Soil Survey Investigations Report No. 28

Soil Survey Laboratory Data and Descriptions for Some Soils of...

..ARIZONA

SOIL CONSERVATION SERVICE • U.S. DEPARTMENT OF AGRICULTURE
In cooperation with
ARIZONA AGRICULTURAL EXPERIMENT STATION

Soil survey investigations reports already published:

SSIR No. 1 Soil Survey Laboratory Methods and Procedures for Collecting Soil Samples

Soil Survey Laboratory Data and Descriptions for Some Soils of:

SSIR No. 2 North Dakota
SSIR No. 3 Iowa
SSIR No. 4 Kansas
SSIR No. 5 Nebraska
SSIR No. 6 Arkansas, Louisiana, and Missouri
SSIR No. 7 Montana
SSIR No. 8 Wyoming
SSIR No. 9 Minnesota
SSIR No. 10 Colorado
SSIR No. 11 Oklahoma
SSIR No. 12 Puerto Rico and the Virgin Islands
SSIR No. 13 Mississippi
SSIR No. 14 Kentucky
SSIR No. 15 Tennessee
SSIR No. 16 North Carolina, South Carolina, and Georgia
SSIR No. 17 Wisconsin
SSIR No. 18 Indiana
SSIR No. 19 Illinois
SSIR No. 20 New England States
SSIR No. 21 A Toposequence of Soils in Tonalite Grus in the Southern California Peninsular Range

Soil Survey Laboratory Data and Descriptions for Some Soils of:

SSIR No. 22 Alabama and Florida
SSIR No. 23 Nevada
SSIR No. 24 California
SSIR No. 25 New York
SSIR No. 26 New Jersey
SSIR No. 27 Pennsylvania

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August 1974

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METHODS CODE SYMBOLS

1. SAMPLE COLLECTION AND PREPARATION
   A. Field sampling
      1. Site selection
      2. Soil sampling
         a. Stony soils
         b. Marsh and swamp soils
   B. Laboratory preparation
      1. Standard (airdry)
         a. Square-hole 2-mm sieve
         b. Round-hole 2-mm sieve
      2. Field moist
      3. Carbonate-containing material
      4. Carbonate-indurated material
2. CONVENTIONS
   A. Size-fraction base for reporting
      1. <2-mm
      2. < size specified
   B. Data sheet symbols
      tr: trace, not measurable by quantitative procedure used or less than reportable amount
      -: analysis run but none detected
      blank: analysis not run
      nd: analysis not run
      <: less than reported amount or none present
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         c. Water-dispersible clay
      2. Moist samples
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         b. Fine clay
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         b. From volume and weight estimates
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         f. 1/3-bar desorption III
         g. 1/10-bar desorption
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         a. Sieved samples
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         b. Sum of bases plus Al
      6. NH_4OAc, pH 7.0, leaching tube
         a. Direct distillation
   B. Extractable bases
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         a. Uncorrected
         b. Corrected (exchangeable)
         c. See 5B4
      3. KCl-TEA, pH 8.2 (revised)
         a. Uncorrected
         b. Corrected (exchangeable)
      4. NH_4OAc, pH 7.0 (modified)
         a. Uncorrected
         b. Corrected (exchangeable)
   C. Base saturation
      1. NH_4OAc, pH 7.0
      2. NaOAc, pH 8.2
      3. Sum of cations
   D. Sodium saturation (exchangeable Na pct.)
      1. NaOAc, pH 8.2
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   F. Calcium saturation
      1. NH_4OAc, pH 7.0
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         a. $FeSO_4$ titration
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      1. Kjeldahl digestion
         a. Ammonia distillation
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      1. Dithionite extraction
         a. Dichromate titration
         b. EDTA titration
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         a. Orthophenanthroline colorimetry
         b. Atomic absorption
      5. Sodium-pyrophosphate extraction
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      1. HCl treatment
         b. Manometric
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         a. Weight gain
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         a. Precipitation in acetone
         b. Indirect estimate
   G. Aluminum
      1. KCl extraction I, 30 min.
         d. Fluoride titration
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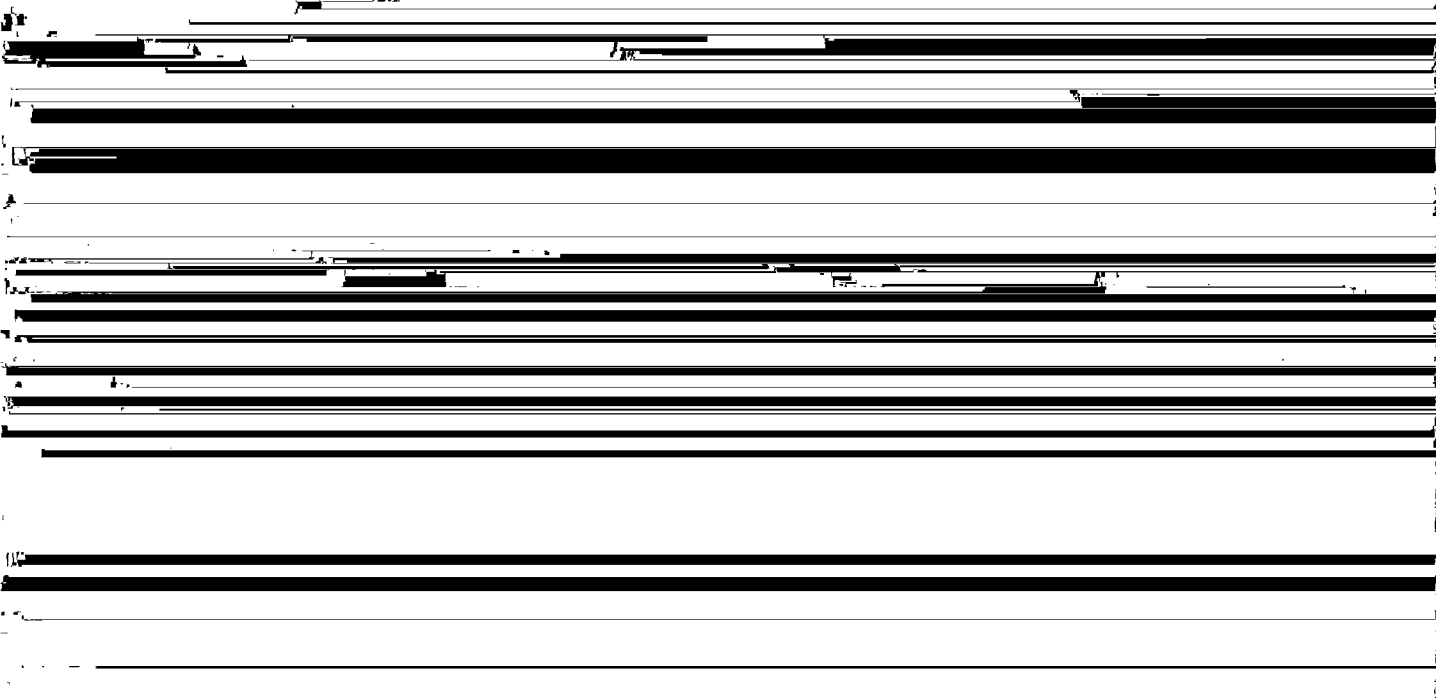

PREFACE

The Soil Survey Investigations Report (SSIR) series was established to preserve and make available technical information resulting from soil

[redacted]

Procedures for Collecting Soil Samples," revised April 1972, describes in detail the methods used in the soil survey laboratories. Most of the remaining reports are a collection of pedon descriptions and laboratory data for pedons from individual states and groups of states. SSIR No. 21 is a technical report on a specific study. The reports already published are listed on the inside front cover.

This report contains data from soil survey investigations in Arizona. These investigations have been going on since 1956 but most of the data have been accumulated since 1966. Some of the data and descriptions have appeared in technical journals, in regional bulletins, in USDA technical bulletins, and in the text of published soil surveys. But most have been distributed in unpublished form to those immediately concerned and were not available to all who might use them.

This report contains all the data from the soil survey laboratories that form reasonably complete characterization of soils in Arizona. While these data were being accumulated there were some changes in laboratory methods. Consequently, laboratory data for different soils cannot always be directly compared without allowance for the method. The methods used are identified by symbol in the column headings of the data tables. The codes are identified briefly on the opposite page.

Ways of describing soils have also changed. The soil descriptions published here were prepared as working documents. The soil scientist who wrote them had no idea they would be published. Editing has been limited for the most part to that necessary for conformance to the "Soil Survey Manual" USDA Handbook No. 18. Field estimates of texture have been retained, even though some are at variance with laboratory data, because the field estimates themselves are important data.

Many pedons are no longer representative of the soil series with which

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1. Apache
2. Cochise
3. Coconino
5. Graham
7. Maricopa
9. Navajo
10. Pima
11. Pinal
12. Santa Cruz
13. Yavapai

SOIL FAMILY: Typic Cryoboralf, fine-loamy, mixed

[redacted]

Depth (In.)	Horizon	1B1b Size class and particle diameter (mm) 3A1													Coarse fragments 2A2		
		Total			Sand					Silt		Int. II (0.2–0.02)	(2–0.1)				
		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)				≥ 2*	2 – 19	19 – 76
		← Pct. of < 2 mm →													Pct	← Pct. of < 76 mm →	
0- 1	A1	69.8	28.2	2.0	0.8	1.0	1.1	13.9	53.0	20.4	7.8	85.8	16.8		1		
1- 4	A21	63.1	33.1	3.8	1.1	1.0	0.8	11.4	48.8	21.5	11.6	81.0	14.3		15		
4-15	A22	64.4	30.2	5.4	0.6	1.0	1.1	12.1	49.6	20.0	10.2	81.1	14.8		26		
15-20	B1	56.7	19.2	24.1	0.6	1.6	2.7	14.4	37.4	10.7	8.5	61.8	19.3		3		
20-28	B2t	51.4	19.4	29.2	0.4	1.2	2.2	8.6	39.0	9.8	9.6	56.8	12.4		4		
28-40	B3t	46.3	24.3	29.4	0.6	0.9	0.5	5.6	38.7	11.7	12.6	55.5	7.6		4		
40-60+	C	58.2	27.6	14.2	4.1	4.9	2.4	7.6	39.2	13.1	14.5	58.5			11		

McVICKERS VERY FINE SANDY LOAM (taxadjunct) 1/
S62Ariz-3-18

Location: Long Valley Area, Arizona. NW 1/4 of Sec. 31, T14N, R10E, Coconino County, Arizona, Photo DGJ-8-178. 18 miles E. 45 miles S. of Flagstaff, Arizona. Date of Sampling: June 4, 1962.
Collectors: J.E. Jay, Truman Anderson, M.S. James, Y.H. Havens, R.E. Nelson, Stanley Buol and L. H Grant.
Classification: Typic Cryoboralf, fine-loamy, mixed.
Vegetation: Ponderosa pine with gambel oak and western wheatgrass, three-awn, Arizona fescue, mutton-grass and yarrow. Use: Grazed forest land. Climate: 20-22" precipitation - subhumid. Mean annual temperature 45°F. Parent Material: Calcareous fine grained sandstone - member of Kaibab Formation. Elevation: 6850 feet. Relief: Gently sloping, 3 percent slope to N-Northwest. Drainage: Well drained, slow permeability.
Remarks: Site is in small opening, so lacks normal O1 horizon. Is modal otherwise.

HORIZON	DESCRIPTION
	Thin covering of pine needles and partially decayed grass. Few angular sandstone cobbles and stones on surface.
A1 RSL 62258	0 to 1 inch, light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium platy structure breaking to weak fine crumb structure; slightly hard, very friable, nonsticky and nonplastic; abundant very fine roots; few fine tubular and many fine interstitial pores; common fine gravel, few cobbles and stones; strongly acid (pH 5.5); abrupt smooth boundary.
A21 RSL 62259	1 to 4 inches, light gray (10YR 7/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; massive structure breaking to weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; plentiful fine and very fine roots; few fine tubular and many fine interstitial pores; common fine gravel, few cobbles and stones; medium acid (pH 6.0); clear smooth boundary.
A22 RSL 62260	4 to 15 inches, very pale brown (10YR 7/3) very fine sandy loam, brown (10YR 5/3) moist; massive breaking to weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; plentiful fine and very fine roots; few fine tubular and many fine interstitial pores; common fine gravel, few cobbles and stones; medium acid (pH 6.0); clear wavy boundary. Thickness of A2 is 10-18" in pit.
B1 RSL 62261	15 to 20 inches, light brown (7.5YR 6/4) loam, yellowish red (5YR 5/6) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine and plentiful medium roots; few fine tubular and many fine interstitial pores; common fine gravel, few cobbles and stones; medium acid (pH 6.0); clear wavy boundary. Discontinuous horizon.
B2t	20 to 28 inches, reddish brown (5YR 5/4) light and reddish brown (5YR 6/4) [illegible]

62262 mottles are reddish yellow (7.5YR 7/6) and light yellowish brown (2.5Y 6/4) moist; moderate to strong fine, medium subangular and angular blocky structure; very hard, friable, sticky and plastic; thin clay films on ped faces; few small slickensides; few fine and abundant medium and coarse roots; common fine tubular and common fine interstitial pores; common fine gravel, few cobbles and stones; medium acid (pH 6.0); clear irregular boundary.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Cryoboralf, fine, montmorillonitic

SOIL McVickers very fine sandy loam SOIL Nos. S62Ariz-3-17 LOCATION Coconino County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62251 - 62257

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: >2* Pct.	Coarse fragments 2A2: 2 – 19 Pct. of <76 mm	Coarse fragments 2A2: 19 – 76 Pct. of <76 mm
		Size class and particle diameter (mm) 3A1 — Pct. of <2 mm																
1- 0	01	Organic Matter																
0- 4	A21	47.7	45.6	6.7	0.7	2.9	1.2	7.8	35.1	26.6	19.0	68.6	12.6			9		
4-12	A22	46.1	47.4	6.5	0.9	2.7	1.3	8.0	33.2	30.3	17.1	70.7	12.9			19		
12-14	B1	52.5	34.5	13.0	0.7	2.6	1.1	8.7	39.4	20.6	13.9	67.8	13.1			25		
14-24	B21t	37.4	24.1	38.5	0.0	0.3	0.2	7.7	29.2	11.1	13.0	47.5	8.2			3		
24-31	B22t	38.1	23.8	38.1	0.2	0.3	0.2	7.4	30.0	12.4	11.4	49.3	8.1			3		
31-43+	B3t	51.8	26.5	21.7	0.4	0.7	0.6	11.0	39.1	14.8	11.7	64.0	12.7			4		

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N	6C2a Ext. Iron as Fe Pct.	Carbonate as $CaCO_3$ Pct.	Atterberg limits: Plastic limit Pct. of <0.4 mm	Atterberg limits: Liquid limit Pct. of <0.4 mm	Atterberg limits: Plastic index Pct. of <0.4 mm	Water content: Pct.	Water content: 4B2 15 bar Pct.	Water content: Pct.			pH: 8C1b Sat. Paste	pH: 8C1a 1:10
1- 0		Organic Matter													
0- 4	1.79	0.080	22	0.6						4.7				6.3	6.8
4-12	0.45	0.027	17	0.6		NP	NP	NP		2.8				6.2	6.6
12-14	0.25			0.7						5.2				6.1	6.5
14-24	0.27			1.7		14	55	41		15.9				5.7	6.6
24-31	0.21			1.6						16.3				5.9	6.6

McVICKERS VERY FINE SANDY LOAM
S62Ariz-3-17

Location: Long Valley Area, Arizona. SW 1/4 Sec. 24, T14N, R9E, Coconino County, Arizona, Photo DGJ-8-178. 18 miles E, 42 miles S of Flagstaff. Date of Sampling: June 4, 1962.
Collectors: J.E. Jay, Truman Anderson, M.S. James, Stanley Buol, R.E. Nelson, L.H Grant and Y.H. Havens.
Classification: Typic Cryoboralf, fine, montmorillonitic.
Vegetation: Ponderosa pine with understory of western wheatgrass, muttongrass and yarrow. Use: Grazed forest land. Climate: 20-22" - subhumid, mean annual temperature 45°F. Parent Material: Calcareous, fine grained sandstone - member of Kaibab Formation. Elevation: 6800 feet. Relief: Gently sloping. 3 percent slope to northwest. Drainage: Well drained, slow permeability.
Remarks: Modal profile.

HORIZON	DESCRIPTION
	Thin covering of pine needles, twigs and some grass. Moist soil, few to many angular sandstone cobbles and stones scattered over surface.
O1	1 to 0 inches, very dark grayish brown (10YR 3/2) partially decayed pine needles and grass.
RSL 62251	very dark brown (10YR 2/2) moist; strongly acid (pH 5.5); abrupt smooth boundary.
A21 RSL 62252	0 to 4 inches, pale brown (10YR 6/3) very fine sandy loam, brown to dark brown (10YR 4/3) moist; moderate medium and coarse platy structure breaking to weak fine platy structure; slightly hard, very friable, nonsticky and nonplastic; plentiful fine and medium roots; few fine tubular and many fine interstitial pores; common fine gravel; medium acid (pH 60); clear smooth boundary.
A22* RSL 62253	4 to 12 inches, pinkish gray (7.5YR 7/2) cobbly very fine sandy loam, brown (7.5YR 5/4) moist; massive; hard, friable, nonsticky and nonplastic; plentiful fine and medium roots; common fine and few medium tubular pores; many fine interstitial pores; 15-40 percent angular sandstone and chert cobbles; medium acid (pH 6.0); abrupt wavy boundary. Thickness of A2 ranges from 10 to 20" in pit.
B1 RSL 62254	12 to 14 inches, reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; plentiful fine and medium roots; few fine tubular and many fine interstitial pores; common fine gravel; slightly acid (pH 6.5); abrupt broken boundary. This horizon is discontinuous.
B21t* RSL 62255	14 to 24 inches, yellowish red (5YR 5/6) clay, yellowish red (5YR 5/6) moist; few fine weathered reddish yellow (7.5YR 7/6) sandstone fragments, reddish yellow (7.5YR 6/6) moist; strong fine medium and coarse angular blocky structure; very hard, firm, sticky and very plastic; continuous clay films on ped faces; common slickensides; plentiful fine and medium roots; few coarse and very coarse roots; common fine tubular and few fine interstitial pores; few to common gravel; slightly acid (pH 6.5); gradual irregular boundary.
B22t RSL 62256	24 to 31 inches, yellowish red (5YR 5/6) clay, yellowish red (5YR 5/6) moist, with many medium and coarse distinct reddish yellow (7.5YR 7/8) mottles, reddish yellow (7.5YR 7/8) moist; mottles are weathered angular sandstone fragments; strong medium and coarse angular blocky structure; continuous thin clay films; common slickensides; very hard, firm, sticky and very plastic; few fine roots; few fine tubular and common fine interstitial pores; slightly acid (pH 6.5); gradual irregular boundary.
B3t* RSL 62257	31 to 43 inches +, mottled yellowish red (5YR 5/6), reddish yellow (7.5YR 7/8) and white (10YR 8/1) clay, yellowish red (5YR 5/6), reddish yellow (7.5YR 7/8) and very pale brown (10YR 7/3) moist; pseudo structure which appears to be moderate to strong fine and medium angular blocky structure; weathered sandstone makes up approximately 50 percent of mass; rock structure is platy; very hard, firm, sticky and plastic; few fine and medium roots; few fine tubular and common fine interstitial pores; few unweathered flat stones; continuous clay films; common slickensides; slightly acid (pH 6.5). This horizon contains many fragments of weathered horizontally bedded sandstone less than 1" across with clay in all seams; few unweathered flat sandstone cobbles and stones; sandstone when broken is white (10YR 8/1), very pale brown (10YR 7/3), moist.

* These horizons were sampled for BPR.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Glossic Cryoboralf, clayey-skeletal, mixed

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62303 - 62307

Depth (In.)	Horizon	1B1b Size class and particle diameter (mm) 3A1													Coarse fragments 2A2		
		Total			Sand					Silt		Int. II (0.2–0.02)	(2–0.1)				
		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)				> 2*	2 – 19	19 – 76
		Pct. of < 2 mm													Pct	Pct. of < 76 mm	
0- 3	A1	32.3	56.2	11.5	1.9	1.9	1.1	6.4	21.0	33.4	22.8	59.2	11.3			26		
3-17	A2	34.4	50.0	15.6	1.7	1.7	1.0	6.0	24.0	26.8	23.2	55.6	10.4			35		
17-36	B2t	14.3	24.7	61.0	3.0	2.0	0.8	2.2	6.3	16.3	8.4	24.1	8.0			55		
36-50	B31	18.9	23.4	57.7	3.1	2.1	0.7	2.3	10.7	13.5	9.9	25.9	8.2			35		
50-65	B32	28.0	14.9	57.1	0.1	0.1	0.1	3.8	23.9	5.9	9.0	33.3	4.1			6		

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	Carbonate as $CaCO_3$		Bulk density 4A1f 1/3 bar	Bulk density 4A1h Oven dry			Water content 4B1c 1/3 bar	Water content 4B2 15 bar		4D1 Extensibility			pH 8C1b Sat. Paste	pH 8C1a 1:10
	Pct	Pct		Pct.	Pct.		g/cc	g/cc	g/cc		Pct.	Pct.	Pct	in./in.				
0-3	4.55	0.194	23	1.4			1.09	1.16			22.5	10.4		0.020			5.9	6.4
3-17	1.51	0.087	17	1.5			1.23	1.30			21.4	8.3		0.017			5.7	6.2
17-36	0.38			2.8			1.20	1.57			29.6	24.0		0.088			5.6	6.5
36-50	0.21			2.8								25.0					5.7	6.4
50-65	0.19			1.9			1.36	1.63			31.3	24.6		0.060			6.5	7.0

Depth (In.)	Extractable bases 5B1a 6N2c Ca	6O2c Mg	6P2a Na	6Q2a K	6H2a Ext. Acidity	Cation Exch. Capacity 5A2a NaOAc			Water extract from saturated paste: Ca	Mg	Na	K		CO_3	HCO_3	Cl	SO_4	Electrical conductivity
	meq/100 g								meq/liter									mmho/cm
0-3	11.0	2.5	0.1	0.6	13.6	26.4												
3-17	8.5	2.0	0.1	0.3	9.9	20.5												
17-36	20.4	9.4	0.2	0.5	9.2	38.8												
36-50	19.7	10.9	0.3	0.4	10.0	40.6												
50-65	25.2	8.6	0.4	0.4	4.2	37.3												

SOLDIER COBBLY LOAM
S62Ariz-3-25

Location: Long Valley Area, Arizona. SE 1/4 of SW 1/4, Sec. 22, T13N, R10E, Coconino County, Arizona, photo DGJ-8-131. 19 miles E, 48 miles S. of Flagstaff. Date of Sampling: June 7, 1962.
Collectors: Stanley Buol, Truman Anderson, R.E. Nelson, L.E. Grant, Capito and Y.H. Havens.
Classification: Glossic Cryoboralf, clayey-skeletal, mixed.
Vegetation: Ponderosa pine, gambel oak, Arizona fescue, yarrow and stipa. Use: Grazed woodland.
Climate: 24 in. precipitation, subhumid. Mean annual temperature 45°F. Parent Material: Cherty limestone of Kaibab formation. Elevation: 7400 ft. Relief: Gently sloping. Convex slope of 5 percent to west. Drainage: Moderately well drained, slow permeability.
Remarks: Modal profile.

HORIZON	DESCRIPTION
	Thin covering of partially decayed pine needles, twigs and some grass.
A1	0 to 3 inches, grayish brown (10YR 5/2) gravelly and cobbly loam, very dark brown
RSL	(10YR 2/2) moist; weak medium coarse platy structure breaking to moderate fine granular
62303	structure; slightly hard, friable, nonsticky and slightly plastic; plentiful fine roots; many fine interstitial pores; 40 percent cherty gravel and cobbles; slightly acid (pH 6.5); abrupt wavy boundary.
A2	3 to 17 inches, light brown (7.5YR 6/4) very gravelly and cobbly loam, dark brown
RSL	(7.5YR 3/2) moist; tongues of A1 material extend into A2 along large root channels;
62304	weak fine subangular blocky and moderate fine granular and rock structure; slightly hard, friable, nonsticky and slightly plastic; plentiful fine, medium and coarse roots; many fine interstitial pores; 70-80 percent cherty gravel and cobbles; slightly acid (pH 6.5); abrupt wavy boundary. (20 percent by volume of rock material greater than 3/4 inch in diameter discarded from characterization and BPR samples.)
B2t	17 to 36 inches, reddish brown (5YR 5/4) gravelly and cobbly clay, dark reddish brown
RSL	(5YR 3/4) when moist, with common to many fine faint light brown (7.5YR 6/4), brown
[illegible]	[illegible] (7.5YR 5/6) and dark brown (7.5YR 4/4) when moist;

[redacted]

rock and moderate fine angular blocky structure; very hard, very firm, sticky and very plastic; common small slickensides; common black N 2/ concretions; manganese coatings on ped faces; few fine and medium roots; few fine tubular pores; 30-50 percent cherty gravel and cobbles; neutral (pH 7.0); noneffervescent; clear irregular boundary. Note: Lower boundary of B2 horizon varies from 25-52" in depth in this pit. (25 percent by volume of rock material greater than 3/4" in diameter discarded from characterization and BPR samples.)

B31	36 to 50 inches, mottled reddish yellow (7.5YR 7/8) and reddish brown (5YR 5/4)
RSL	gravelly and cobbly clay, reddish yellow (7.5YR 6/8) and dark reddish brown (5YR 3/4)
62306	moist; mottles are many medium and coarse and distinct; rock and moderate medium angular blocky structure; extremely hard, extremely firm, sticky and very plastic; clay tongues of B2 horizon extend into the B3 horizon; common large slickensides; many black (7.5YR N 2/) concretions and black manganese coatings on ped faces; few

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U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Glossic Cryoboralf, clayey-skeletal, mixed

SOIL Soldier cobbly loam SOIL Nos. S62Ariz-3-26 LOCATION Coconino County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62308 - 62312

Depth (In)	Horizon	1B1b Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: ≥ 2*	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
1- 0	01	Organic Matter																
0- 4	A1	26.2	62.2	11.6	2.9	1.8	0.9	4.4	16.2	36.9	25.3	56.1	10.0			19		
4-15	A2	25.4	58.2	16.4	2.1	1.8	0.9	3.7	16.9	31.5	26.7	51.3	8.5			37		
15-28	B2t	29.4	17.5	53.1	1.8	1.0	0.4	1.9	24.3	11.6	5.9	37.3	5.1			17		
28-44+	B3	42.7	22.9	34.4	13.9	8.2	2.6	4.2	13.8	15.1	7.8	31.3	28.9			28		

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N		Carbonate as $CaCO_3$		Atterberg limits: Plastic limit	Liquid limit	Plastic index		Water content:	4B2 15 bar		pH: 8C1b Sat. Paste	8C1a 1:10
	Pct.	Pct.			Pct.		Pct. of < 0.4 mm				Pct.	Pct.	Pct		

SOLDIER COBBLY LOAM
S62Ariz-3-26

Location: Long Valley Area, Arizona. SW 1/4, Sec. 4, T12N, R10E, Coconino County, Arizona, photo DGJ-8-137. 21 miles E and 51 miles S of Flagstaff. Date of Sampling: June 7, 1962.
Collectors: Stanley Buol, Truman Anderson, R.E. Nelson, L. H. Grant and Y.H. Havens.
Classification: Glossic Cryoboralf, clayey-skeletal, mixed.
Vegetation: Ponderosa pine, gambel oak, Douglar fir and Arizona fescue. Use: Grazed forest.
Climate: 26" precipitation; subhumid, mean annual temperature 45°F. Parent Material: Gray dense cherty limestone. Elevation: 7700 feet. Relief: Gently sloping, convex slope of 2 percent to northwest. Drainage: Moderately well drained. Slow permeability.
Remarks: Modal profile.

HORIZON	DESCRIPTION
	Thin covering of pine needles and twigs. Cobbly and gravelly surface - 50 percent gravel, 10 percent cobbles.
O1 RSL 62308	1 to 0 inches, gray partially decayed pine needles, leaves and grass.
A1 RSL 62309	0 to 4 inches, grayish brown (10YR 5/2) gravelly and cobbly loam, very dark brown (10YR 2/2) moist; weak medium platy structure breaking to moderate fine granular structure; slightly hard, friable, nonsticky and nonplastic; few fine roots; many fine interstitial pores; 25-50 percent cherty gravel and cobbles; medium acid (pF 6.0); abrupt smooth boundary.
A2 RSL 62310	4 to 15 inches, brown (10YR 5/3) very gravelly and cobbly loam, dark brown (7.5YR 3/2) moist; rock and weak medium subangular blocky and moderate fine granular structure; slightly hard, friable, nonsticky and slightly plastic; many fine and medium roots; few coarse roots; many fine interstitial and few fine tubular pores; 60-80 percent cobbles and gravel; strongly acid (pH 5.5); abrupt wavy boundary. (30 percent by volume of rock material greater than 3/4" in diameter discarded from characterization samples. Coarse fragments discarded from BPR samples were all greater than 6" in the longest dimension. They are estimated to be about 30 percent by volume.)
B2t RSL 62311	15 to 28 inches, brown (7.5YR 5/4) clay, with common fine distinct red (2.5YR 4/6) and brown (10YR 5/3) mottles, brown-dark brown (7.5YR 4/4) moist, with common fine distinct dark red (2.5YR 3/6) and brown (10YR 4/3) moist, mottles; moderate fine and medium angular blocky structure; very hard, firm, sticky and very plastic; few manganese coatings and few manganese concretions; common small slickensides and pressure faces; few fine and plentiful medium and coarse roots; few fine tubular pores; few gravel and cobbles; strongly acid (pH 5.3); clear wavy boundary. Common white (10YR 8/2) dry, (10YR 6/3) moist, silt coatings on macro ped faces. Coatings are continuous around peds.
B3 RSL 62312	28 to 44 inches +, mottled yellow (10YR 7/8), very pale brown (10YR 7/3) and red (2.5YR 5/6) very gravelly and cobbly clay, brownish yellow (10YR 6/8), red (2.5YR 4/6) and grayish brown (10YR 5/2) moist; mottles are many fine faint and distinct; common large slickensides; rock and moderate fine angular blocky structure; very hard, firm, sticky and very plastic; few manganese coatings and concretions; few fine and medium roots; few old root channels; few fine tubular pores; 50-70 percent cherty gravel and cobbles; very strongly acid (pH 5.0). (35 percent by volume of rock material greater than 3/4 inch in diameter discarded from characterization samples. Silt coatings as in B2. No coarse fragments discarded from BPR samples.)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Aquic Eutroboralf, fine, montmorillonitic

SOIL Wildcat stony loam SOIL Nos. S62Ariz-3-22 LOCATION Coconino County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62286 - 62291

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: >2 * Pct.	2 – 19 Pct. of <76 mm	19 – 76 Pct. of <76 mm
		Pct. of <2 mm																
½– 0	O1	Organic Matter																
0– 2	A21	52.6	40.6	6.8	0.5	11.8	14.6	18.6	7.1	28.2	12.4	45.4	45.5			2		
2– 7	A22	38.6	49.3	12.1	0.7	8.5	10.1	13.5	5.8	30.7	18.6	44.3	32.8			3		
7–14	B2t	21.7	31.6	46.7	0.2	5.2	6.7	6.8	2.8	16.2	15.4	22.7	18.9			2		
14–24	B3	20.0	25.8	54.2	0.1	5.5	7.5	5.2	1.7	12.3	13.5	16.8	18.3			2		
24+	R	Rock																

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	Atterberg limits: Plastic limit	Liquid limit	Plastic index	Bulk density: 4A1f 1/3 bar	4A1h Oven dry		Water content: 4B1c 1/3 bar	4B2 15 bar		4D1 Extensibility		pH: 8C1b Sat. Paste	8C1a 1:10
	Pct.	Pct		Pct. of <0.4 mm			g/cc	g/cc	g/cc	Pct.	Pct.	Pct.	in./in.			
½– 0	Organic Matter															
0– 2	1.55	0.066	23								4.3				6.3	6.4
2– 7	0.86	0.041	21	17	20	3	1.52	1.58		16.2	4.9		0.014		5.6	6.2
7–14	0.76	0.038	20				1.34	1.91		30.5	20.4		0.112		4.9	6.1
14–24	0.64	0.033	19	15	82	67	1.38	1.94		29.8	25.3		0.108		5.0	6.2
24+		Rock					2.16	2.22		5.0			0.010			

Depth (In.)	Extractable bases 5B1a: 6N2c Ca	6O2c Mg	6P2a Na	6Q2a K	6H2a Ext. Acidity	Cation Exch. Capacity 5A2a NaOAc		Water extract from saturated paste: Ca	Mg	Na	K		CO_3	HCO_3	Cl	SO_4	Electrical conductivity
	meq/100 g							meq/liter									mmho/cm
½– 0	Organic Matter																
0– 2	5.7	1.6	0.1	0.2	3.3	10.4											
2– 7	5.4	1.8	0.1	0.2	3.7	12.1											
7–14	17.1	8.4	0.3	0.4	7.9	35.2											
14–24	21.7	11.3	0.4	0.4	8.0	43.2											
24+		Rock															

Depth (In.)	Water at Saturation Pct.	Exchangeable Na Pct.		Gypsum Pct.	5C3 Base Sat. (sum) Pct.		
½– 0		Organic Matter					
0– 2					70		
2– 7					67		
7–14					77		
14–24					81		
24+		Rock					

* Percent of <19 mm ; see profile description for estimates of >19 mm.

