonate nodule, about 0.5 cm in diameter; effervesces strongly; moderately alkaline; clear wavy boundary.

B21ca 50-65 cm. Pinkish gray (7.5YR 7/3, dry) or brown (7.5YR 5/4, moist) silty clay loam; compound weak medium prismatic and weak fine and medium subangular blocky structure, slightly hard and hard, friable; very few roots; few very fine tubular pores; very few carbonate nodules ranging from 1-4 mm in diameter; effervesces strongly; moderately alkaline; clear wavy boundary.

B22ca 65-90 cm. Pinkish gray (7.5YR 7/3, dry) or brown (7.5YR 5/4, moist) silty clay loam; compound moderate fine and medium prismatic and weak fine and medium subangular blocky structure; slightly hard and hard, friable; no roots; few carbonate nodules ranging from about 1-4 mm in diameter; effervesces strongly; moderately alkaline; clear wavy boundary.

B23ca 90-112 cm. Very pale brown (10YR 7/3, dry) or brown (10YR 5/3, moist) silty clay loam; compound moderate fine and medium prismatic and weak medium and fine subangular blocky structure; hard and slightly hard, friable; no roots, common very fine tubular pores; few carbonate nodules; effervesces strongly; moderately alkaline; clear wavy boundary.

2C1ca 112-120 cm. White (10YR 9/2, dry) or light gray (10YR 7/2, moist) loam; compound weak medium prismatic and weak medium subangular blocky structure; slightly hard and hard, friable; no roots; common very fine tubular pores; carbonate occurs as scattered grain coatings; some fine-grained gypsum is present; this horizon is absent in places along the trench exposure; effervesces strongly; moderately alkaline; abrupt smooth boundary.

2C2ca 120-138 cm. White (10YR 8/2, dry) or pale brown (10YR 6/3, moist) sandy loam; massive; very hard, firm; no roots; the material consists largely of fine-grained gypsum; one crack filling, nearly vertical, consists largely of gypsum and is about 1 mm thick; common very fine tubular pores; carbonate occurs as scattered faint patches and grain coatings; effervesces strongly; moderately alkaline.

Remarks: The stratigraphy and chronology of the materials in and adjacent to the palya are not known. Gypsum in the horizons from 112-138 cm is considered to be of geologic (lacustrine) origin instead of pedologic origin. The material from 0-112 cm is considered to be alluvium of latest Pleistocene or early to mid-Holocene age. This soil is designated "Algerita, deep gypsum phase" to distinguish it from Algerita soils, which lack such gypsum deposits.

Site F

Soil: Onite, buried soil variant.

Classification: Typic Haplargid, coarse-loamy, mixed, thermic.

Soil Surface: The surface is smooth and bare because of strong erosion by wind. Along the fences and around a few plants, there is an accumulation of sand, apparently of very recent origin.

B2t 0-18 cm. Reddish brown (5YR 5/5, dry; 5YR 4/5, moist) fine sandy loam; very weak medium subangular blocky structure; slightly hard; very friable;

few roots; a few fine and very fine tubular pores; silicate clay coatings on sand grains; few termite tunnels; noncalcareous; mildly alkaline; clear wavy boundary.

B31t 18-34 cm. Reddish brown (5YR 5/5, dry; 5YR 4/5, moist) light fine sandy loam; massive; slightly hard, very friable; very few roots; clay coatings on sand grains; a few termite tunnels; noncalcareous; mildly alkaline; clear wavy boundary.

B32t 34-44 cm. Reddish brown (5YR 5.5/4, dry; 5YR 4.5/4, moist) loamy sand; massive and single grain; soft and slightly hard, very friable and friable; very few roots; in places, tongues of sandy loam extend irregularly upward from the underlying horizon; generally noncalcareous, but effervesces weakly in a few spots; mildly alkaline; clear and abrupt, wavy and irregular boundary.

Bltcab 44-60 cm. Reddish brown (5YR 5.5/4, dry; 5YR 4.5/4, moist) heavy sandy loam; compound weak coarse prismatic and weak medium subangular blocky structure; hard, friable; very few roots; clay coatings on sand grains; few carbonate filaments; distinctly firmer and harder in place than the overlying horizon; commonly effervesces strongly, noncalcareous in a few places; moderately alkaline; clear wavy boundary.

B2ltcab 60-76 cm. Light reddish brown (6YR 6/4, dry) or reddish brown (6YR 4.5/4, moist) light sandy clay loam; compound weak coarse prismatic and weak medium and coarse subangular blocky structure; hard, friable; very few roots; a few volumes of yellowish red (5YR 5/6, dry; 5YR 4/6, moist); few dark insect burrow fillings, 0.5-1 cm in diameter; common carbonate filaments; few very fine tubular pores; clay coatings on some sand grains; most parts effervesce strongly, a few weakly; moderately alkaline; clear wavy boundary.