WILDCAT STONY LOAM
S62Ariz-3-22

Location: Long Valley Area, Arizona. SW 1/4 of Sec. 10, T12N, R8E, Coconino County, Arizona, photo DEN-6-60, 9 miles E and 51 miles S. of Flagstaff. Date of Sampling: June 6, 1962. Collectors: Truman Anderson, Capito, L. H. Grant, Stanley Buol, R. E. Nelson, and Y. H. Havens. Classification: Aquic Eutroboralf, fine, montmorillonitic.
Vegetation: Ponderosa pine, gambel oak, alligator juniper with some western wheatgrass. Use: Grazed forest lands. Climate: 22" precipitation, subhumid, mean annual temperature 45°F. Parent Material: Fine grained Coconino sandstone. Elevation: 6875 feet. Relief: Gently sloping, 5 percent slope to north. Drainage: Somewhat poorly drained, very slow permeability.
Remarks: Modal profile.

HORIZON	DESCRIPTION
01 RSL 62286	1/2 to 0 inches, thin covering of partially decayed pine needles and twigs. 50-60 percent of surface covered with sandstone, stones and cobbles.
A21 RSL 62287	0 to 2 inches, light brownish gray (10YR 6/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse platy structure breaking to moderate fine granular; slightly hard, friable, nonsticky and nonplastic; few fine roots; many fine interstitial pores; neutral (pH 6.7); abrupt smooth boundary.
A22 * RSL 62288	2 to 7 inches, light brownish gray (10YR 6/2) loam, very dark grayish brown (10YR 3/2) moist; massive structure breaking to weak fine subangular blocky and moderate fine granular structure; hard, friable, nonsticky and slightly plastic; few fine and medium roots; few fine tubular and many fine interstitial pores; slightly acid (pH 6.2); abrupt wavy boundary.
B2t RSL 62289	7 to 14 inches mottled yellowish red (5YR 4/6), light brown (7.5YR 6/4) and light brownish gray (2.5Y 6/2) clay, yellowish red (5YR 4/6), brown (7.5YR 5/4) and grayish brown (2.5Y 5/2) when moist; mottles are many fine and medium and distinct; moderate fine and medium angular blocky structure; extremely hard, extremely firm, sticky and very plastic; continuous clay films on ped faces; common small slickensides; plentiful fine and abundant medium and coarse roots; few fine tubular and interstitial pores; neutral (pH 6.6); clear wavy boundary.
B3 * RSL 62290	14 to 24 inches mottled light brownish gray (2.5Y 6/2) and light yellowish brown (10YR 6/4) clay, grayish brown (2.5Y 5/2), dark yellowish brown (10YR 4/4) moist; mottles are many fine to coarse and faint; common large slickensides; massive in places where breaks to weak to moderate medium angular blocky structure; extremely hard, extremely firm, sticky and very plastic; few fine and plentiful medium and coarse roots; few fine tubular and few fine interstitial pores; slightly acid (pH 6.4); abrupt irregular boundary.
R RSL 62291	24 inches +, very pale brown (10YR 7/3) and red (2.5YR 4/6) dense fine grained noncalcareous sandstone; massive; extremely hard, extremely firm, neutral (pH 6.6 to 7.0); clay tongues extend into the fractured bedrock - bedrock ranges in depth from 22-36" in this hole - A horizon ranges from 4-17" thick in this pit; gravel, cobbles and stones range from few to many throughout the solum; cobbles and stones range in size from 4-24" across.

* Sampled for BPR.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Aquic Eutroboralf, very-fine, montmorillonitic

SOIL Wildcat stony silt loam (taxadjunct) SOIL Nos. S62Ariz-3-21 LOCATION Coconino County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62280 - 62285

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.2)	Coarse fragments 2A2: > 2*	2 – 19	19 – 76
		Pct. of < 2 mm												Pct	Pct. of < 76 mm	
½– 0	O1	Organic Matter														
0– 2	A21	28.5	63.5	8.0	0.7	3.9	5.9	12.5	5.5	35.2	28.3	47.9	23.0	11		
2– 7	A22	30.0	58.8	11.2	1.4	3.8	6.4	13.6	4.8	32.1	26.7	45.0	25.2	9		
7–17	B2t	9.3	17.1	73.6	0.1	1.1	2.4	4.4	1.3	8.4	8.7	12.3	8.0	6		
17–32	B3	11.1	17.2	71.7	0.1	1.8	3.1	4.8	1.3	8.9	8.3	13.0	9.8	12		
32+	R	Rock														

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	Carbonate as $CaCO_3$	Atterberg limits: Plastic limit	Liquid limit	Plastic index	Water content: 4B2 15 bar	pH: 8C1b Sat. Paste	8C1a 1:10
	Pct.	Pct.		Pct.	Pct	Pct. of <0.4 mm			Pct.		
½– 0		Organic Matter									
0– 2	1.48	0.063	23	0.7					4.4	6.1	6.4
2– 7	0.65	0.032	20	0.7		17	19	2	4.4	5.7	6.2
7–17	0.78	0.043	18	1.8					32.5	4.7	5.8
17–32	0.56	0.033	17	1.3		21	99	78	33.8	4.3	5.5
32+		Rock									

Depth (In.)	Extractable bases 5B1a: 6N2c Ca	6O2c Mg	6P2a Na	6Q2a K	6H2a Ext. Acidity	Cation Exch. Capacity 5A2a NaOAc	Water extract from saturated paste: Ca	Mg	Na	K	CO_3	HCO_3	Cl	SO_4	Electrical conductivity
	meq/100 g						meq/liter								mmho/cm
½– 0		Organic Matter													
0– 2	6.0	1.5	0.1	0.2	4.2	12.3									
2– 7	4.5	1.4	0.1	0.2	3.0	9.2									
7–17	24.0	12.7	0.6	0.5	17.2	51.5									
17–32	21.5	12.3	0.7	0.5	23.0	53.3									
32+		Rock													

Depth (In.)	Water at Saturation	Exchangeable Na		Gypsum	5C3 Base Sat. (sum)	Clay Mineralogy (<0.002 mm): Montmorillonite	Vermiculite	Mica	Kaolin % DTA 7A3
	Pct	Pct		Pct	Pct.	7A2 X-ray			
½– 0		Organic Matter							

* Percent of <19 mm ; see profile description for estimates of >19 mm.

- = looked for but not found

WILDCAT STONY SILT LOAM (taxadjunct) 1/
S62Ariz-3-21

Location: Long Valley Area, Arizona. NE 1/4, SW 1/4, Sec. 11, T12N, R8E, Coconino County, Arizona, photo DEN-6-73. 10 miles E., 51 miles S. of Flagstaff. Date of Sampling: June 6, 1962.
Collectors: [redacted]

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Mollic Eutroboralf, fine, montmorillonitic

SOIL Hogg loam SOIL Nos. S62Ariz-3-23 LOCATION Coconino County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62292 - 62296

Depth (In.)	Horizon	1B1b Total: Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: > 2 mm Pct	2 – 19 Pct. of < 2 mm	19 – 76 Pct. of < 76 mm
		Pct. of < 2 mm																
1- 0	01	Organic Matter																
0- 3	A1	56.9	26.3	16.8	2.3	12.5	14.4	16.4	11.3	19.2	7.1	39.7	45.6			18		
3-20	B2t	37.6	13.0	49.4	1.8	8.6	9.8	10.4	7.0	7.2	5.8	20.2	30.6			26		
20-25	B3	61.8	18.4	19.8	11.0	12.3	11.6	17.1	9.8	9.8	8.6	28.5	52.0			46		
25-40	R	68.7	20.6	10.7	14.0	16.4	10.8	15.3	12.2	12.1	8.5	32.8	56.5			52		

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct.	3A1a Carbonate in <0.002 mm Pct.	Bulk density g/cc	g/cc	g/cc	Water content Pct.	4B2 15 bar Pct.	Pct.				pH 8C1b Sat. Paste	8C1a 1:10

HOGG LOAM
S62Ariz-3-23

Location: Long Valley Area, Arizona. SW 1/4 of NE 1/4, Sec. 12, T14N, R9E, Coconino County, Arizona, photo DGJ-8-180. 15 miles E, 42 mi. S. of Flagstaff. Date of Sampling: June 7, 1962.
Collectors: Truman Anderson, Stanley Buol, R.E. Nelson, L.H. Grant and Y.H. Havens.
Classification: Mollic Eutroboralf, fine, montmorillonitic.
Vegetation: Ponderosa pine and gambel oak with understory of western wheatgrass. Use: Grazed woodland. Climate: 20-22" precipitation, subhumid. MAT 45° F. Parent material: Hard calcareous conglomerate. Elevation: 4950 feet. Relief: Gently sloping, 4-5 percent slope to west. Drainage: Well drained, slow permeability.
Remarks: Modal profile. Thin discontinuous B1 horizon is present in places (less than 1" thick), not sampled and not described.

HORIZON	DESCRIPTION
	Thin covering of pine needles. Common to many fine and medium gravel on surface.
01 RSL 62292	1 to 0 inches, decayed pine needles and grass.
A1 RSL 62293	0 to 3 inches, grayish brown (10YR 5/2) loam, very dark gray (10YR 3/1) moist; moderate medium and coarse platy structure breaking to moderate fine granular structure; slightly hard, friable, nonsticky and slightly plastic; plentiful fine roots; many fine interstitial pores; common fine and medium gravel; medium acid (pH 5.7); abrupt wavy boundary.
B2t RSL 62294	3 to 20 inches, dark red (2.5YR 3/6) clay, dark reddish brown (5YR 3/4) moist; moderate fine and medium angular blocky structure; extremely hard, extremely firm, sticky and very plastic; gravel is coated with thin clay films; common small slickensides; common old root channels; root channels and ped faces are coated with organic stains and A1 materials; plentiful fine medium and coarse roots; few fine interstitial pores; common fine and few medium gravel; medium acid (pH 6.0); abrupt wavy boundary.
B3 RSL 62295	20 to 25 inches, dark red (2.5YR 3/6) and yellowish red (5YR 4/6) very gravelly clay, dark reddish brown (5YR 3/3) and yellowish red (5YR 4/6) when moist; massive; extremely hard, extremely firm, sticky and very plastic; few fine roots; few fine interstitial pores and few fine voids; 60-70 percent gravel; mildly alkaline (pH 7.5); strong effervescence; abrupt wavy boundary. Thickness range of 2 to 7" in pit.
R RSL 62296	25 to 40 inches, pinkish white (7.5YR 8/2), extremely hard, calcareous conglomerate with small thin pockets of dark reddish brown (5YR 3/3) clay embedded in it, pinkish gray (7.5YR 7/2) when moist; massive; extremely hard, extremely firm; common fine voids; moderately alkaline (pH 8.0); violent effervescence.

*Sampled for BPR.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Mollic Eutroboralf, fine, montmorillonitic

SOIL Hogg loam SOIL Nos. S62Ariz-3-24 LOCATION Coconino County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62297 - 62302

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: >2* Pct.	Coarse fragments 2A2: 2 – 19 Pct. of <76 mm	Coarse fragments 2A2: 19–76 Pct. of <76 mm
		Pct. of <2 mm														Pct.		
0- 1	A11	42.1	37.4	20.5	1.3	3.4	4.5	10.7	22.2	24.9	12.5	54.7	19.9			14		
1- 4	A12	35.3	31.7	33.0	0.7	2.6	3.7	8.0	20.3	19.9	11.8	46.0	15.0			22		
4-14	B21t	28.4	12.8	58.8	0.6	1.8	2.4	5.8	17.8	7.2	5.6	29.5	10.6			9		
14-21	B22t	29.6	12.6	57.8	2.7	2.9	2.1	5.3	16.6	6.2	6.4	26.9	13.0			6		
21-30	C	46.5	19.5	34.0	9.4	8.5	4.0	7.3	17.3	10.8	8.7	32.8	29.2			11		
30-37+	R	Rock																

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct	C/N		6E1b Carbonate as $CaCO_3$ Pct.	3A1a Carbonate in <0.002 mm Pct.	Bulk density: 4A1f 1/3 bar g/cc	Bulk density: 4A1h Oven dry g/cc	Bulk density: g/cc		Water content: 4B1c 1/3 bar Pct.	Water content: 4B2 15 bar Pct	Water content: Pct	4D1 Extensibility in./in.			pH: 8C1b Sat. Paste	pH: 8C1a 1:10
0- 1	3.63	0.186	20									12.3					6.5	6.9
1- 4	1.93	0.104	19				1.34	1.54			24.9	15.9		0.045			6.4	6.9
4-14	1.22	0.072	17				1.31	1.76			34.5	28.0		0.096			6.0	6.9
14-21	0.61	0.046	13		8	-	1.22	1.74			39.1	27.7		0.112			7.3	8.1
21-30	0.26				39	tr.	1.36	1.80			29.4	16.4		0.088			7.6	8.4
30-37+		Rock					2.46	2.46			4.3			-				

Depth (In.)	Extractable bases 5B1a: 6N2c Ca	6O2c Mg	6P2a Na	6Q2a K	6H2a Ext. Acidity	Cation Exch. Capacity 5A2a NaOAc			Water extract from saturated paste: Ca	Mg	Na	K		CO_3	HCO_3	Cl	SO_4	Electrical conductivity
	meq/100 g								meq/liter									mmho/cm
0- 1	18.4	2.5	0.1	0.6	5.9	26.5												
1- 4	22.7	2.8	0.2	0.7	5.1	30.1												
4-14	48.3	4.7	0.1	0.6	5.9	47.4												
14-21	35.6	4.8	0.2	0.8	1.1	48.1												
21-30	36.7	3.2	0.2	0.4	-	28.7												
30-37+		Rock																

Depth (In.)	Water at Saturation Pct.	Exchangeable Na Pct		Gypsum Pct.	5C3 Base Sat. (sum) Pct.	Clay Mineralogy (<0.002 mm.): Montmorillonite 7A2 X-ray	Vermiculite 7A2 X-ray	Mica	Kaolin % DTA 7A3
0- 1					79	t	-	x	3
1- 4					84				
4-14					90	xxx	-	x	13
14-21					97				
21-30					100+	xxx	-	t	17
30-37+		Rock							

* Percent of <19 mm ; see profile description for estimates of >19 mm.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

HOGG LOAM
S62Ariz-3-24

Location: Long Valley Area, Arizona. W 1/2, NW 1/4, Sec. 29, T14N, R10E, Coconino County, Arizona, photo DGJ-8-143, 19 miles E. and 43 miles S. of Flagstaff. Date of Sampling: June 7, 1962.
Collectors: Truman Anderson, Stanley Buol, R.E. Nelson, L. . Grant and Y.H. Havens.
Classification: Mollic Eutroboralf, fine, montmorillonitic.
Vegetation: Ponderosa pine, gambel oak, western wheat, juniper, ring muhly. Use: Grazed forest
[redacted]

Remarks: Modal profile, 40-50 percent of surface covered with gray dolomitic limestone fragments. Depth to bedrock ranges from 15-36". Thickness of lower horizons is quite variable in sample pit. This site has fewer pine needles on surface than S62 Ariz-3-23.

HORIZON	DESCRIPTION

CONSECUTIVE PEDON NUMBER C 68131 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CANELO TAXADJUNCT · SOIL NO. S68 ARIZ. 12-12 SAMPLE NO. 8 971-8 978 , E.PIMA-SANTA CRU AREA

SOIL FAMILY: AQUIC HAPLUSTALF LOAMY-SKELETAL,MIXED,MESIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE .2U	LT	CARBONATE 3A1A	1A2A INT. COARSE FRAGMENTS .2-.02	I PCT. OF WHOLE 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														SOIL	PCT. OF LT 75		
8 971	0- 3	A22	68.3	26.1	5.6	12.0	14.0	9.7	21.4	11.2	13.9	12.2					36.9	51A	21	24	6
8 972	3- 15	A21	59.8	32.4	7.8	9.3	11.3	8.8	20.1	10.3	14.7	17.7					35.9	51A	31	15	5
8 973	15- 23	A22G	60.3	29.8	9.9	7.2	12.5	10.0	19.9	10.7	11.0	18.8					32.8	54A	16	30	8
8 974	23- 38	B1 G	59.2	21.4	19.4	10.4	14.5	9.5	16.4	8.4	6.1	15.3					22.9	58A	35	21	2
8 975	38- 58	B2 TG	46.3	14.4	39.3	8.2	9.2	6.7	14.2	8.0	5.9	8.5					22.1	67A	35	31	1
8 976	58- 97	B31TG	60.2	10.4	29.4	10.6	14.4	10.2	17.7	7.3	5.7	4.7					22.6	57A	29	28Z	N
8 977	97-145	B32	67.4	10.5	22.1	9.5	15.6	12.4	21.4	8.5	5.1	5.4					25.3	61A	26	35Z	N
8 978	145-183	C	60.0	13.6	26.4	7.6	11.5	10.1	20.9	9.9	6.7	6.9					28.5	68A	45	23Z	N

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR-BON 6A1A	NITRO-GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6G2D	DI-CIT AL 6G7A	EXT PYROP FE 6G5C	EXT PYROP AL 6G5A	ATTERBERG LL 4F1	PL 4F2	BULK DENSITY 1/3 BAR 4A1F	DRY 4A1F	4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		-PERCENT-		-PERCENT-		PERCENT				PCT.NO.40		GRAMS PER CC				-PERCENT-			-PERCENT-	
8 971	0- 3	1.31	0.083			0.7	0.1			NP	NP	1.28			0.67			4.6		
8 972	3- 15	0.55	0.038			0.8	TR						1.28	1.28	0.66		11.8	4.1		
8 973	15- 23	0.41				0.8	0.1			NP	NP		1.29	1.29	0.64		15.2	4.5		
8 974	23- 38	0.29				0.8	0.1					1.28			0.60			6.1		
8 975	38- 58	0.55				0.9	0.1			36	19		1.27	1.37	0.52		30.4	13.2	2.6	1.3
8 976	58- 97	0.23				0.9	0.1						1.24	1.29	0.62		30.7	12.6	1.3	0.8
8 977	97-145	0.06				0.9	TR			28	17	1.15			0.59			10.7		
8 978	145-183					0.9	0.1			36	18		1.15	1.18	0.52		29.1	12.9	0.9	0.4

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI-DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	C E C NH4-OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
8 971	0- 3	4.7	1.2	TR	0.3	6.2		0.1	6.2	8.2	100+	98	76		5.5	4.7
8 972	3- 15	3.0	0.8	0.1	0.2	4.1	2.5	0.2	6.6	6.3	62	95	65		5.5	4.7
8 973	15- 23	3.5	1.9	0.1	0.2	5.7		0.2	5.7	7.4	100+	97	77		5.4	4.6
8 974	23- 38	5.0	3.7	0.2	0.3	9.2		0.3	9.2	10.8	100+	97	85		5.6	4.7
8 975	38- 58	9.2	10.8	0.4	0.7	21.1		0.5	21.1	21.6	100+	98	98		5.2	4.5
8 976	58- 97	9.8	11.2	0.9	0.7	22.6		0.2	22.6	21.8	100+	99	100+		4.9	4.4
8 977	97-145	9.0	5.1	0.8	0.6	15.5	1.8	0.4	17.3	18.7	90	97	83		5.5	4.9
8 978	145-183	11.1	21.0	1.0	0.6	33.7			33.7	21.5	100+		100+		6.2	5.6

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY <0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2F IV	DTA 7A3	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III
						PERCENT				
8 971	0- 3	MI 2	KK 2	MT 1						
8 972	3- 15									
8 973	15- 23	MT 2	MI 2	KK 2						
8 974	23- 38									
8 975	38- 58	MT 3	MI 3	KK 3						
8 976	58- 97									
8 977	97-145	MT 4	MI 3	KK 2						
8 978	145-183	MT 4	MI 3	KK 2						

CODE	MINERAL
MI	MICA
KK	KAOLINIT
MT	MONTMORT

RELATIVE AMOUNT	
1	TRACE
2	SMALL
3	MODERATE
4	ABUNDANT
5	DOMINANT
6	INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.

CANELO VERY GRAVELLY SANDY LOAM (taxadjunct) 1/
S68 Ariz-12-12-1 through 8

Location: Santa Cruz County, Arizona, 3.6 miles south of Canelo near top of ridge, ½ mile above tank on wash, approximately 458 feet east and 450 feet south of W¼ corner Section 27, T22S, R18E. Photo AMS 502, FS EEX 14-171. Date of Sampling: October 16, 1968.
Description by: Havens and Richardson. Collectors: Nettleton and Brasher.
Classification: Aquic Haplustalf, loamy-skeletal, mixed, mesic.
Vegetation: Oak, juniper, manzanita, plains lovegrass, canebeard grass, blue grama, New Mexico needlegrass, deergrass, sideoats grama, three-awn and wolftail. Climate: Mean annual temperature 56°F. Mean annual precipitation 18 to 19 inches. Parent Material: Old alluvium from dacite, quartzite and rhyolite tuffs. Topography: Rounded narrow topped ridge remnants of dissected old fan. 14 percent slope. Northwest aspect. Elevation: 5375 feet. Drainage: Somewhat poorly drained. Rapid runoff. Soil Moisture: Dry.
Remarks: This site was paired with S68 Ariz-12-10-1 through 6.

HORIZON	DESCRIPTION
	(0-3 cm)
[redacted]	
68971	nonsticky and nonplastic; many very fine, fine and medium roots; common fine interstitial pores; noneffervescent; medium acid (pH 6.0); clear smooth boundary.
A21	1 to 6 inches, pale brown (10YR 6/3) very gravelly fine sandy loam, dark brown
RSL	(7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic;
68972	many very fine, fine and medium roots; common very fine tubular pores;
(3-15 cm)	noneffervescent; slightly acid (pH 6.5); clear smooth boundary.
A22	6 to 9 inches, light gray (10YR 7/2) gravelly loam, brown (7.5YR 5/4) moist;
RSL	massive; slightly hard, friable, nonsticky and slightly plastic; many very
68973	fine, fine and medium roots; many fine and medium tubular pores; noneffer-

CONSECUTIVE PEDON NUMBER C 68130 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CANELO SOIL NO. S68 ARIZ. 12-10 SAMPLE NO. 8 964-8 970 E.PIMA-SANTA CRU AREA

SOIL FAMILY: AQUIC HAPLUSTALF CLAYEY-SKELETAL,MIXED,MESIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE CLASS AND PARTICLE DIAMETER (MM) 1B1B.3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	1 75-20 PCT.	II 20-5 OF 75	III 5-2 LT 75
			PERCENT OF LESS THAN 2MM																	
8 964	0- 13	A1	60.5	32.0	7.5	21.5	13.8	7.5	11.1	6.6	15.5	16.5				27.9	33A	9	15	9
8 965	13- 18	A21	56.4	35.6	8.0	14.9	14.0	8.3	11.9	7.3	16.9	18.7				30.6	44A	23	14	7
8 966	18- 36	A22	53.1	35.1	11.8	15.9	13.1	7.0	10.6	6.5	14.1	21.0				25.9	44A	26	12	6
8 967	36- 58	B21TG	47.4	25.6	27.0	15.5	12.7	5.8	8.1	5.3	8.5	17.1				18.0	64A	39	2	23
8 968	58- 86	B22TG	13.1	9.1	77.8	3.3	3.7	1.9	2.9	1.3	2.4	6.7				5.1	65A	29	30	6
8 969	86-130	B23T	46.4	11.5	42.1	20.6	13.1	5.0	5.5	2.2	2.9	8.6				7.7	64A	38	18	8

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR-BON 6A1A	NITRO-GEN 6B1A	CARBONATE AS CACO3 LT 2 6C1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L L 4F1	P L 4F2	M I T EST. 1/3 BAR 4A1F	BULK DENSITY 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		-PERCENT-		-PERCENT-		-PERCENT-				PCT.	NO.40	GRAMS PER CC				-PERCENT-			-PERCENT-	
8 964	0- 13	0.78	0.053	TR		0.5	TR			NP	NP		1.60	1.60	0.78	10.3		4.3		
8 965	13- 18	0.48	0.030	TR		0.5	TR			NP	NP		1.53	1.53	0.69	9.7		4.2		
8 966	18- 36	0.28				0.5	TR			NP	NP		1.25	1.25	0.74	22.2		4.6		
8 967	36- 58	0.22				0.6	0.1			26	16		1.45	1.45	0.50	21.3		8.0		
8 968	58- 86	0.30				1.0	0.1			66	27		1.22	1.49	0.54	37.9		24.1	6.9	3.5
8 969	86-130					1.1	0.1			45	25	1.30			0.53			15.1		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI-DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	C NH4-OAC 5A6A	BASE SATURATION SUM+ ACI-DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
8 964	0- 13	2.5	0.7	0.1	0.4	3.7			3.7	4.6	100+		80		6.3	5.6
8 965	13- 18	1.9	0.5	0.1	0.4	2.9			2.9	3.8	100+		76		6.1	5.4
8 966	18- 36	2.0	0.5	0.1	0.4	3.0			3.0	3.8	100+		79		6.2	5.5
8 967	36- 58	6.3	1.6	0.1	0.6	8.6			8.6	6.3	100+		100+		5.8	5.3
8 968	58- 86	6.6	13.6	0.5	1.3	22.0		3.0	22.0	23.5	100+	88	94		4.4	4.0
8 969	86-130	3.9	5.8	0.6	0.9	11.2	6.7	2.3	17.9	14.9	63	83	75		4.3	3.7

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY <.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III
8 964	0- 13	MT 1	MI 1	KK 1						
8 965	13- 18	MI 2	KK 2	MT 1						
8 966	18- 36	MT 1	MI 1	KK 1						
8 967	36- 58	KK 3	MI 2	MT 1						
8 968	58- 86	KK 4	MI 3	MT 1						
8 969	86-130	MI 2	KK 2	MT 1						

MT MONTMORT 1 TRACE
MI MICA 2 SMALL
KK KAOLINIT 3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

CANELO GRAVELLY SANDY LOAM
S68 Ariz-12-10-1 through 6

Location: Santa Cruz County, Arizona, 12 miles south of Elgin and 0.8 mile by road, east-southeast of Canelo Pass cattle guard and 100 feet east of road. Approximately 2000 feet east of W¼ corner Section 30, T22S, R18E. Photo 20-93.
Date of Sampling: October 14, 1968.
Description by: Havens and Clemmons. Collectors: Nettleton and Brasher.
Classification: Aquic Haplustalf, clayey-skeletal, mixed, mesic.
Vegetation: Oak, juniper, manzanita and grasses--bluestem, plains lovegrass, muhly and three-awn. Climate: Mean annual temperature approximately 56°F. Mean annual precipitation 18-20 inches. Parent Material: Mixed old alluvium from dacite, andesite, rhyolite and tuffs. Topography: High alluvial fan. 3 percent slope. Southeast aspect. Elevation: 5225 feet. Drainage: Somewhat poorly drained. Soil Moisture: Slightly moist.
Remarks: This site was paired with S68 Ariz-12-12-1 through 8.

HORIZON	DESCRIPTION
	(0-13 cm)
A1	0 to 5 inches, brown (10YR 5/3) gravelly sandy loam, dark brown
RSL	(7.5YR 3/2) moist; moderate fine granular structure; slightly
68964	hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common fine interstitial and tubular pores; noneffervescent; slightly acid (pH 6.2); abrupt smooth boundary.
A21	5 to 7 inches, very pale brown (10YR 7/3) very gravelly sandy
RSL	loam, brown (7.5YR 5/4) moist; massive; slightly hard, very
68965	friable, slightly sticky and slightly plastic; common very fine
(13-18 cm)	and fine roots; common fine interstitial and tubular pores; noneffervescent; medium acid (pH 6.0); abrupt smooth boundary.
A22	7 to 14 inches, light gray (10YR 7/2) very gravelly loam, light
RSL	brown (7.5YR 6/4) moist, with few fine distinct brownish yellow
68966	(10YR 6/8) mottles, yellowish brown (10YR 5/8) moist; weak
(18-36 cm)	medium subangular blocky structure near massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; few fine tubular pores; noneffervescent; very strongly acid (pH 5.0); abrupt wavy boundary.
B21tg	14 to 23 inches, mottled pinkish white (7.5YR 8/2), reddish
RSL	yellow (7.5YR 6/6) and yellowish red (5YR 5/8) very gravelly
68967	heavy clay loam, light brown (7.5YR 6/4), strong brown (7.5YR 5/6)
(36-58 cm)	and yellowish red (5YR 4/8) moist, mottles are many medium and large and distinct with few fine distinct light gray (10YR 7/1) mottles; moderate medium subangular blocky and angular blocky structure; hard, friable, sticky and plastic; common fine and few very fine roots; common very fine tubular pores; common thin clay films on ped faces and in pores; noneffervescent; strongly acid (pH 5.2); clear wavy boundary.
B22tg	23 to 34 inches, white (10YR 8/2) very gravelly clay, light gray
RSL	(10YR 7/2) and very pale brown (10YR 7/4) moist, with many medium
68968	and large and distinct red (10R 4/6) mottles, red (10R 4/6)
(58-86 cm)	moist; moderate medium subangular and angular blocky structure; very hard, firm, sticky and plastic; few fine and very fine roots; few thin clay films on ped faces; noneffervescent; very strongly acid (pH 4.6); clear wavy boundary.
B23t	34 to 51 inches, light red (2.5YR 6/6) and red (2.5YR 4/6) very
RSL	cobbly clay, red (2.5YR 4/6) moist, with common fine distinct
68969	pinkish gray (7.5YR 7/2) mottles, brown (7.5YR 5/4) moist;
(86-130 cm)	moderate medium and fine subangular blocky structure; very hard, friable, sticky and plastic; few fine tubular pores; common moderately thick clay films on ped faces and in pores; noneffervescent; very strongly acid (pH 4.6).

Note: Coarse fragments over 3 inches - B21 13 percent
B22 29 percent

CONSECUTIVE PEDON NUMBER C 68138 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CASTO SOIL NO. S68 ARIZ. 2- 4 SAMPLE NO. 81003-81004 E.PIMA-SANTA CRU AREA

SOIL FAMILY: UDIC HAPLUSTALF,LOAMY-SKELETAL,MIXED,MESIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05	SILT .05- .002	CLAY LT .002	VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	1A2A INT. .2- OF WHOLE SOIL	COARSE FRAGMENTS- I 75- 20 PCT.	II 20-5 PCT.	III 5-2 OF LT 75
			PERCENT OF LESS THAN 2MM																
81003	86-122	C 2CA	47.5	28.5	24.0	3.1	4.0	3.8	19.0	17.6	11.0	17.5				41.8	56A	31	21	4
81004	122-137	C 3CA	48.7	29.8	21.5	8.0	8.0	4.9	15.2	12.6	10.5	19.3			1	32.8	73A	43	10	20

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG LL 4F1	PL 4F2	BULK DENSITY 1/3 BAR 4A1F	EST. 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.		NO.40 GRAMS PER CC				PERCENT			PERCENT	
81003	86-122			6								1.26		0.61				17.7		
81004	122-137			11								1.26		0.44				15.6		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4B	MG 5B3A 6O4B	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4- OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4- OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA- CL2 8C1E
		MEQ/100G									PERCENT					
81003	86-122	73.3	5.4	0.5	0.3	79.5			79.5	47.4	100+		100+		7.8	7.4
81004	122-137	70.6	4.9	0.5	0.3	76.3			76.3	41.3	100+		100+		7.9	7.6

CLAY MINERALOGY

SAMPLE NO	DEPTH CM.	LESS THAN 0.002 MM X RAY	DTA	L.T. 0.0002 MM MINERAL X RAY	CODE	RELATIVE AMOUNT
81003	86-122	MT 5 KK 2				
81004	122-137					

I II III IV -PERCENT- I II III

MT MONTMORT 1 TRACE
KK KAOLINIT 2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

CASTO GRAVELLY SANDY LOAM
S68 Ariz-2-4-1 through 8

Location: Cochise County, Arizona, 11 miles west of south from Fort Huachuca, 2¼ miles south-southeast of Parker Canyon Lodge, approximately 3800 feet southwest of intersection Forest Service Roads 48 and 61, 1700 feet west and 2350 feet south of NE corner Section 29, T23S, R19E. Photo AMS 662 (FS EEX 22-44). Date of Sampling: October 16, 1968.
Description by: Havens and Richardson. Collectors: Nettleton and Brasher.
Classification: Udic Haplustalf, loamy-skeletal, mixed, mesic.
Vegetation: Oak, juniper, grass. Grasses: tanglehead, canebeard grass, blue grama, sprucetop grama, wolftail, curly mesquite, sideoats grama, plains lovegrass, bluestem. Trees: Oak, juniper, guajillo. Climate: Mean annual temperature 56°F. Mean annual precipitation 18-19 inches. Parent Material: Old alluvium from dacite, andesite, quartzite, sandstone and siltstone. Topography: Strongly sloping sides of old terrace remnants. 15 percent slope. Northwest aspect. Elevation: 5600 feet. Drainage: Well drained. Rapid runoff. Soil Moisture: Dry.

HORIZON	DESCRIPTION
	(0-3 cm)
A1	0 to 1 inch, dark grayish brown (10YR 4/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, nonsticky and slightly plastic; many fine and very fine roots; common fine interstitial pores; noneffervescent; slightly acid (pH 6.5); abrupt smooth boundary.
B21t (3-13 cm)	1 to 5 inches, dark grayish brown (10YR 4/2) gravelly heavy clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium angular and subangular blocky structure; hard, friable, sticky and plastic; many fine and very fine roots; common fine interstitial pores; few thin clay films on ped faces and in pores; noneffervescent; neutral (pH 7.0); clear smooth boundary.
B22t (13-28 cm)	5 to 11 inches, reddish brown (5YR 4/4) gravelly clay, reddish brown (5YR 4/4) moist; moderate medium and coarse angular and subangular blocky structure; very hard, firm, sticky and plastic; common fine and medium roots; few fine tubular pores; common moderately thick clay films on ped faces and in pores; noneffervescent; medium acid (pH 6.0); clear wavy boundary.
B23t (28-46 cm)	11 to 18 inches, reddish brown (5YR 4/4) very gravelly clay, reddish brown (5YR 4/4) moist, with pinkish gray (7.5YR 7/2) weathered rock, brown (7.5YR 5/2) moist; weak medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; common fine and medium roots; few fine tubular pores; common moderately thick clay films on ped faces and in pores; noneffervescent; slightly acid (pH 6.5); clear wavy boundary.
B3t (46-61 cm)	18 to 24 inches, pinkish gray (7.5YR 7/2) weathered rock and reddish brown (5YR 4/4) clay, very gravelly clay, brown (7.5YR 5/2) and reddish brown (5YR 4/4) moist; nearly massive breaking to weak medium subangular blocky structure; very hard, firm, sticky and plastic; few fine and medium roots; few fine tubular pores; common thin clay films on ped faces and in pores; noneffervescent; neutral (pH 6.6); clear wavy boundary.
C1 (61-86 cm)	24-34 inches, pinkish gray (7.5YR 7/2) (80 percent weathered rock) and reddish brown (5YR 4/4) (clay 20 percent), very gravelly sandy clay loam, light brown (7.5YR 6/4) and reddish brown (5YR 4/4) moist; massive; very hard, friable, slightly sticky and plastic; few fine and medium roots; few fine tubular pores; noneffervescent; neutral (pH 6.6); clear wavy boundary.
C2ca RSL 681003 (86-122 cm)	34 to 48 inches, pinkish white (7.5YR 8/2) very gravelly sandy clay loam, light brown (7.5YR 6/4) moist, with common medium distinct reddish brown (5YR 4/4) mottles (this horizon has pocket of mottled pinkish white (7.5YR 8/2) and reddish brown (5YR 5/4) clay loam material in lower part. This pocket is discontinuous; massive; hard, friable, slightly sticky and slightly plastic; few fine and medium roots; strongly effervescent; moderately alkaline (pH 8.2); clear irregular boundary.
C3ca RSL 681004 (122-137 cm)	48 to 54 inches, pinkish white (7.5YR 8/2) very gravelly light sandy clay loam, brown (7.5YR 5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; strongly effervescent; moderately alkaline (pH 8.0).

Note: Only 2 horizons sampled: S68 Ariz-2-4-7, S68 Ariz-2-4-8.

CONSECUTIVE PEDON NUMBER C 68139 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CASTO SOIL NO. S68 ARIZ. 2- 5 SAMPLE NO. 81005-81006 E.PIMA-SANTA CRU AREA

SOIL FAMILY: UDIC HAPLUSTALF,LOAMY-SKELETAL,MIXED,MESIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05	SILT .05- .002	CLAY LT .002	VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	CO. CLAY 2- .2U	FINE CLAY LT .2U	CARBONATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS- PCT. OF WHOLE I 75- 20	II 20-5	III 5-2
			SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1												1A2A				
			PERCENT OF LESS THAN 2MM														SOIL PCT. OF LT 75		
81005	74-119	B3TCA	65.0	11.2	23.8	10.6	17.2	12.4	18.0	6.8	4.7	6.5				20.2	76A	54	15	7
81006	119-142	C 1CA	69.4	10.2	20.4	12.2	20.4	14.0	16.8	6.0	4.0	6.2				17.9	69A	50	16	3

SAMPLE NO.	DEPTH CM.	ORG. CAR- BON 6A1A -PERCENT-	MATTER NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 5B4A -PERCENT-	2-20 5B4A	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG LL 4F1	PL 4F2	BULK DENSITY EST. 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
						-----PERCENT-------				PCT.NO.40		GRAMS PER CC				----PERCENT---			-PERCENT-	
81005	74-119			TR								1.26		0.40				11.7		
81006	119-142			TR								1.26		0.48				11.1		

SAMPLE NO.	DEPTH CM.	--EXTRACTABLE BASES---- CA 5B3A 6N4B	MG 5B3A 6D4B	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL AL 6G1E	--C E C-- SUM 5A3A	NH4- OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4- OAC 5C1	-----PH------ NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA- CL2 8C1E
		MEQ/100G									----PERCENT----					
81005	74-119	19.5	9.1	1.9	0.3	30.8			30.8	24.6	100+		100+		8.2	7.4
81006	119-142	20.0	8.7	1.8	0.2	30.7			30.7	22.2	100+		100+		8.0	7.2

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY ----- LESS THAN 0.002 MM ------ L.T. 0.0002 MM ----- X RAY ---- DTA --- X RAY ---- 7A2E I	7A2E II	7A2E III	7A2E IV	7A3 -PERCENT-	7A3	7A2E I	7A2F II	7A2E III
81005	74-119	MT 4	MI 2	KK 2						
81006	119-142									

MINERAL CODE
MT MONTMORT
MI MICA
KK KAOLINIT

RELATIVE AMOUNT
1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

CASTO GRAVELLY LOAM
S68 Ariz-2-5-1 through 7

Location: Cochise County, Arizona, 8 miles west of south from Fort Huachuca and approximately 1500 feet north-northeast of Parker Canyon Lodge (0.6 mile by road), 100 feet east of Highway 83 at intersection of Highway 83 and old road. Approximately 1150 feet east of SW corner Section 8, T23S, R19E. Photo AMS-663, FS EEX 22-41. Date of Sampling: October 16, 1968.
Description by: Havens, Clemmons and Richardson. Collectors: Nettleton and Brasher.
Classification: Udic Haplustalf, loamy-skeletal, mixed, mesic.
Vegetation: Trees, shrubs and grass. Grass: Sideoats grama, wolftail, blue grama, cane-beard grass, curly mesquite, slender grama, Arizona cottontop, plains lovegrass. Trees: Oak, juniper. Shrubs: Manzanita. Climate: Mean annual temperature 56°F. Mean annual precipitation 18-20 inches. Parent Material: Old alluvium from dacite, quartzite, sandstone and possibly siltstone. Topography: Hilly, dissected old fans. 18 percent slope, south aspect. Elevation: 5600 feet. Drainage: Well drained. Medium runoff. Soil moisture: Dry.

HORIZON	DESCRIPTION
	(0-5 cm)
A1	0 to 2 inches, dark grayish brown (10YR 4/2) gravelly loam, dark brown (10YR 3/3) moist; weak thick platy structure; slightly hard, friable, slightly sticky and slightly plastic; many fine, very fine and medium roots; common fine interstitial and tubular pores; noneffervescent; medium acid (pH 6.0); abrupt smooth boundary.
B1t (5-15 cm)	2 to 6 inches, brown (7.5YR 5/4) gravelly light sandy clay loam, dark brown (7.5 YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; many fine, very fine and medium roots; common fine interstitial and tubular pores; few thin clay films on ped faces and in pores; noneffervescent; slightly acid (pH 6.5); clear smooth boundary.
B21t (15-33 cm)	6 to 13 inches, yellowish red (5YR 5/6) and reddish brown (5YR 5/4) gravelly clay, yellowish red (5YR 5/6) and reddish brown (5YR 4/4) moist; moderate medium subangular and angular blocky structure; hard, firm, sticky and plastic; common fine and medium roots; few fine tubular pores; common moderately thick clay films on ped faces and in pores; 40 percent gravel; noneffervescent; slightly acid (pH 6.5); abrupt wavy boundary.
B22t (33-74 cm)	13 to 29 inches, reddish brown (5YR 5/4) and (4/4) very gravelly clay, reddish brown (5YR 4/4) and dark reddish brown (5YR 3/4) moist, with many medium and fine and distinct pink (5YR 7/3) and pinkish gray (7.2) mottles, light reddish brown (5YR 6/3) moist, mottles are from parent rock; weak fine and medium subangular blocky structure; very hard, firm, sticky and plastic; few fine and medium roots; few fine tubular pores; common thin clay films on ped faces and in pores; noneffervescent; neutral (pH 7.0); clear wavy boundary.
B3tca RSL 681005 (74-119 cm)	29 to 47 inches, reddish brown (5YR 5/3 and 5/4) very cobbly heavy clay loam, reddish brown (5YR 4/3 and 4/4) moist; weak, medium and coarse subangular blocky structure; very hard, friable, sticky and plastic; few fine roots; few fine tubular pores; common thin clay films on ped faces; slightly effervescent in spots; moderately alkaline (pH 8.0); clear wavy boundary.
C1ca RSL 681006 (119-142 cm)	47 to 56 inches, reddish brown (5YR 5/3 and 5/4) very gravelly sandy clay loam, reddish brown (5YR 4/3 and 4/4) moist; massive; hard, friable, sticky and plastic; few thin clay films on rock faces; slightly effervescent in spots; moderately alkaline (pH 8.0); abrupt wavy boundary.
C2 (142-157 cm)	56 to 62 inches, yellowish red (5YR 4/6) and red (2.5YR 4/6) very gravelly clay loam, yellowish red (5YR 3/6) and red (2.5YR 4/6) moist; massive; hard, friable, sticky and plastic; noneffervescent; mildly alkaline (pH 7.5).

Note: 2 horizons sampled: S68 Ariz-2-5-5
S68 Ariz-2-5-6

CONSECUTIVE PEDON NUMBER C 68151 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CASTO VARIANT SOIL NO. S68 ARIZ. 12-13 SAMPLE NO. 81090-81095 E.PIMA-SANTA CRU AREA

SOIL FAMILY: UDIC HAPLUSTALF LOAMY-SKELETAL,MIXED,MESIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	1A2A INT. II .2- .02	COARSE FRAGMENTS- PCT. OF WHOLE SOIL	I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM															PCT. OF LT 75			
81090	0- 10	A1	67.8	25.8	6.4	8.8	14.0	12.8	21.2	11.0	13.5	12.3				35.4	68A	52	10	6
[redacted]																				
[redacted]																				
81092	25- 38	B1 T	56.5	27.7	15.8	6.2	13.8	10.9	18.2	7.4	9.3	18.4				25.9	64A	26	32	6
81093	38- 53	B21T	44.7	15.1	40.2	8.0	14.5	7.9	9.6	4.7	5.5	9.6				14.6	57A	17	39	1
81094	53- 76	B22T	51.3	13.0	35.7	11.5	17.3	8.9	10.5	3.1	5.9	7.1				14.0	50A	16	33	1
																		--	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A -PERCENT-	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	CIT EXT AL 6G7A	PYROP EXT FE 6C5A	PYROP EXT AL 6G5A	ATTERBERG LL 4F1	PL 4F2	PI 4A1F	BULK DENSITY 1/3 BAR 4A1F	DRY BAR 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
						-PERCENT-				PCT.			GRAMS PER CC			----PERCENT---			-PERCENT-	
81090	0- 10	1.41	0.080			0.8	0.1						1.13	1.15	0.53	11.5	4.3	0.6	0.3	
81091	10- 25	0.59	0.033			0.7	TR						1.28	1.28	0.57	13.0	3.0			
81092	25- 38	0.39				1.0	0.1						1.39	1.42	0.51	15.0	5.5	0.7	0.4	
81093	38- 53	0.59				2.1	0.2						1.25	1.49	0.62	30.0	14.7	6.0	3.6	
81094	53- 76	0.42				1.7	0.2								0.65		13.5			

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI-DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	C NH4-OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
81090	0- 10	4.6	1.1	TR	0.3	6.0			6.0	7.8	100+		77		6.1	5.4
81091	10- 25	2.5	0.8	0.1	0.2	3.6		0.1	3.6	4.9	100+	97	73		5.6	4.9
81092	25- 38	4.2	2.1	0.1	0.2	6.6		0.7	6.6	8.0	100+	90	82		4.9	4.2
81093	38- 53	8.1	7.6	0.2	0.5	16.4	7.2	1.3	23.6	19.2	69	93	85		4.8	4.2
81094	53- 76	8.0	7.7	0.3	0.6	16.6	6.4	1.2	23.0	20.2	72	93	82		4.8	4.3

C L A Y M I N E R A L O G Y

SAMPLE NO	DEPTH CM.	LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III
81090	0- 10	MI 3	KK 3	MT 2						
81091	10- 25	MI 3	KK 3							
81092	25- 38									
81093	38- 53									
81094	53- 76	MT 4	MI 3	KK 3						

MINERAL CODE		RELATIVE AMOUNT	
MI	MICA	1	TRACE
KK	KAOLINIT	2	SMALL
MT	MONTMORT	3	MODERATE
		4	ABUNDANT
		5	DOMINANT
		6	INDETER.

CASTO VERY GRAVELLY SANDY LOAM variant 1
S68 Ariz-12-13-1 through 5

Location: Santa Cruz County, Arizona, approximately 5.5 miles south-southeast of Harshaw, and 1 mile north of Washington Camp in road cut on east side of road from Washington Camp to Mowry-Harshaw. Photo EEX 20-61. Date of Sampling: October 17, 1968.
Description by: Havens and Richardson. Collectors: Nettleton and Brasher.
Classification: Udic Haplustalf, loamy-skeletal, mixed, mesic.
Vegetation: Blue and sideoats grama, deergrass, plains lovegrass, manzanita, oak, juniper, three-awn, little bluestem, hairy grama. Climate: Approximate mean annual precipitation is 18 inches and mean annual temperature is 57°F. Parent Material: Old mixed alluvium including granite, quartzite, rhyolite, dacite and purple siltstone. Topography: High old dissected fan - 36 percent slope. Southwest aspect. Elevation: 5350 feet. Drainage: Moderately well-drained. Rapid runoff. Soil Moisture: Dry.

HORIZON	DESCRIPTION
	(0-10 cm)
A1	0 to 4 inches, brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3)
RSL	moist; moderate fine and very fine granular structure; slightly hard, very
681090	friable, nonsticky and nonplastic; many fine and common medium roots; many fine interstitial pores; 40 percent gravel, 10 percent cobbles; noneffervescent; slightly acid (pH 6.5); clear wavy boundary.
A2	4 to 10 inches, pinkish gray (7.5YR 7/2) very gravelly sandy loam, brown
RSL	(7.5YR 5/4) moist; massive; slightly hard, friable, nonsticky and nonplastic;
681091	many fine and common medium roots; many fine interstitial and common fine
(10-25 cm)	tubular pores; 50 percent gravel, 10 percent cobbles; noneffervescent; medium acid (pH 6.0); abrupt wavy boundary.
B1t	10 to 15 inches, reddish brown (5YR 5/4) and pink (5YR 7/3) very gravelly
RSL	sandy clay loam, yellowish red (5YR 4/6) and reddish brown (5YR 5/4) moist;
681092	weak medium subangular blocky structure; slightly hard, friable, slightly
(25-38 cm)	sticky and slightly plastic; common fine and very fine and few medium roots; common fine and few medium tubular pores; few thin clay films on ped faces; 40 percent gravel, 5 percent cobbles; noneffervescent; very strongly acid (pH 5.0); clear irregular boundary.
B21t	15 to 21 inches, yellowish red (5YR 5/6) and (5/8), and dark red (10R 3/6)
RSL	very gravelly clay, light red (2.5YR 6/6), red (2.5YR 5/6) and dark red (10R
681093	3/6) moist, with some brownish yellow (10YR 6/6) and white (8/2) weathered gravel
(38-53 cm)	that appears to be mottles; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few medium and common fine and very fine roots; few fine interstitial pores; common moderately thick clay films on ped faces; 40 percent gravel, 5 percent cobbles; noneffervescent; very strongly acid (pH 5.0); clear smooth boundary.
B22t	21 to 30 inches, mottled very pale brown (10YR 7/3, yellow (8/6) and red
RSL	(10R 4/6) very gravelly clay, brownish yellow (10YR 6/6), pale brown (10YR 6/3)
681094	and light yellowish brown (10YR 6/4), and red (10R 4/6) moist, mottles are many
(53-76 cm)	medium and large and distinct; moderate medium subangular blocky structure; hard, firm sticky and plastic; few medium roots; common very fine and fine pores; common moderately thick clay films on ped faces and in pores; noneffervescent; very strongly acid (pH 5.0); gradual wavy boundary.
B23t	30 to 77 inches, mottled light reddish brown (5YR 6/4), reddish brown (5YR 5/4)
(not sampled)	and yellowish red (5/6) very gravelly clay, reddish brown (5YR 4/4) and yellowish

and very fine roots; few fine interstitial pores; common moderately thick clay films on ped faces and pressure faces; 5 percent stones, 40 percent gravel; noneffervescent; strongly acid (pH 5.5); clear wavy boundary.

CONSECUTIVE PEDON NUMBER C 68137 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CASTO TAXADJUNCT SOIL NO. S68 ARIZ. 2- 3 SAMPLE NO. 8 995-81002 E.PIMA-SANTA CRU AREA

SOIL FAMILY: UDIC HAPLUSTALF,FINE-LOAMY,MIXED,MESIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	INT. COARSE FRAGMENTS II PCT. OF WHOLE 2	I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM													SOIL	PCT. OF LT 75		
8 995	0- 3	A1	72.1	14.4	13.5	4.4	13.3	13.4	27.9	13.1	7.6	6.8				36.6	72A	49	15	8
8 996	3- 13	B21T	62.4	15.8	21.8	4.2	12.4	12.1	23.4	10.3	7.4	8.4				30.6	20*	13	3Z	N
8 997	13- 28	B22T	51.5	14.8	33.7	6.2	13.6	9.5	14.6	7.6	5.8	9.0				21.6	23*	15	3	1
8 998	28- 41	B23T	56.0	15.2	28.8	8.0	16.0	9.8	14.6	7.6	5.6	9.6				21.1	38*	27	6	2
8 999	41- 56	B3 T	59.8	18.5	21.7	8.5	15.7	9.8	16.0	9.8	6.3	12.2				25.4	36*	26	5	1
81000	56- 71	C 1	58.8	24.3	16.9	8.4	13.2	7.1	16.3	13.8	9.2	15.1				33.4	70*	35	26	7
81001	71-114	C 2	61.0	25.3	13.7	12.5	11.2	6.4	17.0	13.9	10.5	14.8				35.5	70A	24	39	7
81002	114-152	C 3	57.4	27.1	15.5	11.6	11.1	5.9	15.7	13.1	8.4	18.7				31.7	66A	54	8	4

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L L 4F1	P L 4F2	BULK DENSITY 1/3 BAR 4A1E	4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		-PERCENT-		-PERCENT-		-----PERCENT-----				PCT.	NO.40	GRAMS PER CC				----PERCENT---			-PERCENT-	
8 995	0- 3	1.27	0.094			0.8	0.1			NP	NP	1.25			0.43			8.5		
8 996	3- 13	1.24	0.091			0.9	0.1			39	21		1.34	1.58	0.89		25.3	11.6	5.6	4.9
8 997	13- 28	0.47	0.030			1.1	0.2						1.30	1.57	0.87		31.2	16.8	6.5	5.6
8 998	28- 41	0.36				0.9	0.2			42	23		1.23	1.53	0.78		33.4	15.7	7.5	5.7
8 999	41- 56	0.20				0.9	0.1						1.21	1.37	0.80		29.9	13.3	4.2	3.3
81000	56- 71					0.7	0.1			41	24		1.21	1.35	0.48		32.8	13.0	3.7	1.7
81001	71-114			2		0.6	TR						1.26	1.30	0.46		28.4	12.1	1.0	0.5
81002	114-152			5		0.5	TR			42	33	1.26			0.50			14.7		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4B	MG 5B3A 6O4B	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	BASE SATURATION NH4- SUM+ OAC 5A6A	SUM+ ACI- DITY	AL	NH4- OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA- CL2 8C1E
		MEQ/100G								PERCENT						
8 995	0- 3	19.1	4.9	0.1	0.5	24.6			24.6	18.4	100+		100+		6.2	5.8

CASTO VERY GRAVELLY SANDY CLAY LOAM (taxadjunct) 1/
S68 Ariz-2-3-1 through 8

Location: Cochise County, Arizona, 8.5 miles southwest of Fort Huachuca, 1.1 mile northnortheast of road from Parker Canyon on Highway 83 on top of ridge above curve in road. Approximately 500 feet south and 700 feet east of W¼ corner Section 8, T23S, R19E. Photo AMS 663 (FS 22-41). Date of Sampling: October 16, 1968.
Description by: Havens, Clemmons and Richardson. Collectors: Nettleton and Brasher.
Classification: Udic Haplustalf, fine-loamy, mixed, mesic.
Vegetation: Juniper, oak, manzanita and grasses. Grasses: Plains lovegrass, blue grama, tanglehead, three-awn, curly mesquite, sideoats grama, wolftail, Arizona cottontop, bluestem. Climate: Mean annual temperature 56°F. Mean annual precipitation 18-20 inches. Parent Material: Old alluvium from quartzite, sandstone, dacite and tuffs. Topography: Steep sided, dissected old alluvial fans - 20 percent slope, northwest aspect. Elevation: 5,600 feet. Drainage: Well drained. Medium runoff. Soil moisture: Dry.

HORIZON	DESCRIPTION
	(0-3 cm)
A1	0 to 1 inch, dark grayish brown (10YR 4/2) very gravelly light sandy clay loam,
RSL	very dark grayish brown (10YR 3/2) moist; moderate fine granular structure;
68995	slightly hard, friable, slightly sticky and slightly plastic; many fine and medium
	roots; common fine interstitial and tubular pores; noneffervescent; mildly alka-
	line (pH 7.8); abrupt smooth boundary.
B21t	1 to 5 inches, dark grayish brown (10YR 4/2) gravelly heavy clay loam, very dark
RSL	grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; hard,
68996	friable, sticky and plastic; few fine tubular pores; many very fine, fine and
(3-13 cm)	medium roots; few thin clay films on ped faces and in pores; noneffervescent;
	mildly alkaline (pH 7.6); clear smooth boundary.
B22t	5 to 11 inches, reddish brown (5YR 4/4) gravelly clay, reddish brown (5YR 4/4)
RSL	moist; moderate medium and coarse subangular and angular blocky structure; very
68997	hard, firm, sticky and plastic; common fine and medium roots; few fine tubular
(13-28 cm)	pores; common moderately thick clay films on ped faces and in pores; 40 percent gravel;
	noneffervescent; neutral (pH 7.2); clear wavy boundary.
B23t	11 to 16 inches, reddish brown (5YR 4/3) very gravelly clay, reddish brown (5YR
RSL	4/3) moist, with many medium and coarse distinct pinkish gray (7.5YR 7/2) mottles,
68998	brown (7.5YR 5/2) moist, mottles appear to be weathered rock; moderate medium and
(28-41 cm)	coarse subangular and angular blocky structure; very hard, firm, sticky and plastic; common fine and medium roots; few fine tubular pores; common moderately thick clay films on ped faces and in pores; noneffervescent; neutral (pH 7.2); clear wavy boundary.
B3t	16 to 22 inches, pinkish gray (7.5YR 7/2) weathered rock and reddish brown (5YR
RSL	4/4) clay, very gravelly clay, brown (7.5YR 5/2) and reddish brown (5YR 4/4)
68999	moist; nearly massive breaking to moderate fine and medium subangular blocky struc-
(41-56 cm)	ture; very hard, firm, sticky and plastic; few fine and medium roots; common moderately thick clay films on ped faces and in pores; noneffervescent; mildly alkaline (pH 7.4); clear wavy boundary.
C1	22 to 28 inches, pinkish gray (7.5YR 7/2) rock, and 20 percent reddish brown (5YR 4/4)
RSL	very gravelly clay, light brown (7.5YR 6/4) and reddish brown (5YR 4/4) moist;
681000	massive; very hard, firm, sticky and plastic; few fine roots; common moderately
(56-71 cm)	thick clay films on surface of clay, slightly effervescent in spots; mildly alka-
	line (pH 7.6); clear irregular boundary.
C2 (71-	28 to 45 inches, pinkish white (7.5YR 8/2) very gravelly sandy loam, brown (7.5YR
RSL 114 cm)	5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; slightly
681001	effervescent; moderately alkaline (pH 8.0); diffuse wavy boundary.
C3	45 to 60 inches, pinkish white (7.5YR 8/2) very gravelly sandy loam, brown (7.5YR

CONSECUTIVE PEDON NUMBER C 68145 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES MARTINEZ SOIL NO. S68 ARIZ. 2- 1 SAMPLE NO. 81042-81051 E.PIMA-SANTA CRU AREA

SOIL FAMILY: HOIC.HAPLUSTALF.VERY-FINE.KAOLINITIC-MESIC RIVERSIDE SOIL SURVEY LABORATORY

[redacted]

SAMPLE NO.	DEPTH CM.	HORZ.	SAND 2-.05	SILT .05-.002	CLAY LT .002	VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	CO. 2-.2U	FINE LT .2U	CARBO NATE 3A1A	II .2-.02 WHOLE SOIL	PCT. OF 20	I 75-20 PCT.	II 20-5 OF	III 5-2 LT 75
			PERCENT OF LESS THAN 2MM																	
81042	0- 18	A1	44.2	35.6	20.2	8.5	6.2	5.0	14.2	10.3	20.9	14.7				39.4	16A	7	7	2
81043	18- 28	B11T	37.1	33.3	29.6	4.7	4.9	4.3	13.5	9.7	19.7	13.6				37.5	25A	19	2	4
81044	28- 38	B12T	34.3	27.9	37.8	9.7	4.2	2.9	9.6	7.9	14.4	13.5				28.2	24A	17	7Z	N
81045	38- 58	B21T	9.6	10.7	79.7	1.3	1.2	1.0	3.3	2.8	4.8	5.9				9.6	6A	--	5	1
81046	58- 74	B22T	10.7	8.5	80.8	1.6	1.4	1.2	3.4	3.1	3.4	5.1				8.7	7A	--	7Z	N
81047	74- 89	B23T	22.8	11.8	65.4	4.6	3.9	3.2	6.4	4.7	5.7	6.1				14.3	10A	--	10Z	N
81048	89-112	B31T	43.8	12.0	44.2	12.5	12.0	5.8	8.5	5.0	4.6	7.4				14.2	22A	9	13Z	N
81049	112-132	B32T	51.3	9.4	39.3	18.7	14.2	6.6	7.8	4.0	3.6	5.8				11.7	38A	23	15Z	N
81050	132-170	B33T	51.9	10.2	37.9	12.9	13.5	8.5	11.7	5.3	4.0	6.2				15.3	50A	40	10Z	N
81051	0- 38		72.5	19.5	8.0	17.3	19.5	10.5	17.2	8.0	13.4	6.1				30.0	7A	--	7Z	N

1/ [redacted]

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR-BON 6A1A	NITRO-GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	DI-CIT AL 6G7A	PYROP FE 6C5A	PYROP AL 6G5A	ATTERBERG LL 4F1	LIMIT PL 4F2	EST. 1/3 BAR 4A1F	BULK DENSITY 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT	
81042	0- 18	1.36	0.115			2.3	0.1			26	18		1.36	1.42	0.91		18.4	8.1	1.4	1.3
81043	18- 28	1.05	0.101			2.2	0.2						1.35	1.41	0.86		20.3	9.7	1.5	1.2
81044	28- 38	0.85	0.080			2.4	0.3						1.41	1.46	0.86		22.4	12.8	1.2	1.0
81045	38- 58	0.74	0.068			2.5	0.3			60	34		1.26	1.54	0.97		37.9	26.1	6.9	6.7
81046	58- 74	0.55			TR	2.4	0.3						1.26	1.58	0.96		37.7	27.6	7.8	7.5
81047	74- 89	0.23			TR	1.9	0.2			61	28		1.28	1.62	0.95		36.6	23.3	8.2	7.7
81048	89-112	0.16			TR	1.1	0.1						1.49	1.66	0.86		25.5	16.1	3.7	3.1
81049	112-132				1	0.9	TR						1.24	1.38	0.78		34.4	14.4	3.6	2.8
81050	132-170				2	0.9	0.1			44	21		1.18	1.32	0.69		36.9	14.2	3.8	2.6
81051	0- 38	1.19	0.105									1.37			0.96			9.7		

MARTINEZ GRAVELLY LOAM
S68 Ariz-2-1-1 through 9

Location: Cochise County, Arizona, about 12 miles W of south from Fort Huachuca and approximately 3 miles south of Parker Canyon Lodge. 1.3 miles southwest of intersection of Forest Service roads 48 and 61, 150 feet east of road. Approximately 1000 feet east and 2000 feet south of NW corner Section 32, T23S, R19E. Photo 692. FS 22-46. Date of Sampling: October 15, 1968.
Description by: Clemmons and Havens. Collectors: Nettleton and Brasher.
Classification: Udic Haplustalf, very-fine, kaolinitic, mesic.
Vegetation: Grassland--plains lovegrass, canebeard grass, New Mexico needle grama, three-awn, blue grama. Climate: Mean annual temperature approximately 57°F. Mean annual precipitation 16-18 inches. Parent Material: Old alluvium from dacite, andesite, rhyolite, quartzite and shale (siltstone). Topography: Nearly level to gently sloping broad tops of old terrace remnants. 1 to 3 percent slope. Southwest aspect. Elevation: 5425 feet. Drainage: Well drained, but with slow to very slow permeability. Medium runoff. Soil Moisture: Slightly moist.
Remarks: This was paired with S68 Ariz-2-2-1 through 7.