B22tcab 76-90 cm. Dominantly light brown (7.5YR 6/5, dry) or brown (7.5YR 5/5, moist) light sandy clay loam; compound weak coarse prismatic and weak medium subangular blocky structure; hard and very hard, friable and firm; no roots; common carbonate nodules, white (10YR 9/2, dry) or pink (10YR 8/4, moist); a few parts yellowish red (5YR 5/6, dry; 5YR 4/6, moist); few fine tubular pores; few carbonate filaments; sand grains in yellowish red parts have clay coatings; few dark, fine-earth insect burrow fillings, 0-5-1 cm in diameter; most parts effervesce strongly, yellowish red parts effervesce weakly; moderately alkaline; clear wavy boundary.

B23tcab 90-103 cm. Dominantly reddish brown (5YR 5.5/5, dry; 5YR 4.5/5, moist) with smaller amounts of light brown (7.5YR 6/5, dry) or brown (7.5YR 4/5, moist) light sandy clay loam; compound weak coarse prismatic and very weak medium subangular blocky structure; hard and very hard, friable and firm; no roots; a few carbonate nodules, white (7.5YR 9/2, dry) or pinkish white (7.5YR 8/2, moist); clay coatings on sand grains in reddish brown parts; few fine tubular pores; in places this horizon is absent and the B22tcab rests directly on the K2; most parts effervesce weakly, some parts noncalcareous; moderately alkaline; clear smooth boundary.

K2b 103-126 cm. Pinkish white (7.5YR 8/2, dry; 7.5YR 7/4, moist) sandy clay loam, a few parts light brown (7.5YR 6.5/4, dry) or brown (7.5YR 5.5/4 moist), and reddish brown (5YR 5/4, dry, or 5YR 4/4, moist); weak medium and coarse

subangular blocky structure; very hard, firm; few very fine tubular pores; sand grains separated by carbonate; grades to less carbonate with depth; no roots; moderately alkaline; effervesces strongly.

Remarks: Sediments from 0-44 cm are considered to be a deposit considerably younger than the materials below, and may mark a period of instability during the Holocene. The extent of this apparently younger deposit is not known. The lack of an A horizon, the Bt horizon at the surface, sand accumulations around shrubs, and sand piled along the enclosure fences--all indicate considerable wind erosion during recent years. This soil is designated "Onite, buried soil variant" because of the buried soil at shallow depths.

Site G

Soil : Hueco

Classification: Petrocalcic Paleargid, coarse-loamy, mixed, thermic.

Soil Surface: A few indurated carbonate nodules, most less than 2 cm in diameter, are scattered over the surface.

C 0-5 cm. Light brown (7.5YR 6/4, dry) or brown (7.5YR 5/4, moist) sand; loose and soft; single grain and massive; few roots; noncalcareous; mildly alkaline; abrupt smooth boundary.

A2 5-10 cm. Reddish brown (6YR 5.5/4, dry; 6YR 4.5/4, moist) light fine sandy loam; massive; soft, very friable; very few roots; noncalcareous; mildly alkaline; abrupt smooth boundary.

Blt 10-23 cm. Reddish brown (5YR 5/4, dry; 5YR 4/4, moist) light fine sandy loam; massive; slightly hard, friable; very few roots; clay coatings on sand grains; few fine tubular pores; noncalcareous; mildly alkaline; clear wavy boundary.

B2lt 23-36 cm. Reddish brown (5YR 5.5/4, dry; 5YR 4/4, moist) fine sandy loam; massive; slightly hard to hard, friable; harder in place than above; very few roots; clay coatings on sand grains; common fine and very fine tubular pores; noncalcareous; mildly alkaline; clear wavy boundary.

B22tca 36-46 cm. Light reddish brown (6YR 6/4, dry) or reddish brown (6YR 5/4, moist) fine sandy loam; massive, slightly hard to hard, friable; very few roots; clay coatings on some sand grains; carbonate coatings on some grains, and a few carbonate filaments; few fine tubular pores; effervesces weakly and strongly; moderately alkaline; clear wavy boundary.

B3ca 46-71 cm. Light brown (6YR 6.5/4, dry) or reddish brown (6YR 4.5/4, moist) heavy sandy loam; very weak medium subangular blocky structure; generally slightly hard with some parts hard, friable; no roots; common carbonate filaments and grain coatings; few fine tubular pores; effervesces strongly; moderately alkaline; abrupt wavy boundary.

Kl 71-79 cm. Light reddish brown (6YR 6/4, dry) reddish brown (6YR 5/4, moist) very gravelly sandy loam; a loose mass of very fine crumbs between the indurated carbonate nodules that constitute the gravel; most nodules are less than

5 cm in diameter; nodules have pustulose surfaces; surfaces of nodules are stained reddish brown but interiors are commonly white (10YR 8/2, dry) or very pale brown (10YR 7/3, moist); effervesces strongly; moderately alkaline; abrupt wavy boundary.

K2m 79-90 cm. Dominantly white (10YR 8/2, dry) or very pale brown (10YR 7/3, moist) carbonate-cemented material; massive; extremely hard, extremely firm; indurated; no roots; sand grains widely separated by carbonate; carbonate laminae occur discontinuously in upper part; effervesces strongly; moderately alkaline.

Remarks: Thickness of the petrocalcic horizon (the upper boundary of which is at 79 cm) is not known. However, based on exposures elsewhere, it is believed to grade through a transitional horizon with less carbonate into unconsolidated sand, possibly with some gravel, at a depth of several meters.

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