HORIZON	DESCRIPTION
	(0-18 cm)
A1	0 to 7 inches, brown (10YR 5/3) gravelly heavy loam, dark brown (10YR 3/3) moist; weak medium
RSL	platy structure in upper part, moderate at 2-5"; slightly hard, friable, slightly sticky and
681042	slightly plastic; many fine and medium roots; common very fine, fine and medium tubular pores;
	noneffervescent; neutral (pH 6.8); clear wavy boundary.
B11t	7 to 11 inches, dark brown (7.5YR 4/4) gravelly light clay loam, dark brown (7.5YR 3/4) moist;
RSL	weak fine and medium subangular blocky structure; slightly hard, friable, sticky and slightly
681043	plastic; common very fine and fine roots; common very fine, fine and medium tubular pores; few
(18-28 cm)	thin clay films on ped faces; noneffervescent; neutral (pH 7.0); clear wavy boundary.
B12t	11 to 15 inches, brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate fine and
RSL	medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and
681044	fine roots; few fine and medium tubular pores; 10 percent gravel; common thin clay films on ped faces
(28-38 cm)	and in pores; noneffervescent; neutral (pH 7.0); abrupt wavy boundary.
B21t	15 to 23 inches, brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; strong medium and coarse
RSL	prismatic structure; hard, firm, sticky and very plastic; common very fine and fine roots;
681045	common very fine tubular pores; many moderately thick clay films on ped faces and common pres-
(38-58 cm)	sure faces; few fine gravel; noneffervescent; neutral (pH 7.2); clear wavy boundary.
B22t	23 to 29 inches, yellowish brown (10YR 5/6) clay, dark yellowish brown (10YR 4/4) moist; moder-
RSL	ate coarse angular and subangular blocky structure; very hard, firm, sticky and very plastic;
681046	few very fine roots; many moderately thick clay films on ped faces and many pressure faces;
(58-74 cm)	common medium slickensides; few fine gravel; noneffervescent; neutral (pH 7.0); clear wavy
	boundary.
B23t	29 to 35 inches, yellowish brown (10YR 5/6) clay, dark yellowish brown (10YR 4/4) moist; mod-
RSL	erate medium and coarse angular and subangular blocky structure; very hard, firm, sticky and
681047	very plastic; few very fine roots; few fine tubular pores; common moderately thick clay films
(74-89 cm)	on ped faces; noneffervescent; few fine filaments of lime; mildly alkaline (pH 7.8); gradual
	irregular boundary.
B31t	35 to 44 inches, reddish brown (2.5YR 5/4) gravelly or very gravelly clay, reddish brown (2.5
RSL	YR 5/4) moist, with tongues of 10YR soil material from horizon above; moderate medium subangu-
681048	lar blocky structure; hard, friable, sticky and plastic; few very fine roots; few fine tubular
(89-112 cm)	pores; common thin clay films on ped faces; slightly effervescent in spots and under gravel;
	moderately alkaline (pH 8.0); gradual wavy boundary.
B32t	44 to 52 inches, mottled reddish brown (2.5YR 5/4), reddish yellow (7.5YR 6/6), light yellow-
RSL	ish brown (10YR 6/4) and yellowish brown (10YR 5/6) very gravelly clay or very gravelly clay
681049	loam, reddish brown (2.5YR 5/4), strong brown (7.5YR 5/6), yellowish brown (10YR 5/4) and dark
(112-132 cm)	yellowish brown (10YR 4/6) moist; moderate medium subangular blocky structure; hard, friable,
	sticky and plastic; few fine tubular pores; common thin clay films on ped faces; slightly
	effervescent in spots and under gravel; moderately alkaline (pH 8.0); gradual wavy boundary.
B33t	52 to 67 inches, mottled reddish brown (2.5YR 5/4), reddish yellow (7.5YR 6/6), light yellow-
RSL	ish brown (10YR 6/4) and yellowish brown (10YR 5/6) gravelly heavy clay loam, reddish brown
681050	(2.5YR 5/4), strong brown (7.5YR 5/6), yellowish brown (10YR 5/4) and dark yellowish brown
(132-170 cm)	(10YR 4/6) moist; massive; hard, friable, sticky and plastic; few fine tubular pores; few
	thin clay films on ped faces and in pores; slightly effervescent in spots and under gravel;
	moderately alkaline (pH 8.0).
	(0-38 cm)
Composite A	0 to 15 inch horizon sampled from 10 pedons selected at 10-foot intervals along a 100-foot,
RSL	N.S. transect centered at the backhoe pit.
681051	(0-38 cm)

CONSECUTIVE PEDON NUMBER C 68146 . C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES MARTINEZ SOIL NO. S68 ARIZ. 2- 2 SAMPLE NO. 81052-81059 E.PIMA-SANTA CRU AREA

SOIL FAMILY: UDIC HAPLUSTALF,VERY-FINE,KAOLINITIC,MESIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A.02	1A2A INT. II .2- OF WHOLE SOIL	COARSE FRAGMENTS I 75-20 PCT.	II 20-5 OF 20 PCT.	III 5-2 OF LT 75
			PERCENT OF LESS THAN 2MM																
81052	0- 3	A11	57.5	28.6	13.9	18.4	10.7	6.1	13.7	8.6	18.4	10.2				34.7	9A	--	9Z	N
81053	3- 15	A12	39.3	31.5	29.2	4.9	5.5	5.2	14.1	9.6	17.8	13.7				35.7	12A	10	2Z	N
81054	15- 25	B2 T	26.5	19.7	53.8	3.8	4.4	3.7	8.8	5.8	10.3	9.4				21.2	2A	--	2Z	N
81055	25- 46	B21T	10.3	7.7	82.0	1.4	1.5	1.4	3.5	2.5	3.6	4.1				8.0	--A	--	--	--
81056	46- 66	B22T	16.3	8.7	75.0	2.2	2.9	2.7	5.4	3.1	5.5	3.2				11.6	1A	--	1Z	N
81057	66- 89	B23T	24.9	9.1	66.0	1.8	5.6	5.2	8.5	3.8	3.6	5.5				11.7	6A	--	6Z	N
81058	89-117	B3 T	49.6	11.6	38.8	12.8	16.1	7.8	9.5	3.4	4.8	6.8				12.9	18A	14	4Z	N
81059	1/ 0- 38																7A	--	2	5

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY EST. 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.NO.40		GRAMS PER CC				PERCENT			PERCENT	
81052	0- 3	1.18	0.096			2.3	0.2			22	18	1.35			0.95			6.5		
81053	3- 15	1.05	0.097			2.3	0.2			27	15		1.41	1.49	0.93		19.7	9.0	1.9	1.7
81054	15- 25	1.05	0.098			2.1	0.3					1.35			0.99			16.6		
81055	25- 46	0.79	0.081			2.8	0.4			58	31		1.28	1.55	1.00		35.4	25.3	6.6	6.6
81056	46- 66	0.39				2.6	0.3						1.33	1.61	0.99		33.4	24.9	6.6	6.5
81057	66- 89	0.21				2.3	0.3					1.35			0.97			23.3		
81058	89-117					1.5	0.2			40	22		1.40	1.55	0.89		30.0	14.5	3.5	3.1
81059	0- 38	1.00	0.090									1.35			0.96			8.3		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACIDITY 6H2A	KCL EXT. AL 6G1E	CEC SUM 5A3A	CEC NH4-OAC 5A6A	BASE SATURATION SUM+ ACIDITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CACL2 8C1E
		MEQ/100G									PERCENT					
81052	0- 3	2.6	1.2	TR	0.6	4.4	7.5	0.5	11.9	9.8	37	90	45		5.0	4.2
81053	3- 15	4.9	2.7	0.1	0.7	8.4	5.5	0.2	13.9	12.8	60	98	66		5.5	4.7
81054	15- 25	10.6	5.4	0.4	0.7	17.1	5.5		22.6	19.9	76		86		6.1	5.5
81055	25- 46	15.4	15.0	1.2	1.1	32.7			32.7	28.7	100+		100+		7.1	6.8
81056	46- 66	17.8	14.4	1.8	0.9	34.9			34.9	27.5	100+		100+		7.8	7.5
81057	66- 89	18.6	11.1	1.9	0.9	32.5			32.5	26.7	100+		100+		8.0	7.5
81058	89-117	15.2	8.8	1.7	0.5	26.2			26.2	21.3	100+		100+		8.1	7.2
81059	0- 38															

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	L.T. 0.0002 MM X RAY 7A3	7A2E I	7A2E II	7A2E III
81052	0- 3	MI 3	KK 3	MT 1						
81053	3- 15	MI 3	KK 3	MT 1						
81054	15- 25									
81055	25- 46	KK 4	MI 3	MT 1						
81056	46- 66									
81057	66- 89									
81058	89-117	KK 4	MI 3	MT 1						
81059	0- 38									

MINERAL CODE: MI MICA, KK KAOLINIT, MT MONTMORT

RELATIVE AMOUNT: 1 TRACE, 2 SMALL, 3 MODERATE, 4 ABUNDANT, 5 DOMINANT, 6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.
1/= Composite from 10 pedons.

MARTINEZ GRAVELLY LOAM
S68 Ariz-2-2-1 through 7

Location: Cochise County, Arizona, 13.5 miles southwest of Fort Huachuca and approximately 5 miles south-southeast of Parker Canyon Lodge. 1.3 miles SW of intersection of Forest Service roads 48 and 227 and 100 feet north of road 227. Approximately 1600 feet west and 350 feet south of NE corner Section 9, T24S, R19E. Photo AMS 692, F.S. EEX 20-169.
Date of Sampling: October 15, 1968.
Description by: Clemmons and Havens. Collectors: Nettleton and Brasher.
Classification: Udic Haplustalf, very-fine, kaolinitic, mesic.
Vegetation: Grassland - blue grama, wolftail, three-awn, plains lovegrass, New Mexico needlegrass, purple grama. Climate: Warm semiarid. Mean annual temperature approximately 57°F. Mean annual precipitation 16-18 inches. Parent Material: Old alluvium from dacite, sandstone, quartzite and possibly siltstone. Topography: Nearly level to gently sloping broad top of old terrace or fan remnant. Slope, 2 percent southwest aspect. Elevation: 5,300 feet.

[redacted]

Moisture: Slightly moist.
Remarks: This site was paired with S68 Ariz-2-1-1 through 9.

HORIZON	DESCRIPTION
	(0-3 cm)
A11	0 to 1 inch, brown (10YR 5/3) gravelly loam, dark yellowish brown (10YR 3/4)
RSL	moist; weak thick platy breaking to moderate fine granular structure;
681052	slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; common fine interstitial and tubular pores; noneffervescent; neutral (pH 7.0); abrupt smooth boundary.
A12	1 to 6 inches, brown (7.5YR 5/4) clay loam, dark brown (7.5YR 3/4) moist;
RSL	weak medium subangular blocky structure; slightly hard, friable, sticky and
681053	plastic; common fine and very fine roots; common fine tubular pores; non-

[redacted]

(3-15 cm)	effervescent; neutral (pH 7.2); clear smooth boundary.
B1t	6 to 10 inches, dark brown (7.5YR 4/4) clay, dark brown (7.5YR 4/4) moist;
RSL	moderate fine and medium subangular blocky structure; hard, friable, sticky
681054	and plastic; many fine and very fine roots; few fine and medium tubular
(15-25 cm)	pores; common thin clay films on ped faces and in pores; noneffervescent; neutral (pH 7.2); clear smooth boundary.
B21t	10 to 18 inches, dark yellowish brown (10YR 4/4) clay, dark yellowish brown
RSL	(10YR 3/4) moist; moderate medium and coarse prismatic breaking to strong
1055	angular and subangular blocky structure; hard, friable, sticky and very
(25-46 cm)	plastic; common fine and very fine roots; few fine tubular pores; many moderately thick clay films on ped faces and in pores; common medium slickensides in lower part; noneffervescent; mildly alkaline (pH 7.4) gradual smooth boundary.

CONSECUTIVE PEDON NUMBER C 69151 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CROT SOIL NO. S69 ARIZ. 2- 5 SAMPLE NO. 9 773-9 779 WILLCOX AREA

SOIL FAMILY: AQUIC NATRUSTALF,FINE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05	SANDS .05-.002	SILTS .002-LT	CLAYS LT .002	INT. COARSE II 2- .02	FRAGMENTS PCT. OF WHOLE 75- 20	I 20-5	II 5-2	III
			PERCENT OF LESS THAN 2MM					SOIL	PCT. OF LT 75		
9 773	0- 5	A21	71.0	24.1	4.9			30.2	FRA	--	--	TR
9 774	5- 13	A22	74.0	21.5	4.5			27.2	--A	--	--	--
9 775	13- 28	B21TCASA	60.9	15.5	23.6			21.7	--A	--	--	--
9 776	28- 43	B22TCASAG	66.0	13.4	20.6			21.7	--A	--	--	--
9 777	43- 51	B3SAG	79.4	7.3	13.3			20.2	--A	--	--	--
9 778	51- 84	C1SAG	77.3	4.9	17.8			20.1	--A	--	--	--
9 779	84-107	C2SAG	85.5	5.9	8.6			23.6	--A	--	--	--

SAMPLE NO.	DEPTH CM.	ORG. CAR- BON 6A1A -PERCENT--	MATTER NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	19-2 6E1B	EXT. IRON FE 6C2B PCT.	ATTERBERG L L 4F1 LL PCT.	P I 4F2 PL NO.40	BULK DENSITY EST 1/3 4A1F	1/3 BAR 4A1F GRAMS PER CC	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C -----PERCENT---	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1 -PERCENT--	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
9 773	0- 5	0.41	0.035	TR		0.1				1.66	1.68	1.00		10.7	3.1	0.4	0.4	7.7		7.1
9 774	5- 13	0.23	0.021	TR		0.1				1.74	1.75	1.00		7.9	2.7	0.2	0.2	7.9		7.1
9 775	13- 28	0.22		5		0.1				1.44	1.64	1.00		24.8	12.4	4.4	4.4	9.3	10.2	9.1
9 776	28- 43			11		0.1				1.67	1.79	1.00		14.5	8.6	2.3	2.3	9.6	10.3	9.2
9 777	43- 51			7		0.1				1.73	1.83	1.00		10.9	7.2	1.9	1.9	9.6	10.3	9.2
9 778	51- 84			4		0.1				1.57	1.79	1.00		20.3	10.1	4.5	4.5	9.7	10.3	9.7
9 779	84-107			4		0.1				1.67	1.86	1.00		15.1	4.8	3.7	3.7	9.7	10.3	9.5

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT. PCT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1B	MG 6Q1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G						-MEQ/100G		MMHO	MEQ/1000 ML								PPM	
9 773	0- 5			1.7	1.5	3.2		6.8												
9 774	5- 13			2.8	1.2	4.0		6.3												
9 775	13- 28			20.7	2.2	22.9		17.5	2.69	0.3	0.1	27.7	0.2	3.6	15.4	4.8				8.9
9 776	28- 43			15.9	1.2	17.1		10.8	3.39	0.4	0.2	53.7	0.2	8.4	13.5	6.2	10.9			9.5
9 777	43- 51			15.1	0.8	15.9		9.7	5.25	0.4	0.2	70.6	0.4	15.2	21.4	8.7				9.7
9 778	51- 84			21.7	1.1	22.8		14.4	5.36	0.4	0.2	81.3	0.2	20.6	19.8	9.0	28.0			9.9
9 779	84-107			10.8	0.4	11.2		6.4	7.0	0.3	0.1	82.0	0.3	25.5	20.3	10.4				10.0

SAMPLE NO.	DEPTH CM.	WATER AT 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- -L.T. .0002 MM- X RAY DTA 7A2E I	7A2E II	7A2E III	7A2E IV	7A3 PCT.	X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE
9 773	0- 5		1.7	25				MI 2								MI MICA
9 774	5- 13		2.8	44				MI 3								MT MONTMORT
9 775	13- 28	46.0	19.4	100+	.62			MI 3	MT 1	KK 1						KK KAOLINIT
9 776	28- 43	36.6	13.9	100+	98											
9 777	43- 51	39.0	12.3	100+	100+			MI 1								
9 778	51- 84	62.1	16.7	100+	100+											
9 779	84-107	34.5	8.0	100+	100+			MT 4	MI 4							

MINERAL CODE	RELATIVE AMOUNT
MI MICA	1 TRACE
MT MONTMORT	2 SMALL
KK KAOLINIT	3 MODERATE
	4 ABUNDANT
	5 DOMINANT
	6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

CROT SANDY LOAM
S69Ariz-2-5

Location: Cochise County, Arizona. 400 feet south and 2,550 feet east of the northwest corner of Sec. 23, T. 14 S., R. 24 E. East of U. S. Highway 666, about 3 miles south and 2 miles west of Willcox. Date of sampling: October 14, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Aquic Natrustalf, fine-loamy, mixed, thermic.
Vegetation: Alkali sacaton, Bothrock grama, burroweed, a few yucca, and scattered cacti. Use:

CONSECUTIVE PEDON NUMBER C 69169 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CROT SOIL NO. S69 ARIZ. 2-23 SAMPLE NO. 9 868-9 874 WILLCOX AREA

SOIL FAMILY: AQUIC NATRUSTALF,FINE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CU. 2-.2U	FINE LT .2U	CARBONATE 3A1A.02	1A2A INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75-20 PCT.	II 20-5 OF LT 75	III 5-2
			PERCENT OF LESS THAN 2MM																	
9 868	0- 10	A21SA	37.4	44.3	18.3	0.6	1.6	3.2	16.9	15.1	18.1	26.2				43.8	--A	--	--	--
9 869	10- 20	A22SA	37.2	38.6	24.2	0.4	1.6	3.6	19.2	12.4	15.4	23.2			5	39.9	--A	--	--	--
9 870	20- 41	B21TCASA	23.7	28.5	47.8	0.2	1.4	2.8	12.3	7.0	9.1	19.4			18	23.4	--A	--	--	--
9 871	41- 50	B22TCASAG	16.2	35.8	48.0	0.2	1.7	2.4	6.8	5.1	6.3	29.5			15	15.2	--A	--	--	--
9 872	50- 84	B3TCASAG	31.8	35.9	32.3	0.9	3.5	4.9	13.1	9.4	8.6	27.3			8	25.1	--A	--	--	--
9 873	84-110	C 1G															13A	1	9	3
9 874	110-145	C 2G															3A	--	2	1

SAMPLE	DEPTH	ORG.MATTER CAR-	NITRO	CARBONATE AS CACO3	EXT. IRON	ATTERBERG L I M I T	BULK DENSITY EST	1/3	ORY	CM WATER CONTENT 1/10	1/3	15	LEF	EXTENSBLTY LE	PH H2O	PH H2O	CACL2
		6A1A	6B1A	6E1B	6E1B	6C2B	4F1	4F2	4A1F	4A1F	4A1H	3B2	4B1C	4B1C	4B2	4D1	4D1	8C1A	8C1A	8C1E
		PERCENT		PERCENT		PCT.	PCT.NO.40		GRAMS PER CC				PERCENT			PERCENT				
9 868	0- 10	1.44	0.149	5			27	24		1.49	1.53	1.00		22.7	12.3	0.9	0.9	7.9	9.2	7.8
9 869	10- 20	1.05	0.115	16						1.29	1.34	1.00		24.0	13.1	1.3	1.3	8.0	9.2	7.7
9 870	20- 41	0.79	0.088	33			51	24		1.28	1.64	1.00		33.4	18.9	8.6	8.6	8.6	9.7	8.3
9 871	41- 50	0.38		47						1.21	1.54	1.00		36.0	28.8	8.4	8.4	9.5	10.1	9.4
9 872	50- 84	0.21		44						1.16	1.48	1.00		36.2	21.2	8.5	8.5	9.4	10.2	9.4
9 873	84-110	0.03		1					1.30			0.94			6.0			9.1		8.6
9 874	110-145			1						1.51	1.74	0.98		23.6	12.9	4.8	4.8	8.2		8.1

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1B	MG 6Q1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G				PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM		
9 868	0- 10		18.5	6.7	25.2			30.9	4.27	9.2	4.0	37.5	3.6		18.9	16.9	18.0			7.6
9 869	10- 20		14.9	3.7	18.6			25.8	1.43	2.8	1.2	13.6	1.2	0.6	9.1	3.9				7.5
9 870	20- 41		16.9	3.2	20.1			20.1	2.37	0.5	0.5	26.8	0.5	0.7	8.0	4.2	14.6			8.3
9 871	41- 50		21.8	3.6	25.4			19.2	2.98	0.3	0.2	36.5	0.6	6.7	13.0	3.9				9.5
9 872	50- 84		15.3	2.4	17.7			14.4	2.54	0.2	0.2	54.8	0.4	5.9	10.4	3.2	8.3			9.5
9 873	84-110		6.8	0.9	7.7			7.0	2.12	0.2	0.1	27.7	0.4	1.2	7.7	3.0	10.4			
9 874	110-145		6.5	0.9	7.4			17.8												

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT SAT. 8A PCT.	NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- L.T. .0002 MM- X RAY 7A2E I	7A2E II	7A2E III	DTA 7A2E IV	7A3 PCT.	X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
9 868	0- 10	41.9	16.9	55	15												1 TRACE
9 869	10- 20	45.6	14.3	55	10			MI 2								MI MICA	2 SMALL
9 870	20- 41	84.6	14.6	73	38			MI 2	MT 1	KK 1						MT MONTMORT	3 MODERATE
9 871	41- 50	142.0	16.6	87	73											KK KAOLINIT	4 ABUNDANT

CROT LOAM
S69Ariz-2-23

Location: Cochise County, Arizona. 1,750 feet south and 500 feet west of the northeast corner of Sec. 15, T. 15 S., R. 25 E. Near Flanders Ranch, about 9 miles east and 1 mile north of Cochise. Date of sampling: October 22, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Aquic Natrustalf, fine-loamy, mixed, thermic.
Vegetation: Alkali sacaton, alkali lovegrass and scattered mesquite. Use: Livestock range. Climate: Precipitation about 11 inches. Mean annual air temperature 58°F., January 41°F., July 78°F. Parent Material: Alluvium, principally from andesite, granite, limestone and quartzite. Topography: Nearly level flat bordering playas. Slope, 0.3 percent, west facing. Elevation: 4160 feet. Drainage: Somewhat poorly drained. Runoff is slow. Permeability is very slow. Soil Moisture: Moist when sampled.
Remarks: Field determinations of pH thymol blue indicator in 1:5 dilution. This sample paired with S69Ariz-2-5. Those horizons designated as sa horizons show an almost complete coating of salt crystals on the exposed surfaces and pit banks after given time and opportunity to dry out. The soil has a fluctuating water table of from about 15 inches downward.

HORIZON	DESCRIPTION
A21sa	0 to 10 cm (0 to 4 inches), light gray (10YR 7/2) loam, dark brown (10YR 4/3) moist;
B2t	weak thick platy structure; slightly hard, friable, slightly sticky, slightly

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Udic Paleustalf, fine, montmorillonitic, mesic

SOIL Elledge fine sandy loam (taxadjunct) SOIL Nos. S56Ariz-9-29 LOCATION Navajo County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 56181 - 56185

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non carbonate clay	1/ Coarse fragments >2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct	Pct. of < 76 mm	
0–6	A1	82.0	10.7	7.3	1.2	1.7	4.6	63.6	10.9	5.8	4.9	66.0	71.1			9		
6–13	A2	80.3	10.3	9.4	1.1	0.7	2.5	64.7	11.3	4.8	5.5	71.6	69.0			38		
13–19	B2t	56.9	4.0	39.1	0.6	0.5	1.0	45.7	9.1	0.6	3.4	52.2	47.8			1		
19–28	B3t	58.6	4.6	36.8	2.0	1.4	1.3	45.4	8.5	1.2	3.4	51.6	50.1			9		
28+	R	PARENT ROCK																

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C4b Free Fe_2O_3	6E1b Carbonate as $CaCO_3$	Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry	Bulk density	3B2 Cm	Water content: 4B2 1/10 bar	Water content: 4B2 1/3 bar	Water content: 4B2 15 bar	4D1 Extensibility LEf	4D1 Extensibility LE	pH: 8C1b Saturated Paste	pH: 8C1a H_2O 1:1	pH: 8C1a H_2O 1:10
	Pct.	Pct.		Pct.	Pct.	g/cc	g/cc	g/cc		Pct.	Pct	Pct	Pct	Pct.			
0–6	1.43	0.069	21	0.5						14.8	8.9	3.5			7.0		7.3
6–13	0.31	0.022	14	0.5						11.1	7.5	3.0			6.7		6.6
13–19	0.42	0.029	15	0.7								17.8			5.9		6.2
19–28	0.37	0.024	15	1.4								14.3			5.8		6.2
28+	PARENT ROCK																

Depth (In.)	Extractable bases: 6N2b Ca	Extractable bases: 6O2c Mg	Extractable bases: 6P2a Na	Extractable bases: 6Q2a K	5B1a Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A2a NaOAc	Cation Exch. Capacity: 5A6a NH_4OAc		Water extract from saturated paste 8A1: 6N1a 6O1a Ca+Mg	6P1a Na	6Q1a K		6I1a CO_3	6J1a HCO_3	6K1a Cl	6L1b SO_4	8A1a Electrical conductivity
	meq/100 g									meq/liter								mmho/cm
0–6	8.6	1.5				1.5	12.2			3.5	0.6	0.4			3.1	–		0.4
6–13	3.2	1.0				0.7	5.6			2.8	0.6	0.1			1.8	–		0.3
13–19	15.7	1.8				2.4	27.8			1.6	0.7	tr.			0.7	–		0.2
19–28	14.6	6.1				3.6	26.8			2.0	0.8	tr.			0.7	–		0.3
28+	PARENT ROCK																	

Depth (In.)	8A Water at Saturation	Exch. bases: 5B3b Ca	Exch. bases: 5B1b 6Q2a K	Exch. bases: 5B1b 6P2a Na	5D2 Exchangeable Na	SAR	5C3 Base Sat.	Clay mineralogy (<0.002 mm) 3A1: Mont.	Verm.	Mica 7A2 X-ray	Kaolin.
	Pct.	meq /100 g			Pct.		Pct.				
0–6	29.7		0.3	0.1			88			x	x
6–13	22.9		0.1	0.1			86			x	x
13–19	55.4		0.5	0.3			88	xx		x	xx
19–28	52.3		0.4	0.3			86	xx		x	xx
28+	PARENT ROCK										

1/ Percent of the whole soil

ELLEDGE FINE SANDY LOAM (taxadjunct) 1/
56Ariz-9-29-1 through 4

Location: Navajo County, Arizona NE ¼, Sec. 19, T 10 N, R 22 E on property line between State Highway lot and Elledge Motel. In Showlow. Date of Sampling: May 17, 1956.
Collectors: M. S. James, W. G. Harper, Gerald Kester, R. E. Nelson, and George Wendt.
Vegetation: Blue grama, sand dropseed, juniper, ponderosa and annual weeds. Climate: 18.4 precipitation at Showlow. Mean annual temperature 50.4° F.; January average 35.2° F.; July average 69.8° F.; Parent Material: Thinly interbedded shales and soft sandstones, probably a member of the Dakota sandstone formation. Relief: Gently sloping to undulating upland; slopes 3 percent to the east. Elevation: 6,520 feet. Drainage: Moderately well to well drained. Slow to medium runoff. Slow permeability.
Remarks: Dry through the A2 horizon, and moist in the D horizon at time of sampling. Slight water erosion. Angular sandstone fragments ranging up to about 12 inches in diameter are common on the surface.
Classification: Udic Paleustalf, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 56181	0-6" -- Dark gray (10YR 4/1) dry, very dark brown (2/2) moist; fine sandy loam; moderate medium to coarse platy; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many grass roots; moderately permeable; noncalcareous; pH 7.5; clear, wavy lower boundary.
A2 RSL No. 56182	6-13" -- Light brownish gray (10YR 6/2) dry, brown (4/3) moist; heavy loamy fine sand; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; grass roots common; moderately rapid permeability; noncalcareous; pH 6.3; abrupt, wavy lower boundary.
B2t RSL No. 56183	13-19" -- Very strongly mottled clay consisting of three colors listed in order of their prominence: brown (7.5YR 5/2), reddish yellow (5YR 6/6), and reddish brown (2.5YR 4/4) dry; reddish brown (7.5YR 4/4 and 5/6), reddish brown (5YR 4/3), dark red (2.5YR 6/3) moist; very weak medium prisms that break to strong coarse to medium angular blocky and subangular blocky; continuous clay films on all ped surfaces; extremely hard when dry, very firm when moist, very sticky and very plastic when wet; few grass roots and common tree roots; slowly to very slowly permeable; noncalcareous; pH 6; gradual, wavy lower boundary.
B3t RSL No. 56184	19-28" -- Similar in color to horizon above but more of the brown and reddish brown colors and less red colors; fine sandy clay; moderately defined coarse to medium angular and subangular blocky aggregates; extremely hard when dry, firm when moist, very plastic and very sticky when wet; few tree roots and few grass roots; slowly to very slowly permeable; noncalcareous; pH 6.
R RSL No. 56185	28"+ -- Decomposing sandstone with tongues of fine sandy clay penetrating downward into this rock.

1/ The Elledge series is in a fine, mixed, mesic family of Typic Hapludalfs. This pedon has an argillic horizon with an abrupt upper boundary and is dominated by montmorillonitic clay.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Udic Paleustalf, fine, montmorillonitic, mesic

SOIL Elledge fine sandy loam (taxadjunct) SOIL Nos. S56Ariz-9-30 LOCATION Navajo County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 56186- 56189

Depth	Horizon	1B1b Total Sand	Total Silt	Total Clay	Sand Very	Sand Coarse	Sand Medium	Sand Fine	Sand Very fine	Silt	Silt Int. III	Int. II (0.2-0.02)	(2-0.1)	3A1a Carbon-	3A1a Non carbon-	1/ Coarse fragments 2A2 >2	2 - 19	19 -76

ELLEDGE FINE SANDY LOAM (taxadjunct) 1/

S56Ariz-9-30

Location: NE1/4, Sec. 32, T. 10 N., R. 22 E., Navajo County, Arizona, about 3 miles south of Showlow. Date of Sampling: May 17, 1956.
Collectors: M. S. James, W. G Harper, Gerald Kester, R. E. Nelson and George Wendt.
Vegetation: Blue grama, fescue, juniper, ponderosa, oak trees and junegrass. Climate: About 18 inches precipitation. Nearest weather station (Showlow, short term): Mean annual temperature: 50.4° F.; January average 35.2° F.; July average 69.8° F.; mean annual precipitation 18.40 inches.
Parent Material: Interbedded soft sandstones and shales, probably a member of the Dakota formation.

Relief: Gently sloping to undulating upland. Slopes 3 percent to the east. Elevation: 6,580 feet. Drainage: Moderately well to well drained. Slow runoff when soil is dry. Medium to high when wet. Slow permeability.
Remarks: A few angular sandstone fragments ranging up to about 8 inches in thickness are common on the surface.
Classification: Udic Paleustalf, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
A0	¼-0" -- Loose pine needles.
A1 RSL No. 56186	0-1" -- Grayish brown (10YR 4.5/2) dry, very dark brown (2.5/2) moist; fine sandy loam; weak fine platy; soft when dry, very friable when moist, nonsticky and nonplastic when wet; few grass roots; rapid permeability; noncalcareous; pH 6.3; abrupt, wavy lower boundary.
A2 RSL No. 56187	1-3" -- Pinkish gray (7.5YR 6/2) dry, dark brown (3/2) moist; fine sandy loam; weak coarse platy; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; few grass and tree roots; moderate to moderately rapid permeability; noncalcareous; pH 5; abrupt, wavy lower boundary.
B2t RSL No. 56188	3-21" -- Brown (2.5YR 4/4) dry, with reddish brown (5YR 4/4) mottlings, reddish brown (2.5YR 4/4 and 5YR 5/4) moist; clay; moderate medium to coarse prisms that break to strong medium to coarse angular blocky; extremely hard when dry, very firm when moist, very sticky and very plastic when wet; tree roots common, few grass roots; very slowly permeable; noncalcareous; pH 6; abrupt, wavy lower boundary. The topmost 3 or 4 inches of this horizon has common organic staining, dark brown (10YR 3/2) dry, and very dark brown (2.5/2) moist. These occur on both horizontal and vertical ped surfaces and is in the thick continuous clay films.
R RSL No. 56189	21-26" -- Decomposing sandstone; pH 6.3.

1/ The Elledge series is in a fine, mixed, mesic family of Typic Hapludalfs. This pedon has an argillic horizon with an abrupt upper boundary and is dominated by montmorillonitic clay.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Durargid, fine, mixed, thermic

SOIL Frye sandy loam SOIL Nos. S64Ariz-2-18 LOCATION Cochise County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 64583 - 64594

Depth cm	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand Very coarse (2–1)	Sand Coarse (1–0.5)	Sand Medium (0.5–0.25)	Sand Fine (0.25–0.1)	Sand Very fine (0.1–0.05)	Silt 0.05–0.02	Silt Int. III (0.02–0.002)	3A1 Int. II (0.2–0.02)	(2–0.1)	Non carbonate clay		Coarse fragments 1A2a >2 Pct.	Coarse fragments 1A2a 2 – 19 Pct. of < 76 mm	Coarse fragments 1A2a 19–76 Pct. of < 76 mm
		Pct. of < 2 mm																
0–5	A11	75.7	18.7	5.6	3.9	15.0	14.4	27.4	15.0	11.9	6.8	41.6	60.7			1	1	
5–15	A12	66.1	23.6	10.3	3.7	12.4	12.6	24.8	12.6	11.2	12.4	36.6	53.5			2	2	
15–23	A3	58.3	28.7	13.0	5.1	11.7	11.0	19.5	11.0	14.5	14.2	35.4	47.3			3	3	
23–31	B1	50.3	32.5	17.2	4.9	9.0	8.6	17.4	10.4	16.0	16.5	36.0	39.9			4	4	
31–43	B21t	27.1	22.5	50.4	1.7	4.7	4.4	9.2	7.1	10.7	11.8	22.8	20.0			2	2	
43–58	B22t	27.3	25.0	47.7	1.8	4.6	4.2	9.6	7.1	11.9	13.1	24.2	20.2			2	2	
58–66	B23tsica	36.2	37.9	25.9	1.8	5.3	5.1	13.0	11.0	18.2	19.7	37.2	25.2			10	10	
66–84	C1sica															10	10	
84–96	C2sica															10	10	
96–142	C3sica	37.2	48.3	14.5	3.8	4.3	3.1	9.6	16.4	28.2	20.1	51.0	20.8	13				
142–203	C4	48.2	36.9	14.9	0.2	1.6	5.3	21.6	19.5	23.9	13.0	57.2	28.7					
203–236	C5	70.7	17.5	11.8	0.5	5.0	17.8	34.6	12.8	10.8	6.7	41.2	57.9					

Depth cm	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N		6E1b Carbonate as $CaCO_3$ 1/ Pct.	3A1a Carbonate in <0.002 mm. Pct.	Bulk density 4A1f 1/3 bar g/cc	Bulk density 4A1h Oven dry g/cc	Bulk density	6C2a Ext. Iron as Fe Pct.	Water content Pct.	Water content 4B1c 1/3 bar Pct.	Water content 4B2 15 bar Pct.	4D1 Extensibility COLEF in./in.	4D1 Extensibility COLE in./in.	3B2 Cm	pH 8C1a 1:1 H_2O	pH 8C1a 1:10 H_2O
0–5																		
5–15																		
15–23																		
23–31																		
31–43																		
43–58																		
58–66																		
66–84																		
84–96																		
96–142																		
142–203																		
203–236																		

FRYE SANDY LOAM
S64Ariz-2-18

Location: Cochise County, Arizona. 7 miles west and 9 miles north of Willcox, Arizona on the Ft. Grant Road, 670 feet north and 125 feet west of the SE corner Sec. 11, T. 12 S, R. 23 E. Date of Sampling: October 19, 1964.
Description by: James E. Jay and M. L. Richardson. Collectors: K. W. Flach, B. Brasher, James E. Jay, R. K. Preece. and M. L. Richardson.
Classification: Typic Durargid, fine, mixed, thermic.
Vegetation: Sparse cover of blue grama, annual gramas and burroweed. Climate: Precipitation about 12 inches annual. Mean annual temperature 58° F. (Willcox). Average January temperature 41° F. Soil temperature at time of sampling: 18 inches - 65° F., 26 inches - 70° F., 72 inches - 64° F. Parent Material: Alluvium from granite, rhyolite, andesite with possibly some influence from volcanic ash. Topography: Nearly level valley plain with slightly concave slopes of 0.2 percent. Elevation: 4280 feet. Drainage: Well drained. Slow runoff. Slowly permeable. Soil Moisture: Slightly moist about 25 percent field capacity. Water table 100 to 150 feet. Remarks: Sandy loam is the dominant type. Frye soils are of limited extent but are an important cropland soil. Field determination of pH by Hellige-Truog indicator and thymol blue in 1:5 dilution.

HORIZON	DESCRIPTION
A11 RSL No. 64583	0-5 cm (0-2 inches), brown (7.5YR 5/4) light sandy loam, brown to dark brown (7.5YR 4/4) when moist; moderate medium platy structure; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; many fine and very fine roots; many fine interstitial pores; noneffervescent with HCL; pH 6.5; abrupt smooth boundary.
A12 RSL No. 64584	5-15 cm (2-6 inches), brown (7.5YR 5/4) sandy loam, dark reddish brown (5YR 3/4) when moist; massive, breaking to weak very fine and fine subangular blocky structure; slightly hard when dry, slightly sticky and slightly plastic when wet; many very fine, fine, and medium roots; many fine interstitial pores; noneffervescent; pH 8.0; clear smooth boundary.
A3 RSL No. 64585	15-23 cm (6-9 inches), same colors, heavy sandy loam; massive, breaking to moderate very fine and fine subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and plastic when wet; common fine tubular pores; noneffervescent; pH 8.1; abrupt smooth boundary.
B1 RSL No. 64586	23-31 cm (9-12 inches), same colors; sandy clay loam; massive, breaking to moderate fine and medium subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and plastic when wet; common very fine and fine roots; common fine and very fine tubular and interstitial pores; few thin patchy clay films; noneffervescent; pH 8.2; clear smooth boundary.
B21t RSL No. 64587	31-43 cm (12-17 inches), reddish brown (5YR 4/4) dry and moist, same color crushed; clay; moderate medium and coarse prismatic breaking to moderate medium and coarse angular blocky structure; hard when dry, firm when moist, sticky and plastic when wet; many compressed fine and very fine roots on ped faces; few fine tubular and common exped pores; continuous thin clay films on ped faces; noneffervescent; pH 8.2; clear smooth boundary.
B22t RSL No. 64588	43-58 cm (17-23 inches), same as horizon above. Broken for lab purposes.
B23tsica RSL No.	58-66 cm (23-26 inches), reddish yellow (7.5YR 6/6 & 6/8) clay, yellowish red (5YR 4/6) when moist, and common fine distinct mottles of pinkish white (7.5YR 8/2), pink (7.5YR 6/4) when moist; massive, breaking to

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Durargid, fine, mixed, thermic

SOIL Frye sandy loam SOIL Nos. S61Ariz-2-19 LOCATION Cochise County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 64595 - 64604

Depth cm	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	Non carbonate clay		Coarse fragments 1A2a: > 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0-5	A11	71.2	22.0	6.8	5.7	13.5	13.9	27.7	10.4	11.9	10.1	36.6	60.8			3	3	
5-10	A12	63.2	27.9	8.9	5.7	12.0	12.4	23.9	9.2	12.7	15.2	34.2	54.0			5	5	
10-15	B1	59.0	27.3	13.7	6.2	10.6	10.8	22.0	9.4	12.1	15.2	33.0	49.6			8	8	
15-33	B21t	27.1	17.7	55.2	1.7	4.8	4.9	10.8	4.9	8.3	9.4	19.1	22.2			1	1	
33-48	B22tca	32.5	23.2	44.3	1.8	5.2	5.2	12.5	7.8	10.9	12.3	25.2	24.7			5	5	
48-58	B3tca	38.9	32.5	28.6	4.2	6.7	5.1	12.6	10.3	14.7	17.8	31.8	28.6	27		54	54	
58-76	C1cam																	
76-94	C2ca																	
94-125	C3ca	42.1	36.4	21.5	3.7	3.8	2.7	14.4	17.5	22.8	13.6	50.2	24.6			11	11	
125-163	IIC4	84.4	9.6	6.0	38.9	22.6	7.3	11.1	5.5	6.1	3.5	16.1	78.9			51	51	

Depth cm	6A1a Organic carbon	6B1a Nitrogen	C/N		6E1b Carbonate as $CaCO_3$ 1/	3A1a Carbonate in <0.002 mm	Bulk density				Water content		4B2 15 bar			pH 8C1a 1:1 H_2O	pH 8C1a 1:10 H_2O
	Pct	Pct.			Pct.	Pct.	g/cc	g/cc	g/cc		Pct.	Pct.	Pct.				
0-5	0.33	0.030	11										2.9			6.3	6.7
5-10	0.26	0.026											3.3			5.7	6.2
10-15	0.25	0.028											4.3			6.3	6.7
15-33	0.44	0.059											18.3			7.5	8.2
33-48	0.26	0.035			2								15.2			8.3	8.9
48-58	0.39				18	2							11.9			8.3	9.1
58-76	0.13				15								9.2			8.6	9.2
76-94	0.03				5								9.5			8.5	9.3
94-125	0.02				6								10.1			8.5	9.3
125-163	0.01				tr.								3.0			8.8	9.2

Depth cm	Extractable bases 5B1a: 6N2b Ca	6O2c Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum	Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K		6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter									mmho/cm

FRYE SANDY LOAM
S64Ariz-2-19

Location: Cochise County, Arizona. 7-1/4 miles west and 10-1/3 miles north of Willcox, Arizona on Ft. Grant Road. 1850 feet north and 1050 feet west of the SE corner of Sec. 2, T. 12 S, R. 23 E. Date of Sampling: October 19, 1964.
Description by: James Jay and M. L. Richardson. Collectors: K. W. Flach, B. Brasher, James Jay, M. L. Richardson, and R. K. Preece.
Classification: Typic Durargid, fine, mixed, thermic.
Vegetation: Rangeland - Grass cover - Annual grama, tall three-awn, Rothrock grama, sand dropseed. Poor condition.
Climate: Precipitation about 12 inches annual. Mean annual temperature 58° F. (Willcox) Soil temperature at time of sampling; 24 inches 69° F., 48 inches 71° F., 72 inches 71° F. Parent Material: Alluvium from granite, rhyolite, andesite, basalt with [redacted] possibly some volcanic ash. Topography: Valley plain. Nearly level with slightly

[redacted]

Sandy is the dominant type. Frye soils are of limited extent but are an important cropland soil. Paired sample is S64Ariz-2-18. Field determinations of pH by Hellige-Truog indicator and thymol blue in 1:5 dilution.

HORIZON	DESCRIPTION
A11 RSL No. 64595	0-5 cm (0-2 inches), brown (7.5YR 3/4) light sandy loam, brown to dark brown (7.5YR 4/4) when moist; weak medium and coarse platy structure; slightly hard when dry, very friable when moist, slightly sticky and slightly plastic when wet; many very fine roots; many fine interstitial pores; pH 6.5; abrupt smooth boundary.
A12 RSL No.	5-10 cm (2-4 inches), brown (7.5YR 5/4), heavy sandy loam, dark reddish brown (5YR 3/4) when moist; massive, breaking to weak fine and medium subangular blocky structure; slightly hard when dry, friable when moist,

CONSECUTIVE PEDON NUMBER C 71 19 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES HARQUA TAXADJUNCT SOIL NO. S71 ARIZ. 7- 4 SAMPLE NO. 1 109-1 115 CENT. MARICOPA AREA

SOIL FAMILY: TYPIC HAPLARGID,COARSE-LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	SILTS CO. 2- .2U	CLAYS FINE LT .2U	CARBO NATE 3A1A	INT. 11 .2- .02 WHOLE	COARSE FRAGMENTS- PCT. OF SOIL	I 75- 20 PCT.	II 20-5 OF LT 75	III 5-2
			PERCENT OF LESS THAN 2MM																	
1 109	0- 5	A11	60.2	32.0	7.8	16.6	10.0	5.4	11.6	16.6	18.9	13.1	5.9	1.9	1	42.1	40A	18	11	11
1 110	5- 13	A12	65.7	27.2	7.1	10.3	10.4	7.7	15.2	22.1	17.2	10.0			TR	47.4	35A	7	16	12
1 111	13- 31	B21TCA	43.2	36.4	20.4	12.3	7.9	4.7	8.2	10.1	12.0	24.4	12.6	7.8	2	26.5	32A	2	13	17
1 112	31- 58	B22TCA	38.4	43.5	18.1	10.5	8.7	5.0	7.4	6.8	9.0	34.5			1	19.9	18A	—	5	13
1 113	58- 84	B31TCA	42.7	38.7	18.6	16.9	9.3	4.4	6.5	5.6	9.3	29.4	11.2	7.4		18.5	41A	2	17	22
1 114	84-112	B32TCA	26.0	53.5	20.5	5.8	5.4	3.7	6.5	4.6	7.9	45.6			TR	16.1	43A	—	25	18
1 115	112-147	2C 1	29.1	55.1	15.8	0.1	0.3	0.7	7.3	20.7	17.5	37.6	8.8	7.0	2	43.9	67A	49	17	TR

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON	NITRO GEN	CARBONATE AS CACO3 LT 2	19-2	EXT. IRON FE	ATTERBERG L L	I M	I T PL	BULK DENSITY EST 1/3 BAR	1/3 BAR	DRY	CM	WATER CONTENT 1/10 BAR	1/3 BAR	15 BAR	EXTENSBLTY LEF	LE	PH H2O 1/1	PH H2O 1/10	PH CACL2
		6A1A	6B2A	6G1B	6G1B	6C3D	6G1		6G3	4A1E	4A1E	4A1H	3B2	4B1C	4B1C	4B2	4D1	4D1	8C1A	8C1A	8C1E

SAMPLE NO.	DEPTH CM.	PERCENT CA	MG	PERCENT NA	K	PCT. SUM	PCT.NO.40 BASE SAT.	GRAMS PER CC 1/10 BAR	1/3 BAR	15 BAR	PERCENT LEF	LE	PERCENT H2O 1/1	H2O 1/10	CACL2
1 109	0- 5	0.40	0.025	14			1.39			0.74	5.9		8.0	9.4	7.0
1 110	5- 13	0.30	0.020	9				1.39	1.40	0.78	16.8	11.0	5.4	0.2	0.2	8.0		7.1
1 111	13- 31	0.35		24				1.41	1.55	0.80	27.2	23.5	10.1	3.2	2.5	8.6	10.0	7.4
1 112	31- 58	0.15		37				1.37	1.54	0.90	32.7	28.2	10.9	4.0	3.5	8.7	10.0	7.5
1 113	58- 84			23				1.38	1.49	0.74	32.0	28.7	14.1	2.6	1.9	8.4	9.9	7.6
1 114	84-112			48			1.38			0.72			13.4			8.5	9.7	7.1
1 115	112-147			30			1.38			0.49			13.6			8.5	9.7	7.4

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6D2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1A	MG 6O1A	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
1 109	0- 5	18.4	1.6	2.6	0.7	23.3	100+			11.8	5.39	10.5	2.0	34.5	0.7		2.9	41.7		7.6
1 110	5- 13	18.8	1.9	0.4	0.1	21.2	100+			10.9										
1 111	13- 31	22.9	2.0	6.4	0.3	31.6	100+			18.9	2.35	0.9	0.5	20.1	0.1		6.2	13.6		7.9
1 112	31- 58	13.9	1.4	18.2	0.3	33.8	100+			18.2	7.5	1.0	0.4	74.2	0.3		4.1	57.0	4.7	8.4
1 113	58- 84	15.3	2.0	26.9	0.4	44.6	100+			21.7	10.6	1.6	1.0	102.0	0.1		3.5	70.2	28.1	8.5
1 114	84-112	15.9	2.0	20.5	0.5	38.9	100+			17.8	14.7	7.9	2.5	142.0	0.1		3.6	79.4	84.0	8.2
1 115	112-147	15.8	2.5	18.3	0.6	37.2	100+			14.6	12.1	7.1	2.7	112.0	0.3		3.2	62.5	61.0	8.4

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT SAT. 8A PCT.	NA 5B4B MEQ.	5D2 PCT.	5E	SAR	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY I 7A2E	II 7A2E	III 7A2E	DTA IV 7A2E	PCT. 7A3	-L.T. .0002 MM- X RAY I 7A2E	II 7A2E	III 7A2E	MINERAL CODE	RELATIVE AMOUNT
1 109	0- 5	31.5	1.5	13	14				MT 5	MI 3	KK 2			MI 3	MT 2		MT MONTMORT	1 TRACE
1 110	5- 13			0.4	.4												MI MICA	2 SMALL

HARQUA GRAVELLY LOAM (taxadjunct) 1/
S71Ariz-7-4(1-7)

Location: Maricopa County, Arizona. 1130 feet east and 270 feet south of the NW corner of Section 20, T1S, R6W, about 18 miles west of Buckeye. Date of Sampling: April 13, 1971. Description by: W. D. Nettleton, J. Jay, G. Hartman, R. Schurig and F. Cook. Collectors: W. D. Nettleton, J. Jay, G. Hartman, R. Schurig and F. Cook.
Classification: Typic Haplargid, coarse-loamy, mixed, hyperthermic.
Vegetation: Saltbush and creosotebush; cholla cactus. Use: Parkland, wildlife habitat and rangeland. Climate: Arid, continental. Mean annual air temperature 70 to 74° F. Precipitation about 7 inches. Parent Material: Old alluvium from granite, rhyolite, quartzite and schist. Topography: Gently sloping dissected low fans on 1 to 2 percent slopes. Elevation: 1100 feet. Drainage: Well drained, slow permeability. Medium runoff. Soil Moisture: Dry when sampled.

HORIZON	DESCRIPTION
A11	0 to 5 cm (0 to 2 inches), light brown (7.5YR 6/4) gravelly loam, dark brown (7.5YR

[redacted]

71109	sticky, slightly plastic; few fine roots; common fine tubular and few fine interstitial pores; 30 to 40 percent fine, medium and coarse subangular gravel; strongly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.
A12 RSL 71110	5 to 13 cm (2 to 5 inches), light brown (7.5YR 6/4) very gravelly fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common fine roots; common fine interstitial and many very fine vesicular pores; 75 percent fine, medium and coarse subangular gravel; strongly effervescent; moderately alkaline (pH 8.2); clear wavy boundary.
B21tca RSL 71111	13 to 31 cm (5 to 12 inches), yellowish red (5YR 4/6) gravelly clay loam, yellowish red (5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, sticky, plastic; common fine and medium roots; common fine interstitial pores and many very fine vesicular pores; 30 percent fine and medium subangular [redacted]

CONSECUTIVE PEDON NUMBER C 68147 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES SONOITA SOIL NO. S68 ARIZ. 12- 3 SAMPLE NO. 81060-81068 E.PIMA-SANTA CRU AREA

SOIL FAMILY: TYPIC HAPLARGID COARSE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBONATE	INT. 1A2A II .2- 3A1A.02	COARSE FRAGMENTS I PCT. OF WHOLE 20	II 75- 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														SOIL	PCT. OF LT 75	
81060	0- 5	A11	75.7	18.5	5.8	11.0	20.3	12.8	21.2	10.4	13.5	5.0				34.6	9A	-- 2	7
81061	5- 10	A12	72.5	19.5	8.0	17.3	19.5	10.5	17.2	8.0	13.4	6.1				30.0	16A	-- 5	11
81062	10- 25	B21	69.8	18.2	12.0	14.5	18.3	10.4	16.9	9.7	8.7	9.5				27.4	5A	-- 5Z	N
81063	25- 43	B22	67.1	22.6	10.3	12.2	17.4	9.9	16.9	10.7	15.0	7.6				34.2	19A	15 1	3
81064	43- 66	B23TCAB	66.1	22.7	11.2	12.4	16.7	10.3	16.7	10.0	14.3	8.4				33.5	17A	-- 17Z	N
81065	66-102	2B24TCAB	64.1	18.5	17.4	16.2	17.1	8.9	13.8	8.1	9.7	8.8				25.2	4A	-- 4Z	N
81066	102-157	2B25TCAB	57.3	27.1	15.6	15.2	18.0	8.1	10.0	6.0	14.5	12.6				25.6	3A	-- 1	2
81067	157-178	2B3CAB	65.8	19.6	14.6	14.5	20.0	10.6	14.4	6.3	11.6	8.0				25.3	24A	19 5Z	N
81068 1/	0- 38		52.4	23.5	24.1	8.1	11.0	5.6	17.3	10.4	9.8	13.7				31.0	21A	-- 6	15

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L I M I T LL 4F1	PL 4F2	BULK DENSITY EST. 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		-PERCENT-		-PERCENT-		PERCENT				PCT.		NO.40 GRAMS PER CC				PERCENT			-PERCENT-	
81060	0- 5	0.38	0.031			0.5	0.1			NP	NP		1.59	1.59	0.94		3.2	2.3		
81061	5- 10	0.23	0.021			0.6	0.1						1.65	1.65	0.89		7.2	2.9		
81062	10- 25	0.23				0.6	0.1			NP	NP		1.62	1.63	0.97		5.6	3.6	0.2	0.2
81063	25- 43	0.24				0.6	0.1						1.55	1.57	0.88		7.7	3.9	0.4	0.4
81064	43- 66			TR		0.5	TR						1.53	1.56	0.90		7.6	4.1	0.6	0.6
81065	66-102			2		0.7	0.1			24	16		1.57	1.65	0.98		14.1	6.6	1.7	1.6
81066	102-157			2		0.6	0.1						1.65	1.71	0.98		12.6	6.3	1.2	1.2
81067	157-178			1		0.6	0.1					1.65			0.83			6.5		
81068	0- 38	0.32	0.034									1.60			0.87			3.5		

[redacted]

SAMPLE NO.	DEPTH CM.	CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	ACI- DITY 6H2A	EXT. AL 6G1E	SUM 5A3A	NH4- OAC 5A6A	SUM+ ACI- DITY	SUM+ AL	NH4- OAC 5C1	NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA- CL2 8C1E
		MEQ/100G									PERCENT					
81060	0- 5	5.1	2.6	0.1	0.7	8.5	0.8		9.3	11.5	91		74		5.7	4.9
81061	5- 10	2.5	0.8	0.1	0.4	3.8			3.8	4.1	100+		93		7.9	7.5
81062	10- 25	4.7	1.3	0.1	0.3	6.4			6.4	5.3	100+		100+		8.0	7.5
81063	25- 43	6.4	1.3	0.1	0.2	8.0			8.0	6.1	100+		100+		7.8	7.0
81064	43- 66	7.9	1.4	0.1	0.2	9.6			9.6	5.0	100+		100+		8.2	7.1
81065	66-102	18.8	4.7	0.3	0.5	24.3			24.3	9.3	100+		100+		8.2	7.4
81066	102-157	16.9	3.9	0.6	0.5	21.9			21.9	8.7	100+		100+		8.3	7.5
81067	157-178	13.5	3.4	0.9	0.5	18.3			18.3	9.9	100+		100+		8.4	7.5
81068	0- 38															

CLAY MINERALOGY

SAMPLE NO	DEPTH CM.	LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
81060	0- 5	MI 3	KK 2	MT 1							MI MICA	1 TRACE
81061	5- 10										KK KAOLINIT	2 SMALL
[illegible]											MT MONTMORT	3 MODERATE

SONOITA GRAVELLY SANDY LOAM
S68 Ariz-12-3-1 through 8

Location: Santa Cruz County, Arizona, 2 miles south and 1 mile west of Amado. 0.4 mile west of ranchhouse, 75 feet south of ranch trail, 600 feet west of E½ corner Section 23, T20S, R12E. Photo AMS-265. Date of Sampling: October 9, 1968.
Description by: Richardson and Clemmons. Collectors: Nettleton and Clemmons.
Classification: Typic Haplargid, coarse-loamy, mixed, thermic.
Vegetation: Desert shrub--grass: Shrubs: Mesquite, catclaw, burroweed and barrel cacti. Grasses: three-awn, Arizona cottontop, Rothrock grama, bush muhly, annual needle grama.
Climate: Mean annual temperature approximately 63.8°F. Mean annual precipitation 11-12 inches.
Parent Material: Old reworked alluvium--mainly granite, andesite tuff and rhyolite tuff. Topography: Gently sloping fan. 3 percent slope. East aspect. Elevation: 3250 feet. Drainage: Well drained. Medium runoff. Soil moisture: Dry.
Remarks: Pit location S.50°W on Sardina Peak. S.15°W on Tumacacori Peak.

HORIZON	DESCRIPTION
	(0-5 cm)
A11	0 to 2 inches, brown (7.5YR 5/4) gravelly sandy loam, dark brown (7.5YR 4/4) moist;
RSL	weak medium platy breaking to weak fine granular structure; slightly hard, very
681060	friable, nonsticky and nonplastic; many very fine and fine roots; few medium and fine tubular and many fine interstitial pores; 20 percent fine gravel; noneffervescent; slightly acid (pH 6.5); abrupt smooth boundary.
A12	2 to 4 inches, brown (7.5YR 5/4) gravelly sandy loam, reddish brown (5YR 4/4) moist;
RSL	massive breaking to weak fine and medium granular structure; hard, very friable, non-
681061	sticky and nonplastic; many very fine and fine roots; common fine interstitial and
	acid (pH 6.5); clear smooth boundary.
B21	4 to 10 inches, reddish brown (5YR 5/4) gravelly sandy loam, dark reddish brown
RSL	(5YR 3/4) moist; massive breaking to fine, medium and coarse subangular blocky struc-
681062	ture; hard, friable, slightly sticky and nonplastic; common fine and very fine and
(10-25 cm)	few medium roots; common very fine and fine tubular pores; 20 percent fine gravel; nonef-
	fervescent; neutral (pH 7.0); clear wavy boundary.
B22	10 to 17 inches, reddish brown (5YR 5/4) gravelly sandy loam, dark reddish brown
RSL	(5YR 3/4) moist; massive breaking to fine, medium and coarse subangular blocky struc-
681063	ture; hard, friable, slightly sticky and nonplastic; common fine and very fine and
(25-43 cm)	few medium roots; common very fine and fine tubular pores; 20 percent fine gravel; nonef-
	fervescent; neutral (pH 7.0); clear wavy boundary.
B23tca	17 to 26 inches, reddish brown (5YR 5/4) gravelly light sandy clay loam, yellowish
RSL	red (5YR 4/6) moist, with common fine distinct white (8/0) lime filaments, pinkish
681064	gray (7/2) moist; weak medium subangular blocky structure; hard, friable, slightly
(43-66 cm)	sticky and slightly plastic; common fine and very fine and few coarse roots; few fine and very fine and few medium tubular pores; common thin clay films on ped faces and in pores; 25 percent fine gravel; few cobbles; slightly effervescent in spots; moderately alkaline (pH 8.0); clear wavy boundary.
IIB24tcab	26 to 40 inches, reddish brown (5YR 5/4) and reddish brown (2.5YR 4/4) gravelly
RSL	sandy clay loam, yellowish red (5YR 4/6) and reddish brown (2.5YR 4/4) moist, with
681065	few fine faint pinkish white (5YR 8/2) lime filaments, light reddish brown (5YR 6/3)
(66-102 cm)	moist; massive; very hard, friable, slightly sticky and slightly plastic; common fine

CONSECUTIVE PEDON NUMBER C 69162 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES SONOITA SOIL NO. S69 ARIZ. 2-16 SAMPLE NO. 9 847-9 848 WILLCOX AREA

SOIL FAMILY: TYPIC HAPLARGID,COARSE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBONATE 3A1A.02	1A2A INT. II .2- 3A1A.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75- 20 PCT.	II 20-5 OF LT 75	III 5-2
			PERCENT OF LESS THAN 2MM																	
9 847	23- 43	B21T	72.4	15.1	12.5	9.3	16.5	14.1	23.2	9.3	8.7	6.4				30.4	16A	--	3	13
9 848	43- 74	B22T	68.4	17.0	14.6	12.9	14.7	10.8	19.3	10.7	9.6	7.4				31.3	19A	2	7	10

SAMPLE NO.	DEPTH CM.	ORG. MATTER CARBON 6A1A -PERCENT-	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A -PERCENT-	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG LL 4F1 PCT.	PL 4F2	BULK DENSITY 1/3 EST. 4A1F 1.55	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2 -PERCENT-	EXTNSBLTY LEF 4D1	LE 4D1 -PERCENT-
												NO.40 GRAMS PER CC								
9 847	23- 43											1.55		0.90				4.7		
9 848	43- 74											1.55		0.88				7.4		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6G2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4- OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4- OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA- CL2 8C1E
		MEQ/100G									PERCENT					
9 847	23- 43			0.1	0.9	1.0			1.0	8.1					7.1	7.1
9 848	43- 74			0.2	0.5	0.7			0.7	9.5					7.2	7.1

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY <2 MM LESS THAN 0.002 MM X RAY DTA 7A2E I	7A2E II	7A2F III	7A2E IV	7A3 -PERCENT-	7A3	L.T. 0.0002 MM MINERAL X RAY CODE 7A2E I	7A2E II	7A2E III	RELATIVE AMOUNT
9 847	23- 43										1 TRACE
9 848	43- 74										2 SMALL
											3 MODERATE
											4 ABUNDANT
											5 DOMINANT
											6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

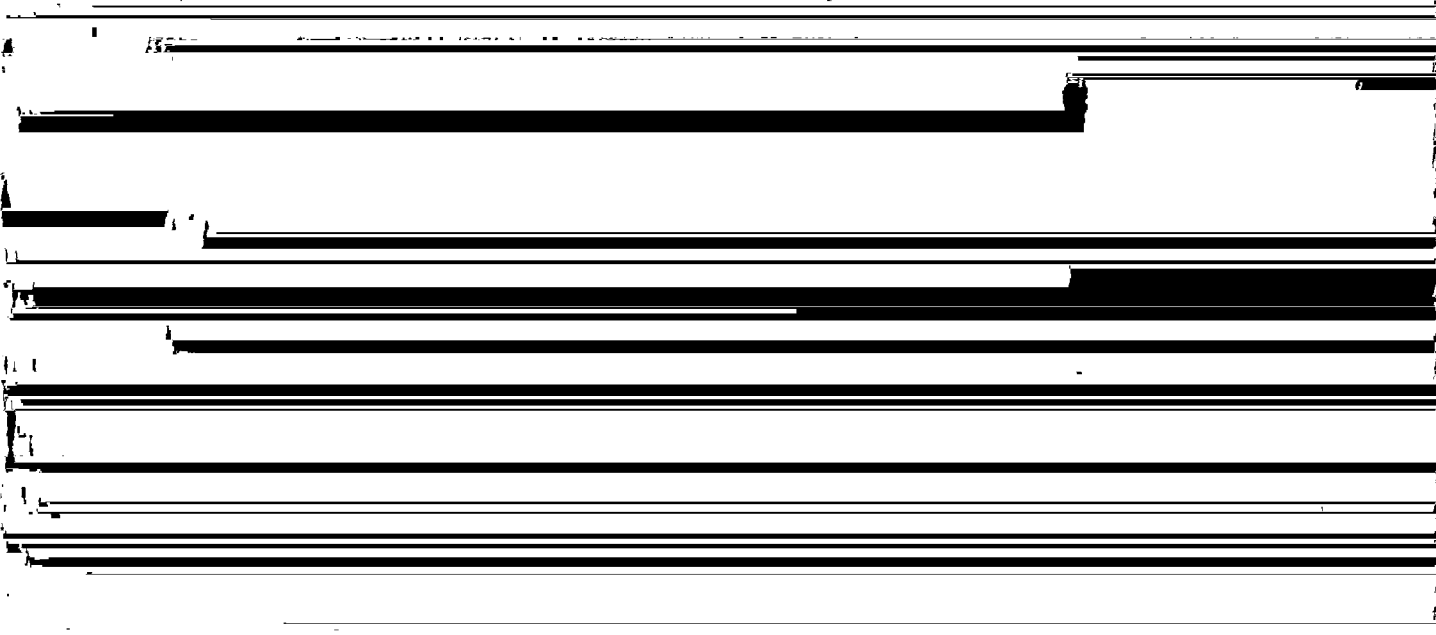
SONOITA SANDY LOAM
S69Ariz-2-16

Location: Cochise County, Arizona. 2,400 feet east and 1,300 feet north of southwest corner of Sec. 21, T. 15 S., R. 26 E. East of Kansas Settlement Road, about 9½ miles south and 8½ miles east of Willcox. Date of sampling: October 16, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Typic Haplargid, coarse-loamy, mixed, thermic.
Vegetation: Rothrock grama, three-awn and spike dropseed. Use: Livestock range. Climate: Precipitation about 11 to 12 inches. Mean annual air temperature 60°F., January 42°F., July 78°F. Parent Material: Alluvium from acid igneous rocks. Topography: Level to moderately sloping convex fans and valley slopes. Slope, 0.5 percent, southwest facing. Elevation: 4370 feet. Drainage: Well drained. Runoff is slow to medium. Permeability is moderately slow. Soil Moisture: Dry when sampled.
Remarks: Field determination of pH by Hellige-Truog indicator solution. Paired with sample S69Ariz-2-28. The B21t and B22t are the only horizons sampled.

HORIZON	DESCRIPTION
A1	0 to 5 cm (0 to 2 inches), brown (7.5YR 5/4) sandy loam, dark reddish brown (5YR 3/4) moist; weak thin platy structure; slightly hard, friable, nonsticky, nonplastic; many fine and medium roots; common very fine and fine tubular pores; noneffervescent; medium acid (pH 6.0); abrupt smooth boundary.
A3	5 to 23 cm (2 to 9 inches), brown (7.5YR 5/4) sandy loam dark reddish brown (5YR 3/4) moist; massive; slightly hard, friable, nonsticky, nonplastic; many fine and medium roots; many very fine and fine and few medium tubular pores; noneffervescent; slightly acid (pH 6.5); clear smooth boundary.
B21t RSL 69847	23 to 43 cm (9 to 17 inches), reddish brown (5YR 5/4) sandy loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly plastic; common fine and medium roots; many fine and medium tubular pores; common thin oriented clay bridges and films in pores; noneffervescent; mildly alkaline (pH 7.5); gradual smooth boundary.
B22t RSL 69848	43 to 74 cm (17 to 29 inches), reddish brown (5YR 5/4) fine gravelly sandy clay loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; many very fine and fine tubular pores; common thin oriented clay bridges and films in pores; about 15 percent by volume of 2 to 5 mm angular granitic and quartz gravel; noneffervescent; mildly alkaline (pH 7.5); clear wavy boundary.
B23t	74 to 91 cm (29 to 36 inches), reddish brown (5YR 5/4) fine and gravelly sandy clay loam, reddish brown (5YR 4/4) moist; weak fine subangular blocky structure; hard, friable slightly sticky, slightly plastic; few very fine roots; many very fine and fine tubular pores; common thin oriented clay bridges and films in pores; about 15 percent by volume of 2 to 5 mm angular granitic and quartz gravel; noneffervescent; [illegible]
B31tca	91 to 117 cm (36 to 46 inches), yellowish red (5YR 5/6) gravelly sandy clay loam, yellowish red (5YR 4/6) moist; weak fine subangular blocky structure; hard, friable, slightly sticky, slightly plastic, many very fine and fine and few coarse tubular pores; many thin clay films on ped faces; about 30 percent by volume of 1/8 to 3 inch rounded rhyolite, andesite, granite, and quartz gravel; few fine threads of lime; slightly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.
B32tca	117 to 135 cm (46 to 53 inches), reddish yellow (5YR 6/6) finely gravelly sandy clay loam, yellowish red (5YR 5/6) moist; massive; hard, friable, slightly sticky, [illegible]

CONSECUTIVE PEDON NUMBER C 69174 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES SONOITA SOIL NO. S69 ARIZ. 2-28 SAMPLE NO. S 889-S 890 WILLCOX AREA



SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 — 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBONATE 3A1A	INT. II .2- .02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75			
S 889	15- 38	B21T	67.2	15.6	17.2	18.4	20.0	9.7	11.9	7.2	8.6	7.0				21.9	23A	--	13	10
S 890	38- 56	B22T	69.2	12.9	17.9	28.2	16.6	7.6	10.0	6.8	7.3	5.6				19.2	23A	--	7	16

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON 6A2c	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1b	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L I M I T 4F1	EST. PL 4F2	BULK DENSITY 1/3 BAR 4A1F	DRY BAR 4A1F	CM 4A1H 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		-PERCENT-		-PERCENT-		PERCENT				PCT.NO.40		GRAMS PER CC			----PERCENT---			-PERCENT-	
S 889	15- 38	0.15										1.55		0.85			7.2		
S 890	38- 56	0.14										1.55		0.85			8.8		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1F	C E C SUM 5A3A	NH4- OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4- OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA- CL2 8C1E
		MEQ/100G									----PERCENT-----					
S 889	15- 38			0.3	0.7	1.0			1.0	12.0					7.8	7.5
S 890	38- 56			0.4	0.7	1.1			1.1	12.7					7.8	7.3

SONOITA SANDY LOAM
S69Ariz-2-28

Location: Cochise County, Arizona. 400 feet south and 500 feet west of the northeast corner of Sec. 16, T. 15 S., R. 26 E. East of Kansas Settlement Road, about 13 miles east and 2 miles north of Cochise. Date of sampling: October 23, 1969.

Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.

Classification: Typic Haplargid, coarse-loamy, mixed, thermic.

Vegetation: Rothrock grama, three-awn, mesquite and yucca. Use: Livestock range. Climate: Precipitation about 11 to 12 inches. Mean annual air temperature 60°F., January 42°F., July 78°F. Parent Material: Alluvium from granite, rhyolite, andesite and possibly limestone. Topography: Nearly level convex fans and valley slopes. Slope, 0.5 percent, west facing. Elevation: 4400 feet. Drainage: Well drained. Runoff is slow to medium. Permeability is moderately slow. Soil Moisture: Dry when sampled.

Remarks: Field determinations of pH Hellige-Truog indicator solution. Paired with sample S69Ariz-2-16. The B21t and B22t are the only horizons sampled.

HORIZON	DESCRIPTION
A11	0 to 5 cm (0 to 2 inches), brown (7.5YR 5/4) sandy loam, dark reddish brown (5YR 3/4) moist; weak thin platy structure; slightly hard, friable, nonsticky, nonplastic; many fine and medium roots; common fine and medium tubular pores; noneffervescent; medium acid (pH 6.0); abrupt smooth boundary.
A12	5 to 15 cm (2 to 6 inches), reddish brown (5YR 4/4) sandy loam, dark reddish brown (5YR 3/4) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; many fine and medium roots; common fine and medium tubular pores; noneffervescent; medium acid (pH 6.0); clear smooth boundary.
B21t RSL 69889	15 to 38 cm (6 to 15 inches), reddish brown (5YR 4/4) gravelly sandy clay loam, dark reddish brown (5YR 3/4) moist; massive parting to weak fine subangular blocky structure; hard, friable, slightly sticky, slightly plastic; common fine and medium roots; common fine and medium tubular pores; common thin clay films on faces of peds and in pores; contains about 15 percent by volume of 2 to 5 mm angular granite, rhyolite and andesite gravel; noneffervescent; neutral (pH 7.0); clear wavy boundary.
B22t RSL 69890	38 to 56 cm (15 to 22 inches), reddish brown (5YR 5/4) gravelly sandy clay loam, reddish brown (5YR 4/4) moist; massive parting to weak fine subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few fine and medium roots; common fine and medium tubular pores; common thin clay films on faces of peds and in pores; contains about 20 percent by volume of 2 to 15 mm angular granite, rhyolite and andesite gravel; 15 to 20 percent fine and medium gravel; noneffervescent; neutral (pH 7.0); clear wavy boundary.
B23t	56 to 79 cm (22 to 31 inches), yellowish red (5YR 5/6) gravelly sandy clay loam, yellowish red (5YR 4/6) moist; massive; hard, friable, slightly sticky, slightly plastic; few very fine and fine roots; many very fine and fine tubular pores; common thin clay films in pores and bridges; about 20 percent by volume of 2 to 25 mm angular granite, rhyolite and andesite gravel; very slightly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.
B31tca	79 to 97 cm (31 to 38 inches), yellowish red (5YR 5/6) gravelly light sandy clay loam, yellowish red (5YR 4/6) moist; massive; hard, friable, slightly sticky, slightly plastic; many fine and very fine tubular pores; common thin clay films in pores and as bridges; has about 25 percent by volume of rounded granite, rhyolite and andesite gravel of 3 to 80 mm; slightly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.
Cca	97 to 120 cm (38 to 47 inches), brown (7.5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; slightly effervescent; moderately alakaline (pH 8.0); clear wavy boundary.
B2tbca	120 to 150 cm (47 to 59 inches), red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; massive; hard, friable, sticky, plastic; slightly effervescent; moderately alkaline (pH 8.0).

CONSECUTIVE PEDON NUMBER C 67 52 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES HARQUA SOIL NO. S67 ARIZ. 7- 5 SAMPLE NO. 7 629-7 638 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC HAPLARGID,FINE-LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HOR2.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI --SILTS-- .05-.02	FSI .02-.002	CO. CLAYS---- 2-.2U	FINE LT .2U	CARBO NATE 3A1A.02	1A2A INT. -COARSE FRAGMENTS- II .2-.02	PCT. OF WHOLE SOIL	I 75-20	II 20-5	III 5-2 PCT. OF LT 75
			PERCENT OF LESS THAN 2MM																	
7 629	0- 0																--	--	--	--
7 630	0- 3	A2	37.7	47.7	14.6	4.3	4.6	2.6	7.0	19.2	23.7	24.0	13.7	0.9		47.6	10	TR	10Z	N
7 631	3- 8	A+B	39.8	41.5	18.7	3.9	4.8	2.6	7.2	21.3	21.3	20.2	16.8	1.9		47.5	9	TR	9Z	N
7 632	8- 23	B21T	37.4	37.8	24.8	9.0	6.2	2.9	4.9	14.4	14.1	23.7	20.1	4.7		31.5	23	TR	23Z	N
7 633	23- 30	B22TSA	47.3	20.7	32.0	14.1	9.8	4.3	5.4	13.7	12.4	8.3	20.3	11.7		29.0	22	TR	22Z	N
7 634	30- 51	B3ITCA	58.6	20.1	21.3	20.5	12.7	5.2	5.9	14.3	12.7	7.4				29.9	28	TR	28Z	N
7 635	51- 712B32TCA		59.3	25.9	14.8	20.1	11.9	5.2	6.6	15.5	16.8	9.1				35.7	40	TR	40Z	N
7 636	71- 843C 1CA		45.8	36.9	17.3	4.5	7.0	4.1	6.3	23.9	25.2	11.7				52.8	7	TR	7Z	N
7 637	84- 943C 2CA																1	TR	1Z	N
7 638	94-1143C 3CA																36	13	23Z	N

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L LL 4F1	I M PL 4F2	I T	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 382	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		PERCENT		PERCENT		PCT.	PCT	NO 40		GRAMS PER CC				PERCENT			PERCENT				
7 629	0- 0																				
7 630	0- 3	0.06	0.018	6		0.7				1.53	1.55	0.94		18.2	8.5	0.4	0.4		9.7		
7 631	3- 8		0.019	6		0.7			1.52			0.95			10.8				9.7		
7 632	8- 23			2		0.8				1.51	1.58	0.85		17.6	10.9	1.5	1.3		8.5		
7 633	23- 30			1		0.7			1.51			0.86			9.9				8.1		
7 636	71- 84			4		0.5				1.48		0.96			6.0				8.5		
7 637	84- 94			13						1.48		0.99			7.3						
7 638	94-114			8						1.48		0.86			6.4						

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES--- CA 5B3A 6N4C	MG 5B3A 6O4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	--C E C-- NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
7 629	0- 0																			
7 630	0- 3			3.4	1.8	5.2		20.4	2.88	5.0	1.2	19.8	0.4		2.6	14.9				8.3
7 631	3- 8			4.9	2.2	7.1		23.4	4.55	5.1	1.0	34.4	0.4		2.2	27.6				7.9
7 632	8- 23			8.6	1.6	10.2		21.9	30.6	100.0	22.0	155.2	1.8		0.6	237.0				7.6
7 633	23- 30			10.6	1.0	11.6		18.6	54.1	274.0	79.2	246.0	2.8		0.2	464.0				7.5
7 634	30- 51			7.4	0.5	7.9		10.8	41.6	192.8	59.2	172.0	1.1			318.0				7.4
7 635	51- 71			6.0	0.4	6.4		8.0	32.8	138.8	44.8	147.2	1.1			241.0				7.5
7 636	71- 84			7.3	0.4	7.7		10.1	33.4	116.8	44.8	151.2	3.4		0.4	254.0				7.5
7 637	84- 94																			
7 638	94-114																			

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A	EXCHANGBLE NA 5B4B	NA 5D2	SAR 5E	-GYPSUM- AMT. 6F1B	REQ. 6P3A	--LESS THAN 0.002 MM--- -----X RAY-------- I	II	III	IV	DTA PCT	-L.T. .0002 MM- ----X RAY----- I	II	III	MINERAL CODE	RELATIVE AMOUNT
								C L A Y M I N E R A L O G Y									
		PCT	MEQ	PCT		PCT	MEQ	7A2E	7A2E	7A2E	7A2E	7A3	7A2E	7A2E	7A2E		

HARQUA GRAVELLY LOAM
S-67-Ariz-7-5

Location: Maricopa County, Arizona. 150 feet west and 1550 feet south of the NE corner of Section 13, T1S, R9W., 15 miles southwest of Tonopah. Date of Sampling: October 10, 1967. Description by: G. Hartman, S. Torrance, J. Jay. Collectors: K. Flach, D. Nettleton, A. DeWall.
Classification: Typic Haplargid, fine-loamy, mixed, hyperthermic.
Vegetation: Sparse stand of creosotebush and saltbush. Use: Seasonal grazing.
Climate: Mean annual precipitation 6 inches. Mean annual air temperature 70° F.; January 51° F.; July 92° F. Parent Material: Medium and moderately fine textured alluvium from rhyolitic tuffs, andesite, granite and schist. Topography:

Nearly level lower end of alluvial fan. Slope less than 1 percent to the northeast.
Elevation: 1280 feet. Drainage: Well drained. Infiltration slow, permeability medium, surface runoff rapid. Soil Moisture: Dry.
Remarks: Sample RSL 67629 was taken from varnished desert pavement 1-0 inches. Sampled from backhoe pit.

HORIZON	DESCRIPTION
A2 RSL 67630	0 to 3 cm (0 to 1 inch), pinkish white (7.5YR 7/2) clay loam, strong brown (7.5YR 5/6) when moist; weak coarse platy structure; slightly hard, firm, sticky and plastic; common very fine and fine vesicular pores; 90 percent of the surface covered with varnished desert pavement; strongly effervescent; strongly alkaline (pH 9.4); abrupt smooth boundary.
A & B RSL 67631	3 to 8 cm (1 to 3 inches), 60 percent is a pinkish white (7.5YR 7/2) and 40 percent light reddish brown loam, strong brown (7.5YR 5/6) and brown (7.5YR 5/4) when moist; weak fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and plastic; few fine tubular pores; about 5-10 percent fine gravel; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
B21t RSL 67632	8 to 23 cm (3 to 9 inches), reddish brown (5YR 5/4) gravelly clay loam, yellowish red (5YR 4/6) when moist; weak very fine subangular blocky to granular structure; hard, friable, sticky and plastic; many very fine interstitial pores; few thin clay films in pores; about 15 percent fine gravel; weakly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
B22tsa RSL 67633	23 to 30 cm (9 to 12 inches), light reddish brown gravelly clay loam, common fine pink soft lime masses and common fine pink salt crystals, reddish brown (5YR 4/4) when moist; weak fine subangular blocky structure; hard, friable, sticky and plastic; common fine tubular pores and many fine interstitial pores; common thin clay films in pores and bridging sand grains; about 20 percent fine gravel; slightly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
B31tca RSL 67634	30 to 51 cm (12 to 20 inches), light reddish brown (5YR 6/4) gravelly clay loam, reddish brown (5YR 4/4) when moist; massive; hard, friable, sticky and plastic; common fine and very fine discontinuous tubular pores; few thin clay films in pores and bridging sand grains; many medium pink soft lime masses, about 25 percent fine gravel; violently effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
IIB32tca RSL 67635	51 to 71 cm (20 to 28 inches), pink (7.5YR 7/4) gravelly clay loam, brown (7.5YR 5/4) when moist; massive; hard, friable, sticky and plastic; many fine and very fine tubular pores and common fine interstitial pores; very few thin clay films in pores; many medium pinkish white lime veins and common fine soft lime masses, about 35 percent fine gravel; strongly to violently effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
IIIC1ca RSL 67636	71 to 84 cm (28 to 33 inches), light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) when moist; massive; very hard, firm, slightly sticky and plastic; many very fine tubular pores; very few thin clay films in pores; common fine pinkish white soft lime masses, about 3 percent fine gravel; weakly to noneffervescent in soil matrix; moderately alkaline (pH 8.0); abrupt smooth boundary.
IIIC2ca RSL 67637	84 to 94 cm (33 to 37 inches), light brown (7.5YR 6/4) clay loam with common medium distinct pinkish white (7.5YR 8/2) soft lime masses, dark brown (7.5YR 4/4) and pinkish white (7.5YR 7/2) when moist; massive; very hard, firm, slightly sticky and plastic; many fine and very fine tubular and interstitial pores; very few clay films in pores; weakly to strongly effervescent on soil matrix; moderately alkaline, pH 8.0; abrupt smooth boundary.
IIIC3ca RSL 67638	94 to 114 cm (37 to 45 inches), light brown (7.5YR 6/4) clay loam with common medium distinct pink (7.5YR 8/4) lime mottles, brown (7.5YR 5/4) and light brown (7.5YR 6/4) when moist; massive; hard, friable, sticky and plastic; many fine and medium tubular pores; very few thin clay films in pores; weakly to strongly effervescent in soil matrix; moderately alkaline, pH 8.0.

CONSECUTIVE PEDON NUMBER C 71 17 C H A R A C T E R I Z A T I O N D A T A

[redacted]

SOIL FAMILY: TYPIC HAPLARGID,FINE-LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBO NATE 3A1A	INT. COARSE II .2-.02	PCT. OF WHOLE SOIL	FRAGMENTS I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM															PCT. OF LT 75		
1 95	0- 4	A2	38.4	48.5	13.1	3.1	3.9	2.8	9.2	19.4	21.0	27.5	12.0	1.1		46.1	29A	7	18	4
1 96	4- 7	B1 T	44.7	38.9	16.4	5.7	5.2	3.8	11.1	18.9	18.0	20.9			TR	44.1	13A	3	5	5
1 97	7- 13	B21Tca	38.5	44.0	17.5	6.4	5.3	3.1	7.8	15.9	17.6	26.4	14.0	3.5	3	38.4	22A	1	7	13
1 98	13- 27	B22tcasa	34.1	43.9	22.0	12.6	4.6	2.2	5.1	9.6	10.9	33.0			5	23.6	28A	--	11	17
1 99	27- 55	B23tcasa	45.3	33.2	21.5	15.1	11.3	4.4	6.9	7.6	8.7	24.5			2	20.3	32A	2	11	20
1 100	55- 71	B24tcasa	52.6	25.4	22.0	20.6	11.3	4.7	8.4	7.6	8.5	16.9			TR	21.0	40A	2	14	24
1 101	71- 94	B25tcasa	60.1	18.9	21.0	27.7	17.2	4.9	5.3	5.0	6.5	12.4				14.5	44A	1	13	29
1 102	94-124	B31tcasa	53.0	28.6	18.4	17.6	14.3	5.5	6.5	9.1	11.0	17.6	10.2	8.2	1	23.9	40A	8	13	19
1 103	124-157	B32tcasa	58.6	17.1	24.3	20.0	18.0	7.2	7.7	5.7	6.2	10.9				16.0	50A	5	24	22
1 104	157-163	B33tcasa	47.0	36.2	16.8	11.8	12.0	6.3	7.9	9.0	11.9	24.3				25.1	25A	7	7	10

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		PERCENT		PERCENT		PCT.	PCT.NO.40		GRAMS PER CC				PERCENT			PERCENT				
1 95	0- 4	0.04	0.011	14					1.40	1.44	0.82	22.7	20.9	8.0	0.9	0.8	9.1	10.0	8.3
1 96	4- 7	0.03	0.017	16				1.37			0.93			9.3			8.5	9.7	8.2
1 97	7- 13	0.08		20					1.34	1.40	0.87	23.6	21.1	8.1	1.5	1.3	7.8	8.6	7.9
1 98	13- 27	0.14		30				1.32			0.84			9.0			7.8	8.4	7.9
1 99	27- 55			26					1.30	1.42	0.81	28.2	25.1	11.0	3.0	2.4	7.8	8.5	7.8
1 100	55- 71			14				1.32			0.75			14.0			7.8	8.5	7.8
1 101	71- 94			4					1.33	1.43	0.72	26.6	24.6	15.6	2.4	1.7	7.8	8.4	7.4
1 102	94-124			24				1.13			0.78			12.1			7.4	8.8	7.3
1 103	124-157			2					1.13	1.23	0.70	33.3	30.6	18.3	2.9	2.0	7.7	8.7	7.2
1 104	157-163			25				1.13			0.88			12.5			7.9	8.9	7.3

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA+ OAC 5A2A	NH4+ OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1A	MG 6Q1A	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
1 95	0- 4	18.7	2.1	7.9	1.8	30.5	100+	19.1		5.50	2.5	0.6	48.5	0.4		4.0	37.8	3.3		8.0
1 96	4- 7	21.5	2.3	12.3	1.7	37.8	100+	21.6		15.9	17.3	3.0	140.0	1.0		2.5	132.0	2.2		7.6
1 97	7- 13	25.3	2.8	16.0	0.7	44.8	100+	15.3		35.5	131.5	21.3	280.0	0.9		4.7	342.0	11.2		7.4
1 98	13- 27	41.2	3.7	18.4	0.5	63.8	100+	16.1		51.4	242.4	42.6	376.0	0.6		5.2	482.0	18.7		7.3
1 99	27- 55	38.4	4.9	21.4	0.4	65.1	100+	20.3		48.2	250.3	49.4	411.0	0.5		5.2	534.0	23.0		7.4
1 100	55- 71	35.9	5.8	30.5	0.6	72.8	100+	22.6		55.6	210.9	45.4	433.0	0.4		5.2	522.0	68.0		7.4
1 101	71- 94	29.2	5.7	31.9	0.6	67.4	100+	24.6		49.9	171.1	42.6	448.0	0.5		5.7	510.0	37.3		7.5
1 102	94-124	26.0	4.6	28.0	0.5	59.1	100+	18.3		45.7	103.7	33.0	376.0	0.3		3.3	407.0	34.3		7.6
1 103	124-157	32.5	5.8	37.5	0.6	76.4	100+	27.5		39.1	65.9	27.1	355.0	0.3		4.7	335.0	55.0		7.7
1 104	157-163	39.1	4.9	29.9	0.6	74.5	100+	20.9		32.1	43.0	17.7	302.0	0.2		4.7	259.0	60.0		7.9

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY LESS THAN 0.002 MM X RAY I 7A2E	II 7A2E	III 7A2E	IV 7A2E	DTA 7A3 PCT.	L.T. .0002 MM X RAY I 7A2E	II 7A2E	III 7A2E	MINERAL CODE	RELATIVE AMOUNT
1 95	0- 4	28.3	6.5	34	39		5.7	MT 4	MI 3	KK 2			MI 3	MT 2		MT MONTMORT	1 TRACE
1 96	4- 7	34.3	7.5	35	44		6.4									MI MICA	2 SMALL
1 97	7- 13	42.2	4.2	27	32			MI 4	MT 3	KK 1			MI 5	MT 1	KK 1	KK KAOLINIT	3 MODERATE
1 98	13- 27	39.3	3.6	22	31	1.0											4 ABUNDANT
1 99	27- 55	44.9	3.0	15	34	0.7											5 DOMINANT
1 100	55- 71	51.6	8.2	36	38	0.1											6 INDETER.
1 101	71- 94	50.7	9.2	37	43	0.5											
1 102	94-124	47.7	10.1	55	45	0.3		MT 4	MI 3	KK 1			MT 4	MI 3			
1 103	124-157	63.2	15.1	55	52	0.7	2.3										
1 104	157-163	51.6	14.3	69	55	1.4	4.9										

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

HARQUA VERY GRAVELLY LOAM
S71Ariz-7-5(1-10)

Location: Maricopa County, Arizona. 1250 feet east and 500 feet south of NW corner Sec. 20, T1S, R6W, about 18 miles west of Buckeye.
Date of Sampling: April 13, 1971.
Description by: W. D. Nettleton, J. E. Jay, G. W. Hartman, R. G. Schurig, F. Cook. Collectors: W. D. Nettleton, J. E. Jay, G. W. Hartman, R. G. Schurig, F. Cook.
Classification: Typic Haplargid, fine-loamy mixed, hyperthermic.
Vegetation: Surface nearly barren. Use: Desert range. Climate: Semiarid. 7 inches precipitation. Mean annual air temperature of 70°F. Parent Material: Old alluvium from granite, gneiss, schist, basalt and tuff. Topography: Gently sloping dissected low alluvial fans, 1 percent. slopes. Elevation: 1100 feet. Drainage: Well-drained. Permeability is moderately slow. Runoff is medium. Soil Moisture: Dry when sampled.

HORIZON	DESCRIPTION
A2 RSL 71095	0 to 4 cm (0 to 1 light yellowish brown (10YR 6/4) very gravelly loam, brown (7.5YR 5/4) moist; weak coarse platy structure; slightly hard, friable, slightly sticky and plastic; few fine roots; many fine and medium vesicular pores; 70 to 80 percent of surface covered with fine, medium and coarse rounded gravel, thin coat of desert varnish on gravel; strongly effervescent; moderately alkaline (pH 8.0TB); abrupt smooth boundary.
B1t RSL 71096	4 to 7 cm (1 to 3 inches), light yellowish brown (10YR 6/4) loam, yellowish red (5YR 5/8) moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few fine roots; few fine tubular and common fine interstitial pores; 5 percent fine rounded gravel; strongly effervescent; strongly alkaline (pH 8.6); clear smooth boundary.
B21tca RSL 71097	7 to 13 cm (3 to 5 inches), light reddish brown (5YR 6/4) and yellowish red (5YR 5/6) gravelly clay loam, reddish brown (5YR 4/4) and yellowish red (5YR 4/6) moist; weak fine and medium subangular blocky structure; hard, friable, sticky and plastic few fine roots; few fine tubular and common fine interstitial pores; 15 percent fine and medium rounded gravel; violently effervescent; many fine and medium white irregularly shaped soft lime masses, conductivity 9 mmhos.; moderately alkaline (pH 8.0); clear smooth boundary.
B22tcasa RSL 71098	13 to 27 cm (5 to 10 inches), light reddish brown (5YR 6/4) and yellowish red (5YR 5/6) gravelly clay loam, reddish brown (5YR 4/4) and yellowish red (5YR 4/6) moist; massive, hard, friable, sticky and plastic; few fine roots; few fine tubular and common fine interstitial pores; 30 percent fine and medium rounded gravel; violently effervescent; many fine and medium white irregularly shaped soft lime masses, conductivity 45+ mmhos.; moderately alkaline (pH 8.0); clear smooth boundary.
B23tcasa RSL 71099	27 to 55 cm(10 to 22 inches), light reddish brown (5YR 6/4) and yellowish red (5YR 5/6) very gravelly clay loam, yellowish red (5YR 4/6 and 5YR 4/8) moist; massive, hard, friable, sticky and plastic; no roots; few fine tubular and common fine interstitial pores; 50 percent very fine and fine rounded gravel; violently effervescent; many fine and medium white irregularly shaped soft lime masses, conductivity 45+ mmhos.; moderately alkaline (pH 8.0); gradual smooth boundary.
B24tcasa RSL 71100	55 to 71 cm (22 to 28 inches), reddish brown (5YR 5/4 and 5YR 4/4) gravelly clay loam yellowish red (5YR 4/6) moist; massive; hard, friable, sticky and plastic; few fine tubular and common fine interstitial pores; 40 percent fine and medium rounded gravel;

CONSECUTIVE PEDON NUMBER C 71 18 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES HARQUA SOIL NO. S71 ARIZ. 7- 7 SAMPLE NO. 1 105-1 108 CENT. MARICOPA AREA

SOIL FAMILY: TYPIC HAPLARGID,FINE-LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A.02	INT. .2-.02 WHOLE 20	COARSE FRAGMENTS I 75-20 PCT. OF SOIL	II 20-5 PCT. OF	III 5-2 LT 75
			PERCENT OF LESS THAN 2MM																
1 105	0- 3	A2	40.7	47.4	11.9	4.0	4.6	3.6	10.5	18.0	19.1	28.3			1	43.5	43A	12	25	6
1 106	3- 9	B1tca	33.7	50.2	16.1	5.4	4.2	3.1	8.6	12.4	12.4	37.8			3	29.9	18A	2	7	9
1 107	9- 21	B21tcase	28.2	51.4	20.4	7.5	7.1	3.2	4.6	5.8	9.0	42.4			5	17.2	27A	1	10	16
1 108	21- 56	B22tcase	46.0	31.4	22.6	14.6	9.2	5.5	9.0	7.7	8.4	23.0			2	20.6	35A	2	13	20

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L L LL 4F1	P L PL 4F2	B M I T	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT-		-PERCENT-		PCT.	PCT.	NO.40		GRAMS PER CC				----PERCENT---			-PERCENT--				
1 105	0- 3	0.09	0.016	19						1.40			0.72			8.2			8.9		7.2
1 106	3- 9	0.07	0.015	34						1.37			0.90			9.9			8.5	9.8	7.4
1 107	9- 21			45						1.34			0.84			9.3			8.1	9.7	7.3
1 108	21- 56			23						1.32			0.79			12.5			7.9	8.8	7.3

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1A	MG 6O1A	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	8A1 SO4 6L1B	B 6T1A	PH SAT. PAST. 8C1B
		---MEQ/100G---					PCT.	-MEQ/100G		MMHO	----MEQ/1000 ML----								PPM	
1 105	0- 3	22.4	1.9	2.4	1.0	27.7	100+		17.9											
1 106	3- 9	19.6	1.5	17.0	1.2	39.3	100+		18.6	9.0	6.4	0.9	77.8	0.4		3.7	73.7	1.8		7.7
1 107	9- 21	18.7	2.0	19.5	0.1	40.3	100+		17.7	21.0	14.9	6.7	203.0	0.4		2.7	190.0	4.4		7.7
1 108	21- 56	27.9	4.0	28.4	0.4	60.7	100+		21.8	40.9	77.0	25.7	383.0	0.3		5.2	382.0	31.4		7.6

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT 8A PCT.	NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY 7A2E I	7A2E II	7A2E III	DTA 7A2E IV	7A3 PCT.	-L.T. .0002 MM- X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE
1 105	0- 3		2.4	13												
1 106	3- 9	39.4	13.9	75	41		5.9									
1 107	9- 21	43.7	10.6	60	62		6.9									
1 108	21- 56	48.3	9.9	45	53	1.7	2.8									

RELATIVE AMOUNT

1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

HARQUA VERY GRAVELLY LOAM
S71Ariz-7-7(1-7)

Location: Maricopa County, Arizona. 1135 feet east and 270 feet south of the NW corner of Sec. 20, T1S, R6W, about 18 miles west of Buckeye. Date of Sampling: April 13, 1971. Description by: W. Nettleton, J. Jay, G. Hartman, R. Schurig, F. Cook. Collectors: W. Nettleton, J. Jay, G. Hartman, R. Schurig, F. Cook.
Classification: Typic Haplargid, fine-loamy, mixed, hyperthermic.
Vegetation: Nearly barren. Use: Desert rangeland. Climate: Semiarid. 7 inches precipitation. Mean annual air temperature is 70° F. Parent Material: Old alluvium from granite, andesite, schist, tuff, and basalt. Topography: Gently sloping dissected low fans. Slopes about 1 percent. Elevation: 1100 feet. Drainage: Well drained, permeability is moder-

[redacted]

A2 0 to 3 cm (0 to 1 inch), pale brown (10YR 6/3) and light brownish gray (10YR 6/2) very
RSL gravelly loam, brown (10YR 4/3) moist; weak thin platy structure; slightly hard, very

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Haplargid, fine-loamy, mixed, hyperthermic

SOIL Mohall loam SOIL Nos. S59Ariz-7-1 LOCATION Maricopa County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 5919 - 5928

Depth (in.)	Horizon	1B1b Size class and particle diameter (mm) 3A1											3A1a	3A1a	Coarse fragments 1A2a		
		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)	0.05–0.02	Int III (0.02–0.002)	Int II (0.2–0.02)	(2–0 1)	Calcareous clay	Non carbonate clay	>2 ** Pct.	2 – 19	19 -76
		Pct. of < 2 mm														Pct. of < 76 mm		
[redacted]																		

MOHALL LOAM
S59Ariz-7-1

Location: Maricopa County, Arizona, Maricopa County Area - Northern Part. 2,376 feet south and 1,050 feet east of northwest corner of Sec. 10, T. 4 N., R. 3 W., G&SRB&M, on west side of field road, 6 miles south and 2 miles west of Wittman. Date of Sampling: January 15, 1959.
Description by: Milo James. Collectors: Reuben E. Nelson, James Jay, and Milo James.
Classification: Typic Haplargid, fine-loamy, mixed, hyperthermic.
Vegetation: Very sparse cover of creosotebush and a scattering of annual grasses. Climate: 9 inches precipitation. Mean annual air temperature is approximately 70°F. Parent Material: Gravelly alluvium from schist, granite, rhyolite and with some andesite. Topography: Intermediate and low end of fan. Smooth convex slope, less than 1 percent, to the southeast. Elevation: 1,625 feet approximately. Drainage: Internal drainage good, surface drainage moderate to rapid. Soil Moisture: Deep, probably below 200 feet. Remarks: Soil very dry at time of sampling. Slight wind erosion at the sampling site. A thin gravel pavement on surface shows traces of desert varnish. Samples from 5 foot pit. Auger samples below 5 feet.

HORIZON	DESCRIPTION
A RSL No. 5919	0-1 inch (0-3 cm), brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak fine platy with vesicles between plates; slightly hard when dry, very friable moist, slightly sticky and slightly plastic when wet; noncalcareous; pH 7.5; common fine roots; abrupt wavy boundary.
B1t RSL No. 5920	1-3 inches (3-8 cm), between brown and dark brown (7.5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate fine to medium subangular blocky with few thin patchy clay skins and a few fine and occasional large tubular pores in peds; slightly hard when dry, friable moist, slightly sticky and slightly plastic when wet; noncalcareous; pH 7.5; common fine roots following faces of peds; clear wavy boundary.
B21t RSL No. 5921	3-8 inches (8-20 cm), between brown and dark brown (7.5YR 4/4) light sandy clay, dark reddish brown (5YR 3/4) moist; weak to moderate medium and coarse prismatic breaking to moderate medium and coarse subangular blocky; thin continuous clay skins on all faces; few fine and occasional large tubular pores in peds; hard when dry, friable when moist, sticky and plastic when wet; noncalcareous except for occasional mycelia; pH 7.5; common fine roots following faces of peds.
B22t RSL No. 5922	8-14 inches (20-36 cm), same description as above; abrupt wavy lower boundary.
B23t RSL No.	14-21 inches (36-53 cm), between brown and dark brown (7.5YR 4/4) light sandy clay; moderate coarse to very coarse angular blocky with tendency to very coarse platy; thin continuous clay
5923	skins on faces; occasional medium and a few fine continuous pores in peds; slight evidence of slickensides; very hard when dry, friable when moist, sticky and plastic when wet; calcareous; pH 8.0; common fine roots on faces; wavy lower boundary.
B24t RSL No. 5924	21-32 inches (53-81 cm), reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; massive breaking to weak medium subangular blocky; thin continuous clay skins on faces and in pores; a few fine continuous pores in peds; common medium distinct pinkish gray (5YR 7/2) lime nodules; reddish yellow (5YR 6/6) moist; nodules are firm but can be crushed in fingers; peds hard when dry, friable moist, slightly sticky and plastic when wet; calcareous in matrix to strongly calcareous in mottles; pH 8.0; a few fine roots; gradual wavy boundary.
C1ca RSL No. 5925	32-41 inches (81-104 cm), light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; common medium to coarse pinkish gray (5YR 7/2) lime mottles and nodules; reddish yellow (5YR 6/6) when moist; massive; common fine and few medium continuous pores; no roots; hard when dry, friable moist, slightly sticky and plastic when wet; strongly calcareous; pH 8.0; clear wavy boundary.
C2ca RSL No. 5926	41-56 inches (104-142 cm), pinkish gray (7.5YR 7/2) gravelly sandy loam; light brown (7.5YR 6/4) moist; massive with common fine and few medium continuous pores; strongly cemented when dry, firm when moist, slightly sticky and nonplastic when wet; strongly calcareous; pH 8.0.
C3ca RSL No. 5927	56-70 inches (142-178 cm), same description as above; clear wavy boundary.
C4 RSL No. 5928	70-84 inches + (178-213 cm), pink (7.5YR 7/4) gravelly coarse loamy sand, light brown (7.5YR 6/4) moist; massive or stratified; loose when dry or moist, nonsticky and nonplastic when wet; strongly calcareous; pH 8.0.

U S. DEPARTMENT OF AGRICULTUR
SOIL CONSERVATION SERVIC-

SOIL FAMILY: Typic Haplargid, fine-loamy, mixed, hyperthermic
SOIL Mohall loam SOIL Nos. S59Ariz-7-2 LOCATION Maricopa County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 5929 - 5937

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non carbonate clay	Coarse fragments 1A2: ≥ 2 Pct	Coarse fragments 1A2: 2 – 19 Pct. of < 76 mm	Coarse fragments 1A2: 19 – 76 Pct. of < 76 mm
		Pct of < 2 mm																
0-4	A	46.7	40.5	12.8	7.0	14.1	7.6	8.9	9.1	20.2	20.3	34.4	37.6			1		
4-10	B1t	52.0	30.3	17.7	7.3	15.9	8.6	10.2	10.0	16.7	13.6	32.3	42.0			2		
10-19	B21t	49.0	28.3	22.7	7.3	16.0	7.9	9.0	8.8	16.3	12.0	30.0	40.2			3		
19-27	B22t	38.2	34.5	27.3	6.3	9.8	5.2	7.2	9.7	20.5	14.0	34.3	28.5			6		
27-36	B3tca	39.3	41.0	19.7	6.5	10.7	5.5	7.2	9.4	19.2	21.8	32.6	29.9			8		
36-58	C1ca	46.8	36.4	16.8	11.0	13.8	6.3	7.5	8.2	18.0	18.4	30.3	38.6			11		
58-70	C2ca	59.7	26.1	14.2	18.7	19.4	7.7	8.4	5.5	10.0	16.1	19.7	54.2			41		
70-80	C3ca	70.1	15.8	14.1	21.1	26.7	10.1	8.5	3.7	4.0	11.8	11.4	66.4			32		
80-98	C4	82.6	9.9	7.5	19.1	35.7	14.9	10.6	2.3	4.5	5.4	11.1	80.3			24		

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct	C/N	6C2b Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct.	Bulk density: 4A1f 1/3 bar g/cc	Bulk density: 4A1h Oven dry g/cc	Bulk density: g/cc	Water content: Pct.	Water content: 4B1c 1/3 bar Pct.	Water content: 4B2 15 bar Pct.	4D1 Extensibility LEf Pct	4D1 Extensibility LE Pct.	pH: 8C1b Saturated Paste	pH: 8C1a H_2O 1:1	pH: 8C1a H_2O 1:10
0-4	0.31	0.040	8		-						7.1			7.3		8.0
4-10	0.18	0.027			-						7.3			7.3		7.8
10-19	0.20	0.035			-						9.5			7.7		8.3
19-27	0.23	0.029			5						11.4			7.8		8.8
27-36	0.22	0.020			16						9.2			7.9		8.8
36-58	0.16				15						7.6			8.2		9.0
58-70	0.08				19						6.7			8.4		9.2
70-80	0.03				11						6.7			8.5		9.3
80-98	0.01				2						5.5			8.7		9.4

Depth (In.)	Extractable bases 5B1a: 6N2b Ca	6O2c Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch Capacity: 5A2a NaOAc	5A6a NH_4OAc	Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	6I1a CO_3	6J1a HCO_3	6K1a Cl	6L1b SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter								mmho/cm
0-4	11.7	9.3					17.4		2.8	1.3	0.4	0.5	-	2.2	1.1		0.5
4-10	11.0	8.6					13.3		3.1	1.0	0.7	-	-	1.6	1.0		0.5
10-19	14.9	9.9					16.0		5.7	1.7	1.3	-	-	1.6	2.5		0.9
19-27							18.9		6.8	2.1	1.6	-	-	1.0	2.7		1.1
27-36							14.3		4.2	1.5	1.2	-	-	1.0	1.7		0.8
36-58							11.5		1.7	1.0	1.5	-	-	0.8	1.1		0.4
58-70							8.7		1.3	1.0	2.8	-	-	2.0	0.9		0.5
70-80							7.0		0.6	0.5	3.3	-	-	1.6	0.7		0.4
80-98							6.9		0.4	0.4	4.1	-	+	2.2	0.7		0.5

Depth (In.)	8A Water at Saturation Pct.	Exch. bases 5B3b Ca	5B1b 6Q2a K	5B1b 6P2a Na	5D1 Exchangeable Na Pct.	5C2 Base Sat. NaOAc Pct.	Gypsum Pct	Clay mineralogy (<0.002 mm) 3A1: Mont.	Verm.	Mica 7A2 X-ray	Kaolin.
		meq /100 g						X-ray			
0-4	26.4		1.3	0.1	0.6	100+					
4-10	27.8		0.8	0.2	1.5	100+					
10-19	33.7		0.6	0.3	1.9	100+					
19-27	40.3		0.5	0.3	1.6						
27-36	39.0		0.3	0.2	1.4						
36-58	38.4		0.2	0.3	2.6						
58-70	34.2		0.1	0.3	3.4						
70-80	34.7		0.2	0.6	8.6						
80-98	28.4		0.2	0.8	11.6						

MOHALL LOAM
S59Ariz-7-2

Location: Maricopa County, Arizona, Maricopa County Area - Northern Part. 2,310 feet north, 1,980 feet east of the southwest corner, Sec. 13, T. 5 N., R. 4 W., G&SRB&M, about 300 feet east of Morristown-Airfield Road and about 6 miles south of Morristown. Date of Sampling: January 16, 1959.
Description by: Milo James. Collectors: Reuben E. Nelson, James Jay and Milo James.
Classification: Typic Haplargid, fine-loamy, mixed, hyperthermic.
Vegetation: Creosotebush and bursage aspect with scattered clumps of tobosa, palo verde, and annual grasses. Climate: 9 inches precipitation. Mean annual air temperature is about 70° F.
Parent Material: Gravelly alluvium from schist, granite and rhyolite with possibly some andesite.
Topography: Low end of large fan from the Hieroglyphic Mountains, smooth concave slope of less than 1 percent sloping southward. Elevation: 1,675 feet approximately. Drainage: Internal drainage good, surface drainage moderately rapid. Soil Moisture: Probably below 200 feet. Remarks: Thin algae crust on surface in all depressed areas, occasional gravel on surface and throughout profile. Soil was very dry when sampled. Samples from 5 foot pit. Auger samples below 5 feet.

HORIZON	DESCRIPTION
A RSL No. 5929	0-4 inches (0-10 cm), brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak fine to coarse platy breaking to weak coarse granules; soft when dry, friable moist, sticky and plastic when wet; noncalcareous; pH 7.0; abrupt wavy lower boundary.
B1t RSL No. 5930	4-10 inches (10-25 cm), brown (7.5YR 5/4) gravelly sandy clay loam, reddish brown (5YR 4/4) moist; weak very coarse angular blocky or massive; thin patchy clay skins on faces of peds; common fine and few medium tubular pores; hard when dry, friable moist, slightly sticky and plastic when wet; noncalcareous; pH 7.0; clear wavy boundary.
B21t RSL No. 5931	10-19 inches (25-48 cm), between brown and dark brown (7.5YR 4/4) sandy clay, dark reddish brown (5YR 3/4) moist; weak to moderate medium prismatic breaking to moderate medium to coarse angular blocky; thin continuous clay skins on ped faces; no visible pores in peds; very hard when dry, friable moist, sticky and plastic when wet; noncalcareous; pH 8.0; abrupt wavy boundary.
B22t RSL No. 5932	19-27 inches (48-69 cm), between brown and dark brown (7.5YR 4/4) light sandy clay, dark reddish brown (5YR 3/4) moist; weak medium prismatic breaking to weak medium to coarse angular blocky; thin continuous clay skins on peds; numerous fine common and medium tubular pores; hard when dry, friable moist, sticky and plastic when wet; calcareous; numerous fine mycelia of lime and occasional fine firm concretions; pH 8.0; clear wavy lower boundary.
B3tca RSL No. 5933	27-36 inches (69-91 cm), light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; common medium to coarse distinct pinkish gray (7.5YR 7/2) mottles and soft concretions of lime, pinkish gray (7.5YR 6/2) moist; massive with few thin patchy clay skins and few clay bridges; common fine and medium continuous tubular pores; slightly hard to hard when dry, friable moist, sticky and plastic when wet; calcareous in matrix, very strongly calcareous in concretions; pH 8.0; gradual wavy boundary.
C1ca RSL No.	36-58 inches (91-147 cm), pinkish gray (7.5YR 6/2) heavy loam, brown (7.5YR 5/4) moist; common medium to coarse distinct pinkish gray (7.5YR 7/2) mottles and soft concretions of lime, pinkish

SOIL SURVEY LABORATORY Riverside, California

SOIL TYPE Mohall loam **LOCATION** Maricopa County, Arizona

SOIL FAMILY: Typic Haplargid, fine-loamy, mixed, hyperthermic

SOIL NOS. S59Ariz-7-3 **LAB. NOS.** 5938 - 5945

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 1/	TEXTURAL CLASS
0- 4	A1	17.4	19.9	5.8	6.8	8.9	30.6	10.6	32.5	10.7	5	cosl
4-10	B1	12.8	18.0	6.4	7.8	10.1	31.1	13.8	35.1	10.3	8	cosl
10-19	B21	11.7	17.9	6.6	7.4	8.3	26.5	21.6	29.8	8.9	9	scl
19-27	B22	9.6	15.7	5.7	5.7	7.7	27.7	27.9	28.8	9.7	10	l-scl-cl
27-37	B3ca	12.3	15.1	5.4	5.8	6.7	33.2	21.5	29.9	13.1	9	l
37-54	C1can	19.1	18.1	6.5	5.9	4.1	29.7	16.6	20.8	15.9	26	cosl
54-76	C2can	15.8	20.8	9.5	8.3	4.3	26.4	14.9	21.9	12.7	21	cosl
76-98+	C3	24.6	33.7	15.1	8.9	2.0	10.0	5.7	11.4	4.0	20	lcos

DEPTH INCHES	pH 8C1b SATURATED PASTE 1:1	pH 8C1a 1:5	pH 8C1a 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	ORGANIC MATTER 6B1a NITROGEN %	C/N	6H1a CO_3 meq./l.	8A1a Elec. Conduc. EC×10³ MILLIMHOS PER CM @25°C.	6E1b $CaCO_3$ equivalent %	6J1a HCO_3 meq/l	MOISTURE TENSIONS 1/10 ATMOS. %	MOISTURE TENSIONS 1/3 ATMOS. %	4B2 15 ATMOS. %
0- 4	7.2		7.8	0.16	0.025		-	0.3	-	1.0			5.6
4-10	7.5		7.4	0.12	0.021		-	0.4	-	1.6			6.0
10-19	7.6		8.2	0.14	0.022		-	0.6	-	0.6			9.1
19-27	8.1		8.9	0.16	0.023		-	0.9	2	0.6			12.0
27-37	8.1		8.9	0.16	0.020		-	0.9	10	0.4			10.3
37-54	8.6		9.2	0.05			-	0.9	22	2.4			8.1
54-76	8.8		9.6	0.02			-	1.2	15	1.8			8.0
76-98+	9.0		9.7	0.01			-	1.2	6	2.6			4.0

DEPTH INCHES	5A2a CATION EXCHANGE CAPACITY (4 Na)	EXTRACTABLE CATIONS 5B 5B1a Ca 6N2b	5B1a Mg 6O2c	6H2a H	Exch. 5B1b Na 6P2a	Exch. 5B1b K 6Q2a	5D1 EXCH. Na %	SATURATION EXTRACT SOLUBLE 6P1a Na	6Q1a K	6N1a Ca	6O1a Mg	6K1a	CA MOISTURE AT SATURATION %
		milliequivalents per 100g. soil →						← milliequivalents per liter →					
0- 4	8.5	7.7	8.0		0.1	0.9	1.2	0.4	0.4	1.8	0.8	0.5	28.6
4-10	14.7	9.6	8.7		0.3	0.6	2.0	0.6	0.2	2.1	0.9	0.5	23.3
10-19	20.7	13.9	10.8		0.5	0.4	2.4	1.8	0.4	2.7	0.9	2.2	32.6
19-27	23.3				0.6	0.4	2.6	3.1	0.4	3.7	1.3	4.5	41.2
27-37	17.1				0.7	0.3	4.1	3.7	0.4	3.0	1.1	5.0	44.2
37-54	6.3				0.8	0.2	12.7	13.5	0.1	1.0	0.6	5.7	40.3
54-76	6.1				1.2	0.2	19.7	18.9	0.1	0.5	0.6	5.1	37.7
76-98+	4.0				1.2	0.2	30.0	20.0	0.1	0.4	0.5	3.4	30.8

1/ Percent of the whole soil

MOHALL LOAM
S59Ariz-7-3

Location: Maricopa County, Arizona, Maricopa County Area - Northern Part. 1,650 feet and 300 feet south of the northwest corner of Sec. 1, T. 5 N., R. 4 W., G&SRB&M, 100 feet east of road about 3 miles south of Morristown. Date of Sampling: January 16, 1959.
Description by: Milo James. Collectors: Reuben E. Nelson, James Jay, and Milo James.
Classification: Typic Haplargid, fine-loamy, mixed, hyperthermic.
Vegetation: Bursage aspect with scattering of galleta, creosote, palo verde, cane cholla, and annual weeds and grasses. Climate: Precipitation about 9 inches annual. Mean annual air temperature is about 70° F. Parent Material: Granite, schist and rhyolite alluvium from Heiroglyphic Mountains. Topography: Smooth, convex slope of less than 1 percent near the low end of a large fan. Surface drainage is to the south. Elevation: About 1,690 feet. Drainage: Internal drainage is good. Surface drainage is slow to moderate. Soil Moisture: Ground water is deep, probably more than 200 feet. Remarks: Occasional gravel encountered throughout profile. Soil was very dry when sampled. Sampled from 5 foot pit. Auger samples below 5 feet.

HORIZON	DESCRIPTION
A1 RSL No. 5938	0-4 inches (0-10 cm), reddish yellow (7.5YR 6/6) loam, between brown and dark brown (7.5YR 4/4) when moist; a thin veneer, about 1/8 inch, of coarse sand on surface; weak medium to coarse platy breaking to weak fine granular; soft to slightly hard when dry, very friable when moist, sticky and plastic when wet; common fine to medium roots; many fine interstitial pores;

noncalcareous; pH 7.2; abrupt wavy boundary.

B1 RSL No. 5939	4-10 inches (10-25 cm), strong brown (7.5YR 5/6) light sandy clay loam, between brown and dark brown (7.5YR 4/4) moist; massive, breaking to weak medium subangular blocky; a few thin patchy clay skins on peds, common fine and medium continuous tubular pores in peds; common fine roots following faces; slightly hard to hard when dry, very friable moist, sticky and plastic when wet; noncalcareous; pH 7.5; clear wavy boundary.
B21 RSL No. 5940	10-19 inches (25-48 cm), brown (7.5YR 5/4) sandy clay, reddish brown (5YR 4/4) moist; moderate medium and coarse prismatic breaking to moderate medium and coarse angular blocky; thin continuous clay skins; few fine pores; common fine roots following ped faces; very hard when dry, friable when moist, very sticky and very plastic when wet; noncalcareous; pH 7.5; clear wavy boundary.
B22 RSL No. 5941	19-27 inches (48-69 cm), brown (7.5YR 5/4) sandy clay, reddish brown (5YR 4/4) moist; moderate medium and coarse subangular blocky; thin continuous clay skins; no visible pores in peds; common fine roots following faces; very hard when dry, friable when moist, very sticky and very plastic when wet; calcareous in matrix, strongly calcareous in numerous fine mycelia of lime, an occasional soft concretion of lime; pH 8.0; clear wavy boundary.
B3ca RSL No. 5942	27-37 inches (69-94 cm), strong brown (7.5YR 5/6) sandy clay loam, between brown and dark brown (7.5YR 4/4) moist; common medium and distinct pinkish white (7.5YR 8/2) mottles and soft or, occasionally, hard concretions of lime, pink (7.5YR 7/4) moist; massive breaking to weak fine and medium subangular blocky; thin patchy clay skins on ped faces; common fine and medium continuous pores in peds; slightly hard when dry, very friable when moist, sticky and plastic when wet; strongly to very strongly calcareous; pH 8.0; clear wavy boundary.
C1cam	37-54 inches (94-137 cm), pinkish white (7.5YR 8/2) strongly cemented heavy loam, pinkish

CONSECUTIVE PEDON NUMBER C 67 56 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES MOHALL SOIL NO. S67 ARIZ. 11- 1 SAMPLE NO. 7 658-7 668 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC HAPLARGID,FINE-LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS- WHOLE 20 I 75-	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM													SOIL	PCT. OF LT 75		
7 658	0- 3	A11	58.2	28.0	13.8	2.3	6.6	8.1	25.1	16.1	14.9	13.1	9.1	4.7		45.6	TR	TR	--	--
7 659	3- 13	A12	60.4	23.0	16.6	3.3	8.7	9.0	23.7	15.7	13.2	9.8	11.1	5.5		41.9	1	TR	1Z	N
7 660	13- 23	B1 T	57.5	21.8	20.7	2.5	7.2	8.7	23.2	15.9	13.1	8.7	12.2	8.5		42.6	1	TR	1Z	N
7 661	23- 46	B21T	45.9	24.5	29.6	1.6	4.0	5.3	18.4	16.6	15.0	9.5	14.1	15.5		42.8	1	TR	1Z	N
7 662	46- 66	B22Tca	39.4	31.3	29.3	1.4	3.2	4.2	14.7	15.9	18.7	12.6	16.4	12.9		44.0	3	TR	3Z	N
7 663	66- 84	B23Tca	32.4	31.3	36.3	1.5	3.2	3.8	11.6	12.3	15.2	16.1	23.9	12.4		34.5	2	TR	2Z	N
7 664	84-109	B24Tca	31.2	39.4	29.4	1.4	2.4	2.9	10.7	13.8	15.5	23.9				36.0	4	TR	4Z	N
7 665	109-130	B31Tca	33.9	40.1	26.0	1.2	2.4	3.4	12.3	14.6	16.0	24.1				38.6	2	TR	2Z	N
7 666	130-160	B32Tca	33.4	43.5	23.1	1.1	2.3	3.3	12.1	14.6	16.9	26.6				39.4	1	TR	1Z	N
7 667	160-180	B33Tca	27.4	48.9	23.7	0.5	1.2	2.1	9.6	14.0	17.4	31.5				37.8	1	TR	1Z	N
7 668	180-229	C	31.5	49.2	19.3	0.2	0.8	2.4	13.0	15.1	20.5	28.7				44.2	TR	TR	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 6E1B	6E1B	EXT. IRON 6C2B	ATTERBERG L I M I T LL	PL	BULK DENSITY EST 1/3 BAR 4A1F	4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEE 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		PERCENT		PERCENT	19-2	PCT.	PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT				
7 658	0- 3	0.98	0.095	TR		0.7				1.49	1.51	1.00		14.7	6.3	0.4	0.4		7.8	
7 659	3- 13	0.26	0.038	TR		0.7				1.63	1.65	1.00		12.1	5.6	0.4	0.4		7.5	
7 660	13- 23			TR		0.7				1.50	1.60	1.00		16.3	6.9	2.2	2.2		7.5	
7 661	23- 46			TR		0.7				1.47	1.65	0.99		20.4	10.2	3.9	3.9		8.4	
7 662	46- 66			3		0.7				1.39	1.56	0.98		22.5	11.7	3.9	3.9		8.9	
7 663	66- 84			8		0.7				1.41	1.61	0.99		24.6	14.4	4.5	4.5		9.1	
7 664	84-109			15		0.6				1.34	1.55	0.98		24.0	13.5	5.0	4.9		9.2	
7 665	109-130			16		0.6				1.45	1.66	0.99		22.9	13.7	4.6	4.6		9.4	
7 666	130-160			18		0.3				1.60	1.76	0.99		21.6	10.0	3.2	3.2		9.5	
7 667	160-180			12		0.6				1.42	1.57	0.99		22.3	10.5	3.4	3.4		9.4	
7 668	180-229			9		0.7				1.37	1.49	1.00		24.1	8.3	2.8	2.8		9.1	

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4C	MG 5B3A 6O4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	FC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1B	MG 6O1O	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
7 658	0- 3			0.1	2.0	2.1		13.7												6.9
7 659	3- 13			0.1	1.4	1.5		12.9												6.6
7 660	13- 23			0.1	1.6	1.7		16.9												6.9
7 661	23- 46			0.1	1.8	1.9		18.7												7.5
7 662	46- 66			0.2	1.3	1.5		17.8												7.9
7 663	66- 84			0.4	1.2	1.6		22.5												8.0
7 664	84-109			0.5	0.6	1.1		19.1												8.1
7 665	109-130			1.8	0.3	2.1		17.1												8.1
7 666	130-160			2.8	0.3	3.1		15.5	0.96	1.1	0.6	6.7	0.6		2.3	2.0				8.3
7 667	160-180			4.0	0.2	4.2		16.9	2.70	3.3	2.4	17.8	0.2		1.6	8.5				8.1
7 668	180-229			6.3	0.3	6.6		19.6	6.8	19.4	14.2	39.2	0.2		1.0	18.4				7.9

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM- AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY I 7A2E	II 7A2E	III 7A2E	DTA IV 7A2F	PCT. 7A3	-L.T. .0002 MM- X RAY I 7A2E	II 7A2E	III 7A2E	MINERAL CODE	RELATIVE AMOUNT
7 658	0- 3		0.1	1				MT 3	MI 3				MI 3			MT MONTMORT	1 TRACE
7 659	3- 13		0.1	1				MI 3	MT 2	KK 1			MI 3	MT 1		MI MICA	2 SMALL
7 661	23- 46		0.1	1				MT 4	MI 4	KK 2			MT 3	MI 3			4 ABUNDANT
7 662	46- 66		0.2	1									MT 3	MI 3			5 DOMINANT
7 663	66- 84		0.4	2				MT 4	MI 2	KK 2			MT 4	MI 3			6 INDETER.
7 664	84-109		0.5	3													
7 665	109-130		1.8	11													
7 666	130-160	58.2	2.4	16	7												
7 667	160-180	63.8	2.9	15	11												
7 668	180-229	53.3	4.2	21	10			MT 5	MI 2	KK 2							

SAMPLE PREPARATION CODES
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE

MOHALL LOAM
S67Ariz-11-1

Location: Pinal County, Arizona. 150 feet north and 250 feet east of the center of Sec. 11, T. 3 S., R. 8 E., 13 miles north of Coolidge. Date of Sampling: October 13, 1967.
Description by: E. Adams, J. Jay. Collectors: K. Flach, D. Nettleton, D. Hendricks.
Classification: Typic Haplargid, fine-loamy, mixed, hyperthermic.
Vegetation: Desert shrub - dominantly creosote with some brittlebush and cacti. Use: Seasonal range.
Climate: Mean annual precipitation 9 inches (Florence). Mean annual temperature 70° F.; January 51° F., July 90° F. Parent Material: Alluvial valley fill material from acid and basic igneous and sedimentary rocks. Topography: Nearly level valley plain with slopes of less than 0.5 percent to the southwest.
Elevation: 1300 feet. Drainage: Well drained with a moderately slowly permeable subsoil. Medium runoff.

HORIZON	DESCRIPTION
A11 RSL No. 67658	0-3 cm (0-1 inch), light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) when moist; weak medium platy structure; slightly hard, friable, slightly sticky and plastic; many fine and medium roots; few fine vesicular pores; noneffervescent (pH 8.0 thymol blue); abrupt smooth boundary.
A12 RSL No. 67659	3-13 cm (1-5 inches), light brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4) when moist; weak coarse platy breaking to weak fine subangular blocky structure; hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many fine and medium roots; common fine tubular and and interstitial pores; noneffervescent (pH 8.0); abrupt smooth boundary.
B1t RSL No. 67660	13-23 cm (5-9 inches), brown (7.5YR 5/4) light sandy clay loam, dark reddish gray (5YR 4/2) when moist; weak medium prismatic breaking to weak medium subangular blocky structure; hard when dry, friable when moist, slightly sticky and plastic when wet; common fine and medium roots; few fine tubular and common fine interstitial pores; few thin clay films in pores; noneffervescent (pH 8.0); clear smooth boundary.
B21t RSL No. 67661	23-46 cm (9-18 inches), brown (7.5YR 5/4), clay loam, dark brown (7.5YR 4/4) when moist; weak medium prismatic breaking to moderate medium subangular blocky structure; hard when dry, friable when moist, sticky and plastic when wet; few fine and very fine roots; common fine tubular and few fine interstitial pores; few thin clay films in pores; noneffervescent (pH 8.0); clear smooth boundary.
B22tca RSL No. 67662	46-66 cm (18-26 inches), reddish yellow (7.5YR 6/6) clay loam; dark brown (7.5YR 4/4) when moist; weak medium prismatic breaking to strong medium subangular blocky structure; hard when dry, friable when moist, sticky and plastic when wet; few fine and very fine roots; few fine tubular and common fine interstitial pores; few thin clay films in pores and on ped faces; few fine soft masses of pinkish white and irregular filaments of carbonates; strongly effervescent (pH 8.0); gradual smooth boundary.
B23tca RSL No. 67663	66-84 cm (26-33 inches), yellowish red (5YR 5/6) clay loam; reddish brown (5YR 4/4) when moist; weak medium prismatic breaking to strong medium prismatic breaking to strong medium subangular blocky structure; hard when dry, friable when moist, sticky and plastic when wet; few fine and very fine roots; common fine tubular and interstitial pores; few thin clay films in pores and on ped faces; common medium pinkish white irregular soft masses of carbonates, slightly to strongly effervescent (pH 8.0); gradual smooth boundary.
B24tca RSL No. 67664	84-109 cm (33-43 inches), light brown (7.5YR 6/4) clay loam, reddish brown (5YR 4/4) when moist; massive; hard when dry, firm when moist, slightly sticky and plastic when wet; few fine tubular and common fine interstitial pores; few thin clay films in pores; common medium pinkish white irregular soft masses of carbonates, strongly effervescent (pH 8.0); gradual smooth boundary.
B31tca RSL No. 67665	109-130 cm (43-51 inches), light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) when moist; massive; hard when dry, firm when moist, slightly sticky and plastic when wet; few fine tubular pores; few thin clay films in pores; common medium pinkish white irregular soft masses of carbonates, strongly effervescent (pH 8.0); gradual smooth boundary.
B32tca RSL No. 67666	130-160 cm (51-63 inches), light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) when moist; massive; hard when dry, firm when moist, sticky and plastic when wet; few fine and medium tubular pores; few thin clay films in pores; common medium pinkish white irregular soft masses of carbonates; strongly effervescent (pH 8.0); gradual smooth boundary.
B33tca RSL No. 67667	160-180 cm (63-71 inches), light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) when moist; massive; hard when dry, firm when moist, sticky and plastic when wet; few fine tubular pores; few thin clay films in pores; few fine pinkish white irregular filaments and soft masses of carbonates, strongly effervescent (pH 8.0); gradual smooth boundary.
C RSL No. 67668	180-229 cm (71-90 inches), very pale brown (10YR 7/3) loam, brown (7.5YR 4/4) and very pale brown (10YR 7/4) when moist; massive; hard when dry, firm when moist, sticky and plastic when wet; many fine tubular pores; few thin clay films in pores; few fine white filaments and soft masses of carbonates; strongly to violently effervescent (pH 8.0).

CONSECUTIVE PEDON NUMBER C 67 57 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES MOHALL SOIL NO. S67 ARIZ. 11- 2 SAMPLE NO. 7 669-7 680 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC HAPLARGID,FINE-LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2U	FINE LT 2U	CARBONATE 3A1A	1A2A INT. II .2-.02	COARSE FRAGMENTS PCT. DF WHOLE SOIL	I 75-20 PCT. OF LT 75	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM																	
7 669	0- 5	A11	18.2	55.8	26.0	1.0	2.5	2.9	6.7	5.1	13.3	42.5				21.8	TR	TR	--	--
7 670	5- 10	A12	54.2	28.7	17.1	2.9	6.3	8.9	22.0	14.1	14.0	14.7				40.1	2	TR	2Z	N
7 671	10- 20	A3	57.1	18.9	24.0	3.7	6.7	9.6	23.8	13.3	9.6	9.3				35.9	6	TR	6Z	N
7 672	20- 28	B1 T	58.5	15.8	25.7	6.1	8.2	9.5	22.7	12.0	9.4	6.4				33.4	8	TR	8Z	N
7 673	28- 51	B21T	41.9	14.1	44.0	2.8	6.5	7.0	16.3	9.3	9.3	4.8				27.0	4	TR	4Z	N
7 674	51- 66	B22T	40.8	17.8	41.4	3.3	5.3	6.0	14.7	11.5	10.7	7.1				30.0	11	TR	11Z	N
7 675	66- 79	B31T	45.7	22.1	32.2	4.7	5.6	6.0	16.5	12.9	13.1	9.0				35.0	14	2	12Z	N
7 676	79-109	B32TCA	48.1	29.5	22.4	3.6	5.4	6.8	18.8	13.5	14.4	15.1			1	37.9	15	TR	15Z	N
7 677	109-135	C 1CA	48.2	30.4	21.4	3.2	5.4	6.9	19.3	13.4	16.5	13.9			1	40.7	11	TR	11Z	N
7 678	135-147	2A1 BCA															23	TR	23Z	N
7 679	147-193	2B2TBCA	43.7	21.8	34.5	3.4	6.4	6.7	16.5	10.7	10.8	11.0				30.2	4	TR	4Z	N
7 680	193-208	2C2 CA															5	TR	5Z	N

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A -PERCENT-	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	19-2 6E1B	EXT. IRON FE PCT. 6C2B	ATTERBERG LIMIT LL 4F1 PCT.	PL 4F2 NO.40	BULK DENSITY EST 1/3 BAR 4A1F GRAMS PER CC	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C -PERCENT-	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1 -PERCENT-	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
7 669	0- 5	0.86	0.074	TR		1.0				1.36	1.47	1.00		30.4	11.9	2.6	2.6		8.6	
7 670	5- 10	0.31	0.044	TR		0.7				1.53	1.62	0.99		19.5	6.3	1.9	1.9		8.3	
7 671	10- 20			TR		0.8				1.71	1.82	0.96		14.7	6.7	2.1	2.0		8.4	
7 672	20- 28			TR		0.7				1.52	1.62	0.95		14.2	6.9	2.1	2.0		8.4	
7 673	28- 51			TR		0.8				1.50	1.71	0.98		23.5	15.5	4.5	4.4		8.8	
7 674	51- 66			4		0.7			1.50			0.93			13.8				9.0	
7 675	66- 79			5		0.6			1.40			0.93			11.5				9.2	
7 676	79-109			13		0.4				1.31	1.48	0.92		21.3	9.2	4.2	3.8		9.5	
7 677	109-135			12		0.4			1.31			0.94			8.7				9.6	
7 678	135-147								1.34			0.87			8.7					
7 679	147-193					0.5				1.36	1.58	0.98		27.5	13.0	5.1	5.0			
7 680	193-208								1.36			0.97			9.1					

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4C	MG 5B3A 6O4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT. PCT.	C E C NA-OAC 5A2A -MEQ/100G	NH4-OAC 5A6A	WATER EXTRACT FROM SATURATED PASTE 8A1 EC 8A1A MMHO	CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A -MEQ/1000 ML	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A PPM	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.													
7 669	0- 5			0.1	1.6	1.7			27.6	1.26	10.3	2.1	0.6	0.9		9.7	0.3			7.9
7 670	5- 10			0.1	1.0	1.1			15.2	1.55	11.9	2.6	1.0	0.5		3.7	0.6			7.4
7 671	10- 20			0.1	1.2	1.3			16.3											7.6
7 672	20- 28			0.1	1.2	1.3			17.5	0.91	6.2	2.1	1.0	0.5		1.2	0.4			7.6
7 673	28- 51			0.5	1.1	1.6			24.0											7.7
7 674	51- 66			0.7	0.8	1.5			19.0											7.9
7 675	66- 79			0.8	0.5	1.3			15.4											8.0
7 676	79-109			1.2	0.4	1.6			10.2	0.55	0.6	0.3	4.4	0.1		2.6	0.7			8.3
7 677	109-135			1.5	0.2	1.7			9.7											8.5
7 678	135-147																			
7 679	147-193			3.7	0.6	4.3			17.3											
7 680	193-208																			

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. REQ. 6F1B PCT.	6P3A MEQ.	CLAY MINERALOGY <0.002 MM X RAY DTA 7A2E I	7A2E II	7A2E III	7A2E IV	7A3 PCT.	<0.0002 MM X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE
7 669	0- 5	55.9	TR	TR	TR			MT	3	MI	3	KK	2			MT
7 670	5- 10	29.8	TR	TR	TR											MI
7 671	10- 20		0.1	1				MT	3	MI	3	KK	2			KK
7 672	20- 28	33.4	TR	TR	TR											
7 673	28- 51		0.5	2				MI	4	MT	3	KK	2			
7 674	51- 66		0.7	4												
7 675	66- 79		0.8	5												
7 676	79-109	63.8	0.9	9	7											
7 677	109-135		1.5	15												
7 678	135-147															
7 679	147-193		3.7	21				MI	4	MT	3	KK	2			
7 680	193-208															MT

MINERAL CODE: MT MONTMORT MTKK

RELATIVE AMOUNT: 1 TRACE; 2 SMALL; 3 MODERATE; 4 ABUNDANT; 5 DOMINANT; 6 INDETER.

SAMPLE PREPARATION CODES
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.

MOHALL LOAM
S67Ariz-11-2

Location: Pinal County, Arizona. 450 feet east and 200 feet north of the southwest corner of Section 19, T3S, R9E, 16 miles north of Coolidge. Date of Sampling: October 14, 1967.
Description by: E. Adams, J. Jay. Collectors: K. Flach, D. Nettleton.
Classification: Typic Haplargid, fine-loamy, mixed, hyperthermic.
Vegetation: Desert shrub--creosote bush, cholla cacti, and brittlebush. Use: Desert rangeland. Climate: Mean annual precipitation 9 inches (Florence). Mean annual air temperature 70° F., January 51° F., July 90° F. Parent Material: Valley fill material derived from acidic and basic igneous and metamorphosed sedimentary rocks. Topography: Nearly level valley plain with slopes of 0.5 percent. Elevation: 1400 feet. Drainage: Well drained with moderately slow permeability. Runoff is medium. Soil Moisture: Dry when sampled.
Remarks: Profile is probably finer textured than modal Mohave (est. 37-39 percent clay). Structure is about 1 grade stronger than Mohave. Soil temperature at 20 inches 84° F.

HORIZON	DESCRIPTION
A11 RSL 67669	0 to 5 cm (0 to 2 inches), light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) when moist; weak medium platy breaking to moderate medium and fine subangular blocky structure; hard, friable, sticky and plastic; many *fine and very fine roots; common fine vesicular pores; non-* to slightly effervescent ((pH 8.0 thymol blue); abrupt smooth boundary.
A12 RSL 67670	5 to 10 cm (2 to 4 inches), light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) when moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and plastic; many fine and very fine roots; few fine tubular and many fine intersitital pores; noneffervescent (pH 8.0); abrupt smooth boundary.
A3 RSL 67671	10 to 20 cm (4 to 8 inches), light brown (7.5YR 6/4) loam, brown (7.5YR 4/4) when moist; massive; slightly hard, friable, slightly sticky and plastic; common fine and very fine roots; few fine tubular and common fine interstitial pores; about 5 percent gravel; noneffervescent (pH 8.0); abrupt wavy boundary.
B1t RSL 67672	20 to 28 cm (8 to 11 inches), yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6) when moist; weak coarse prismatic structure; hard, friable, sticky and plastic; common fine and very fine roots; very few fine tubular and few fine interstitial pores; few thin clay films in pores; about 5-10 percent quartzite gravel; noneffervescent (pH 8.0); clear smooth boundary.
B21t RSL 67673	28 to 51 cm (11 to 20 inches), reddish brown (5YR 5/3) clay loam, reddish brown (5YR 4/4) when moist; strong medium prismatic breaking to strong medium angular blocky structure; very hard, friable, sticky and plastic; common fine and very fine roots; few fine tubular and common fine interstitial pores; common moderately thick clay films on ped faces and in pores; about 5 percent gravel; noneffervescent (pH 8.0); clear smooth boundary.
B22t RSL 67674	51 to 66 cm (20 to 26 inches), reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) when moist; strong medium prismatic breaking to strong medium angular blocky structure; very hard, friable, sticky and plastic; common fine and very fine roots; common fine tubular and interstitial pores; common moderately thick clay films on ped faces and in pores; about 10 percent medium gravel; noneffervescent (pH 8.0); clear smooth boundary.
B31t RSL 67675	66 to 79 cm (26 to 31 inches), reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) when moist; weak medium prismatic breaking to moderate medium angular blocky structure; hard, friable, sticky and plastic; common fine and very fine roots; common fine tubular and interstitial pores; about 10 percent gravel; strongly effervescent (pH 8.0); clear smooth boundary.
B32tca RSL 67676	79 to 109 cm (31 to 43 inches), reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) when moist; weak medium prismatic breaking to moderate medium angular blocky structure; hard, friable, sticky and plastic; common fine and very fine roots; common fine tubular and interstitial pores; common moderately thick clay films on ped faces and in pores; common medium pinkish white irregular soft masses of carbonate; about 10-15 percent quartzite gravel, strongly effervescent, violently effervescent on mottles (pH 8.0); gradual smooth boundary.
C1ca RSL 67677	109 to 135 cm (43 to 53 inches), light reddish brown (5YR 6/3) and reddish brown (5YR 5/3) clay loam (30 percent), reddish brown (5YR 4/4) when moist; massive; hard, firm, sticky and plastic; common fine and very fine roots; common fine tubular and interstitial pores; few thin clay films in pores; common medium pinkish white irregular soft masses of carbonates; about 10 percent gravel; strongly effervescent, violently effervescent on mottles (pH 8.0); gradual smooth boundary.
IIA1bca RSL 67678	135 to 147 cm (53 to 58 inches), light reddish brown (5YR 6/3) gravelly loam, yellowish red (5YR 4/6) when moist; massive; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; few *fine tubular and many fine interstitial pores; few thin clay films in pores; common medium distinct pinkish* white (5YR 8/2) irregular soft masses of carbonates, pinkish gray (5YR 7/2) when moist; about 15-20 percent quartzite gravel; strongly effervescent, violently effervescent on mottles (pH 8.0); clear smooth boundary.
IIB2tbca RSL 67679	147 to 193 cm (58 to 76 inches), pink (5YR 7/3) clay loam, reddish brown (5YR 4/4) when moist; weak medium prismatic breaking to weak medium angular blocky structure; very hard, friable, sticky and plastic; few fine and very fine roots; very few fine tubular and few fine interstitial pores; few moderately thick clay films on ped faces in pores; many large pinkish white irregular soft masses of carbonates, less than 5 percent gravel; noneffervescent in matrix, violently effervescent on mottles (pH 8.0); gradual smooth boundary.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Haplargid, fine-loamy, mixed, mesic

SOIL Balon gravelly clay loam (taxadjunct) SOIL Nos. S65Ariz-13-6 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65193 - 65199

Depth (In)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt (0.05–0.02)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	★ Coarse fragments 1A2a ≥ 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct	Pct. of < 76mm	
0-3	A1	57.1	22.3	20.6	6.4	12.4	10.8	18.5	9.0	10.5	11.8	28.3	48.1	0	21	42	11**	31**
3-7	B1t	42.6	24.2	33.2	5.2	10.5	7.8	12.2	6.9	9.8	14.4	22.6	35.7	0	33	12	8	4
7-15	B21t	43.3	27.7	29.0	5.9	11.8	7.6	11.1	6.9	10.5	17.2	23.0	36.4	0	29	26	17	9
15-23	B22t	52.4	29.0	18.6	8.6	14.4	8.8	12.4	8.2	11.0	18.0	25.7	44.2	0	19	31	21**	10**
23-36	B3t	56.9	27.7	15.4	10.9	17.0	9.5	12.2	7.3	9.1	18.6	22.6	49.6	0	15	34	20**	14**
36-54	C1	52.4	33.1	14.5	12.5	14.7	7.3	10.6	7.3	10.3	22.8	23.2	45.1	0	15	55	29**	26**
54-73+	C2	59.0	24.8	16.2	16.8	18.6	8.4	9.9	5.3	7.4	17.4	17.8	53.7	0	16	48	26**	22**

Depth (In)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$	Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry	Bulk density	3B2	Water content	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH: 8C1a H_2O 1:1	pH	
	Pct.	Pct.		Pct.	Pct.	g/cc	g/cc	g/cc	Cm	Pct.	Pct.	Pct.	in./in.	in./in.			
0-3	0.64	0.057	11	1.6	-							8.6			6.5		
3-7	0.53	0.050	11	1.4	-	1.34	1.54		0.94		22.8	15.5	0.049	0.045	6.7		
7-15	0.38			1.3	-	1.35	1.61		0.85		26.7	16.2	0.061	0.051	6.7		
15-23	0.16			1.3	-	1.49	1.65		0.80		22.4	12.7	0.034	0.027	6.7		
23-36	0.09			1.2	-	1.49	1.62		0.78		22.7	11.6	0.028	0.021	6.7		
36-54	0.09			1.2	-							12.4			6.7		
54-73+	0.04			1.0	-							11.6			6.9		

Depth (In.)	Extractable bases 6N2a Ca	6O2a Mg	6P2a Na	5B1a 6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity 5A1a NH_4OAc	5A3a Sum		6G1d KCl Ext. Al^{+++}		Atterberg limits: Plastic limit	Liquid limit	Plastic index		Base saturation 5C1 NH_4OAc	
	meq/100 g											Pct. of <0.4 mm				Pct	Pct
0-3	12.9	5.8	0.1	0.4	19.2		20.6									93	
3-7	23.3	9.2	0.2	0.3	33.0		35.4									93	
7-15	25.4	9.6	0.3	0.3	35.6		37.7									94	
15-23	22.2	9.0	0.3	0.2	31.7		33.2									95	
23-36	21.7	8.6	0.3	0.2	30.8		32.0									96	
36-54	23.4	9.4	0.5	0.3	33.6		34.9					20	42	22		96	
54-73+	23.4	9.6	0.5	0.3	33.8		34.3									98	

BALON GRAVELLY CLAY LOAM (taxadjunct) 1/
S65Ariz-13-6

Location: Western Yavapai County, Arizona. About 2/10 mile northeast of Poland Junction substation on south exposure of ridge. 4/10 mile west and 3/10 mile south of northeast corner of Sec. 5, T12N, R1E. EGE 1959, Photo #27-95. Date of Sampling: May 5, 1965.
Collectors: Flach, Nettleton, Jay, Meurisse, Freeman
Vegetation: Brushgrass. Oakbrush, squawbush, blue grama, black grama. Brush is dominant on north slopes and grass is dominant on south slopes. Climate: Mean annual precipitation 12-14". Mean annual temperature 57°F. Soil temperature at time of sampling 66°F. at 20". Parent Material: Alluvium from schist, phyllite and granite. Relief: Gently sloping, dissected old alluvial fans on a 8 percent convex slope. About midslope on a fan with a south exposure. Elevation: 4800 feet. Drainage: Medium run-off, moderately slow to slowly permeable and well drained.
Remarks: This soil is formed in old alluvium from schist, phyllite and granite under a chaparral or

[redacted]

Truog field kit was used to determine pH. Paired sample is S65 Ariz-13-7.
Classification: Typic Haplargid, fine-loamy, mixed, mesic.

HORIZON	DESCRIPTION
	Gravel pavement on 75 percent of surface, 10 percent cobbles on surface.
A1	0 to 3 inches, dark grayish brown (10YR 4/2) gravelly clay loam, very dark grayish brown
RSL No.	(10YR 3/2) when moist; moderate medium granular structure; slightly hard, friable, nonsticky
65193	and slightly plastic; few fine roots; many fine interstitial pores; A1 has 30-40 percent gravels by volume; noneffervescent; medium acid (pH 6.0); abrupt smooth boundary.
B1t	3 to 7 inches, dark grayish brown (10YR 4/2) heavy clay loam, dark brown (7.5YR 3/2) when
RSL No.	moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky
65194	and plastic; plentiful fine and medium roots; common fine tubular and many fine interstitial pores; few thin clay films on ped faces and in pores; 10 percent fine and medium weathered pebbles which are easily broken in hands; noneffervescent; neutral (pH 7.0); clear smooth boundary.
B21t *	7 to 15 inches, brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) when moist; moderate medium
RSL No.	subangular and angular blocky structure; very hard, friable, sticky and plastic; abundant fine,
65195	medium and coarse roots; common fine tubular and many fine interstitial pores; common thin clay films on ped faces and in pores; 10 percent fine and medium weathered pebbles that are easily broken in hands; noneffervescent; neutral (pH 7.0); clear wavy boundary.
B22t	15 to 23 inches, brownish yellow (10YR 6/6), yellowish brown (10YR 5/4) and white (10YR 8/1)
RSL No.	gravelly heavy clay loam or clay; dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/6)
65196	and white (10YR 8/2) when moist; weak medium subangular and angular blocky structure; very hard, friable, sticky and plastic; plentiful fine, medium and coarse roots; common fine tubular and many fine interstitial pores; few thin clay films on ped faces and in pores; 20 to 30 percent weathered pebbles which are easily broken in hands; noneffervescent; mildly alkaline (pH 7.5); clear wavy boundary.
B3t	23 to 36 inches, light yellowish brown (10YR 6/4), pale brown (10YR 6/3) and white (10YR 8/2)
RSL No.	gravelly clay loam, yellowish brown (10YR 5/4), brownish yellow (10YR 6/6) and white (10YR 8/2)
65197	when moist; massive structure; very hard, friable, sticky and plastic; plentiful fine, medium and coarse roots; few fine and medium tubular and many fine interstitial pores; few thin oriented clay as bridges; 30 to 40 percent weathered pebbles which are easy to break in hand; noneffervescent; neutral (pH 7.0); clear wavy boundary.
C1	36 to 54 inches, light yellowish brown (10YR 6/4), brownish yellow (10YR 6/6) and dark yellow-
RSL No.	ish brown (10YR 4/4) gravelly sandy clay loam or gravelly clay loam, dark yellowish brown
65198	(10YR 4/4), yellowish brown (10YR 5/6), brownish yellow (10YR 6/6), and dark brown (10YR 3/3) when moist; massive; hard, friable, slightly sticky and plastic; plentiful fine and medium roots; few fine tubular and many fine interstitial pores; very few thin oriented clay bridges; 30-40

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Haplargid, fine-loamy, mixed, mesic

SOIL Balon gravelly clay loam (taxadjunct) SOIL Nos. S65Ariz-13-7 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65200 - 65206

		1R1h	Size class and particle diameter (mm) 3A1

BALON GRAVELLY CLAY LOAM (taxadjunct) 1/
S65Ariz-13-7

Location: Western Yavapai County, Arizona. 1 mile south of Dewey, Arizona on State Highway #69 to cemetery and 1 mile northwest of cemetery on ridge near mine pits. 5/10 mile south and 4/10 mile west of northeast corner of Sec. 10, T13N, R1E. Photo #267, AMS Project 134, Lot FA.
Date of Sampling: May 5, 1965.
Collectors: Flach, Alexander, Nettleton, Jay, Freeman, Meurisse
Vegetation: Grass-brush. Sideoats grama, blue grama, three-awn, oakbrush, squawbush. Climate: Mean annual precipitation 13-14". Mean annual temperature 55°F. Soil temperature at time of sampling 63°F. at 20 inches and 64°F. at 60 inches. Parent Material: Alluvium from schist, phyllite and granite. Relief: Strongly sloping, dissected old alluvial fans on a 10 percent convex slope. About 50 feet from the crest of the ridge top on a south exposure. Elevation: 4800 feet. Drainage: Medium runoff, moderately slow to slowly permeable and well drained.
Remarks: This soil is in old alluvium from schist, phyllite and granite under a chaparral or grass vegetation. It is on gently sloping to moderately steep dissected old alluvial fans. Hellige-Truog field kit was used to determine pH. Paired sample is S65 Ariz-13-6.
Classification: Typic Haplargid, fine-loamy, mixed, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 65200	0 to 2 inches, brown (10YR 5/3) gravelly clay loam, dark brown (10YR 3/3) when moist; moderate to strong very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful fine roots; many fine interstitial pores; 30 percent gravel; with surface 30 percent covered by gravel and 10 percent by cobble; noneffervescent; slightly acid (pH 6.5); abrupt smooth boundary.
B1t RSL No. 65201	2 to 7 inches, brown (7.5YR 5/4) gravelly clay, dark brown (7.5YR 3/4) when moist; moderate fine, medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; abundant fine and medium roots; many fine interstitial and few fine tubular pores; few thin clay film on ped faces and in pores; 30 percent gravel; noneffervescent; neutral (pH 7.0); clear smooth boundary.
B21t* RSL No. 65202	7 to 17 inches, strong brown (7.5YR 5/6) gravelly sandy clay, brown (7.5YR 4/4) when moist; moderate medium and coarse subangular blocky structure; very hard, friable, sticky and plastic; abundant fine and medium roots; common fine interstitial and fine tubular pores; common fine clay film on ped faces and in bridges; 20 percent gravel; noneffervescent; neutral (pH 7.0); clear smooth boundary.
B22t RSL No. 65203	17 to 25 inches, strong brown (7.5YR 5/6) gravelly sandy clay loam, brown (7.5YR 4/4) when moist; weak fine and medium angular blocky structure; hard, friable, slightly sticky and plastic; plentiful very fine and fine roots; common thin clay film on ped faces and in bridges; noneffervescent; neutral (pH 7.0); clear smooth boundary.
B3t RSL No. 65204	25 to 40 inches, pink (7.5YR 7/4) gravelly sandy loam, strong brown (7.5YR 5/6) when moist; massive or rock controlled structure; hard, friable, slightly sticky and slightly plastic; plentiful fine, medium and large roots; many fine interstitial pores; very few, thin, oriented clay bridges; 45 percent gravel; noneffervescent; neutral (pH 7.0); gradual smooth boundary.
C1 RSL No. 65205	40 to 53 inches, reddish yellow (7.5YR 7/6) gravelly sandy loam, strong brown (7.5YR 5/6) when moist; massive or rock controlled structure; hard, friable, slightly sticky and slightly plastic; few large roots; many fine interstitial and few fine tubular pores; very few oriented clay as bridges; 45 percent gravel; noneffervescent; mildly alkaline (pH 7.5); gradual smooth boundary.
C2* RSL No. 65206	53 to 80 inches plus, light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 4/4) when moist; massive rock controlled structure; hard, firm, slightly sticky and slightly plastic; many fine interstitial and fine tubular pores; 45 percent gravel; noneffervescent to very slightly effervescent; moderately alkaline (pH 8.0).

* Sampled for BPR.

1/ The Balon series is in a fine-loamy, mixed, mesic family of Ustollic Haplargids. This pedon lacks sufficient organic carbon to meet ustollic requirements.

SOIL SURVEY LABORATORY — Riverside, California

SOIL TYPE Clovis sandy clay loam (taxadjunct) **LOCATION** Navajo County, Arizona

SOIL FAMILY: Typic Haplargid, fine-loamy, mixed, mesic

SOIL NOS. 56-Ariz-9-25 **LAB. NOS.** 56150-56157

DEPTH INCHES	HORIZON	PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 1B1b							3A1		2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 1/	
0- 1	A11	3.7	7.6	9.2	35.0	16.7	17.4	10.4	50.2	7.0	17	lfs1
1- 3	A12	6.3	9.6	9.0	29.4	15.0	21.1	9.6	45.2	10.5	16	fs1
3- 6	A13	4.5	7.1	8.1	29.8	13.7	23.1	13.7	44.3	12.3	15	fs1
6-10	B21t	3.3	6.6	8.4	29.3	12.0	13.6	26.8	38.0	6.7	13	scl
10-23	B22t	4.6	8.2	9.0	25.2	12.7	11.7	28.6	36.7	3.6	21	scl
23-31	B31ca	4.3	8.3	10.4	25.3	12.3	14.7	24.7	35.8	6.4	14	scl
31-54	B32ca	1.9	7.0	12.6	25.9	8.8	20.2	23.6	32.2	11.1	9	scl

CLOVIS SANDY CLAY LOAM * (taxadjunct) 1/
56Ariz-9-25-1 through 8

Location: Navajo County, Arizona. North of County road about 100 feet and west of the northwest corner of Taylor Cemetery in the SW¼, NE¼ NW¼ of Sec. 2, T. 12 N., R. 21 E. Date of Sampling: May 14, 1956.
Collectors: M. S. James, W. G. Harper, Gerald Kester, R. E. Nelson and George Wendt.
Vegetation: Blue grama, ring muhlenbergia, sand dropseed and snakeweed. Climate: Estimated annual precipitation about 12 inches. Nearest weather station (Snowflake): Mean annual temperature 51.6° F.; January average 31.6° F.; July average 72.3° F.; mean annual precipitation 12.25 inches. Parent Material: Alluvium from mixed rocks probably part from tertiary alluvial deposits and part from the Millet*, a tentative soil series. Relief: Very slightly undulating valley plain or terrace that has been somewhat dissected. Slope between 1½ and 2 percent to the northeast. Elevation: 5,640 feet. Drainage: Well drained. Moderate runoff. Moderately slow permeability.
Classification: Typic Haplargid, fine-loamy, mixed, mesic.
Remarks: Very slight wind and water erosion. Profile slightly moist. A few fine rounded pebbles ranging up to 1 inch in diameter have been concentrated on the surface, and occasional pebbles occur throughout the entire profile.

HORIZON	DESCRIPTION
A11	0-1" -- Reddish brown (5YR 5/3) dry, (3.5/3) moist, sandy loam mulch; moderate very fine
RSL No.	granular; soft when dry, loose when moist, slightly sticky when wet; very few or no
56150	plant roots; moderately rapid permeability; noncalcareous; pH 7.5 or 7.7; abrupt, smooth lower boundary.
A12	1-3" -- Similar in color and texture to the surface horizon; moderate medium to fine
RSL No.	platy; slightly hard when dry, very friable when moist; slightly sticky when wet;
56151	plant roots common; moderately rapid permeability; noncalcareous; pH 7.6; abrupt, wavy lower boundary.
A13	3-6" -- Similar in color to the surface horizon; very weak, very coarse platy; slightly
RSL No.	hard when dry, very friable when moist, slightly sticky when wet; plant roots common;
56152	moderately permeable; noncalcareous; pH 7.6; clear, smooth lower boundary.
B21t	6-10" -- Reddish brown (5YR 4/3) dry, (3.5/3) moist; sandy clay loam with common clay
RSL No.	films on all ped faces; weak coarse prisms that break to moderate coarse to medium
56153	subangular blocky; very hard when dry, firm when moist, sticky and plastic when wet; plant roots common; moderately slow permeability; calcareous; pH 8; abrupt, wavy lower boundary.
B22t	10-23" -- Reddish brown (2.5YR 4/4) dry, (3.5/4) moist, fine-textured sandy clay loam
56154	faces; strong medium prisms that break to moderate to coarse to medium subangular blocky; very hard when dry, firm when moist, sticky and plastic when wet; common plant roots; moderately slow permeability; noncalcareous; pH 8; clear, smooth lower boundary.
B31ca	23-31" -- Reddish brown (5YR 5/3) dry, (4/3) moist, with a few fine faint white lime
RSL No.	mottlings; heavy sandy clay loam; moderate medium prisms that break to moderate coarse
56155	and medium subangular blocky; common clay films on vertical and horizontal ped faces; hard when dry, friable when moist, sticky and plastic when wet; few plant roots; moderately slow permeability; slightly calcareous; pH 8.3 clear, wavy lower boundary.
B32ca	31-54" -- Light brown (7.5YR 6/3) dry, brown (5/3) moist, sandy clay loam with many
RSL No.	medium, distinct, white lime mottlings and nodules which are (2.5YR 8/2) dry; moderate
56156	medium subangular blocky; very hard when dry, friable when moist, sticky when wet;

SOIL SURVEY LABORATORY Riverside, California

SOIL TYPE Clovis sandy loam (taxadjunct) LOCATION Navajo County, Arizona

SOIL FAMILY: Typic Haplargid, fine-loamy, mixed, mesic

SOIL NOS. 56-Ariz-9-26 LAB. NOS. 56158-56165

[redacted]

CLOVIS SANDY LOAM (taxadjunct)* 1/
56Ariz-9-26-1 through 8

Location: Navajo County, Arizona in the east part of the town of Taylor, center of NW ¼, Sec. 1, T 12 N, R 21 E. Date of Sampling: May 16, 1956.
Collectors: J. D. Freeman, M. S. James and R. E. Nelson.
Vegetation: Blue grama, ring muhlenbergia, sand dropseed and snakeweed. Climate: About 13 inches precipitation, part in summer, part in winter. Parent Material: Alluvium from many sources of rocks. Relief: Valley plain or terrace; smooth slope, 0 to 1 percent to the north. Elevation: 5,600 feet. Drainage: Well drained, moderately rapid runoff. Moderately rapid permeability.
Remarks: Slight wind erosion. Profile moist to 30 inches. Dry below.
Classification: Typic Haplargid, fine-loamy, mixed, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 56158	0-1" -- Reddish brown (5YR 5/3) dry, (4/3) moist, sandy loam; moderate very fine granular; soft when dry, loose when moist; slightly sticky when wet; many plant roots; moderately rapid permeability; slightly calcareous; pH 8.2; abrupt, smooth lower boundary.
A12 RSL No. 56159	1-3" -- Reddish brown (5YR 5/3) dry, (3.5/3) moist, sandy loam; moderate very fine granular; slightly hard when dry, very friable when moist, slightly sticky when wet; many plant roots; moderately rapid permeability; noncalcareous; pH 7.8; abrupt, wavy lower boundary.
A13 RSL No. 56160	3-5" -- Similar in color to the horizon above; sandy loam; massive or very weak very coarse platy; slightly hard when dry, very friable when moist, slightly sticky when wet; plant roots common; moderately rapid permeability; clear, smooth lower boundary.
B1t RSL No. 56161	5-9" -- Reddish brown (5YR 4/3) dry, (3.5/3) moist; sandy loam; weak coarse prisms that break to weak medium subangular blocky; thin clay films on all ped surfaces; hard when dry, friable when moist, plastic and sticky when wet; plant roots common; moderately rapid permeability; noncalcareous; pH 7.8; clear, wavy lower boundary.
B2t RSL No. 56162	9-18" -- Reddish brown (5YR 4/3) dry, (3/3) moist; sandy clay loam; weak very coarse prisms that break to weak medium subangular blocky; thin clay films on all ped faces; very hard when dry, firm when moist; sticky and plastic when wet; plant roots common; moderately rapid permeability; noncalcareous; pH 7.8; clear, wavy lower boundary.
B3ca RSL No. 56163	18-28" -- Light reddish brown (5YR 6/3) dry, reddish brown (5/3) moist; heavy-textured loam; weak fine to medium angular blocky; thin patchy clay films; hard when dry, friable when moist; slightly sticky when wet; few plant roots; moderately rapid permeability; calcareous; pH 8.6; gradual, wavy lower boundary.
C1ca RSL No. 56164	28-53" -- Reddish brown (5YR 4/3) dry, (4/4) moist; sandy loam with pink (5YR 7/3) calcium carbonate coatings on ped surfaces and in cracks and seams; moderate coarse platy; hard when dry, friable when moist, slightly sticky when wet; few plant roots; moderately rapid permeability; strongly calcareous; pH 8.4; gradual, wavy lower boundary.
IIC2 RSL No. 56165	53-68" -- Reddish brown (5YR 5/3) dry, (4/3) moist, with slight mottling of yellow; fine sandy loam and sandy strata with occasional pebbles; weak fine granular or single grain structure; soft when dry, loose when moist, slightly sticky when wet; few plant roots; rapid permeability; slightly calcareous; pH 8.2.

*Similar profiles have been correlated as Clovis Sandy Loam in adjacent Central Apache County Area, 1968.

1/ The Clovis series is in a fine-loamy, mixed, mesic family of Ustollic Haplargids. This pedon has too little organic matter in the surface 15 inches.

U. S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Haplargid, fine-loamy, mixed, mesic

SOIL *Gaddes gravelly sandy loam (taxadjunct) SOIL Nos. S65Ariz-13-16 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65231 - 65237

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int III (0.02–0.002)	3A1 Int. II (0.2–0.02)	(2–0.1)	3A1a Non-carbonate clay	* Coarse fragments 1A2a: ≥ 2	2 - 19	19 - 76
		Pct of < 2 mm												Pct	Pct	Pct. of < 76mm	
0-2	A1	66.7	24.8	8.5	10.4	11.8	9.5	21.1	13.9	15.1	9.7	40.8	52.8	8	31	31	0
2-5	B21t	50.4	22.9	26.7	10.9	9.7	7.1	14.4	8.3	13.2	9.7	29.5	42.1	27	21	21	0
5-11	B22t	45.2	23.0	31.8	13.2	9.6	5.3	10.8	6.3	13.0	10.0	24.8	38.9	32	23	23	0
11-24	B23t	43.4	21.8	34.8	15.3	9.6	4.5	8.9	5.1	11.8	10.0	21.6	38.3	35	50	50	0
24-36	B3t-C1	63.8	19.1	17.1	26.3	15.6	6.7	10.9	4.3	10.6	8.5	19.9	59.5	17	47	47	0
36-51+	C2	80.7	13.6	5.7	25.3	19.0	10.8	18.5	7.1	7.1	6.5	22.9	73.6	6	23	23	0

GADDES GRAVELLY SANDY LOAM (taxadjunct) 1/
S65Ariz-13-16

Location: Western Yavapai County, Arizona. About 5 miles southeast of Wagoner on the Crown King

CONSECUTIVE PEDON NUMBER C 68140 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CONTINENTAL TAXADJUNCT SOIL NO. S68 ARIZ. 12- 1 SAMPLE NO. 81007-81016 E.PIMA-SANTA CRU AREA

SOIL FAMILY: TYPIC HAPLARGID FINE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	CU. 2~.2U	FINE LT .2U	CARBONATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS- PCT. OF WHOLE SOIL	I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM													20		PCT. OF LT 75		
81007	0- 3	A1	77.7	15.5	6.8	11.3	23.9	14.0	20.5	8.0	11.3	4.2	4.1	2.7		29.1	5A	--	2	3
81008	3- 8	B1	68.5	19.6	11.9	10.9	18.8	11.1	17.9	9.8	13.6	6.0	7.9	4.0		32.6	2A	--	1	1
81009	8- 30	B21T	58.1	15.8	26.1	19.1	15.5	6.9	10.6	6.0	9.5	6.3	12.3	13.8		20.9	16A	10	5	1
81010	30- 53	B22T	48.3	14.7	37.0	21.3	10.8	4.3	6.8	5.1	8.5	6.2	16.6	20.4		17.3	35A	24	9	2
81011	53- 76	B23TCA	35.6	12.9	51.5	12.8	9.9	3.7	5.5	3.7	7.1	5.8	26.9	24.6		13.8	27A	20	3	4
81012	76- 99	B24TCA	46.5	14.7	38.8	15.1	13.9	5.1	7.7	4.7	9.1	5.6				18.0	76*	52	19	2
81013	99-132	B3 CA	53.5	11.4	35.1	19.1	17.1	6.9	7.2	3.2	5.8	5.6				12.4	86*	44	33	5
81014	132-193	C 1CA	71.5	13.4	15.1	27.5	22.8	8.7	8.7	3.8	6.2	7.2			3	14.2	72*	43	17	2
81015	193-218	C 2CA	63.8	18.2	18.0	17.6	17.3	9.5	13.1	6.3	8.7	9.5			2	21.7	75*	28	29	7
81016	0- 38		68.8	24.0	7.2	21.9	19.0	9.4	12.4	6.1	10.6	13.4				23.1	28A	--	21	7

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	DI-CIT AL 6G7A	EXT PYROP FE 6C5A	EXT PYROP AL 6G5A	ATTERBERG L L 4F1	I M I T PL 4F2	BULK DENSITY EST. 1/3 BAR 4A1F	DRY 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT	
81007	0- 3	0.47	0.043									1.50		0.97				3.2		
81008	3- 8	0.33	0.036							NP	NP		1.56	1.62	0.99		11.0	4.2	1.3	1.3
81009	8- 30	0.38										1.30			0.92			8.3		
81010	30- 53	0.45		TR						39	22		1.27	1.32	0.79		20.0	11.9	1.3	1.0
81011	53- 76	0.48		2								1.40			0.83			17.8		
81012	76- 99	0.28		2								1.40			0.37			15.5		
81013	99-132	0.30		3								1.40			0.24			14.5		
81014	132-193			20									1.39	1.47	0.43		17.7	7.9	1.9	0.8
81015	193-218			14						34	21		1.48	1.56	0.37		19.2	9.1	1.8	0.6
81016	0- 38	0.36										1.35			0.84			6.8		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6D2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACIDITY 6H2A	KCL EXT. AL 6G1E	CEC SUM 5A3A	CEC NH4-OAC 5A6A	BASE SATURATION SUM+ ACIDITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CACL2 8C1E
		MEQ/100G									PERCENT					
81007	0- 3	5.1	0.9	TR	0.6	6.6			6.6	6.0	100+		100+		6.9	6.4
81008	3- 8	9.1	2.1	0.1	0.5	11.8			11.8	7.9	100+		100+		7.3	6.5
81009	8- 30	14.6	3.3	0.1	0.5	18.5			18.5	16.8	100+		100+		7.5	6.9
81010	30- 53	19.7	5.3	0.2	0.6	25.8			25.8	21.6	100+		100+		7.7	7.1
81011	53- 76	36.7	9.4	0.4	1.0	47.5			47.5	29.0	100+		100+		7.9	7.5
81012	76- 99	39.8	11.1	0.8	1.4	53.1			53.1	28.9	100+		100+		8.0	7.6
81013	99-132	40.1	10.7	0.7	1.0	52.5			52.5	21.9	100+		100+		7.9	7.6
81014	132-193	27.9	4.4	1.0	0.6	33.9			33.9	9.9	100+		100+		8.5	7.7
81015	193-218	30.4	5.7	1.7	0.7	38.5			38.5	13.9	100+		100+		8.4	7.7
81016	0- 38															

CLAY MINERALOGY

SAMPLE DEPTH LESS THAN 0.002 MM I T 0.0002 MM MINERAL RELATIVE

[redacted]

NO. CM. X-RAY DTA X-RAY CODE AMOUNT

CONTINENTAL SANDY LOAM (taxadjunct) 1/
S68 Ariz-12-1-1 through 9

Location: Santa Cruz County Area, Arizona. 1.2 miles west-southwest of Amado School. 100 feet south of intersection of two ranch trails. Approximately 2900 feet north, 2700 feet west of southeast corner Section 11, T20S, R12E. Photo AMS-581. Date of Sampling: October 9, 1968.
Description by: Richardson and Havens. Collectors: Nettleton and Brasher.
Classification: Typic Haplargid, fine-loamy, mixed, thermic.
Vegetation: Desert shrub--grass: mesquite, burroweed, three-awn, Rothrock grama, fluffgrass, plains bristlegrass. Climate: Mean annual temperature approximately 63.8°F. Mean annual precipitation 10-12 inches. Parent Material: Old alluvium from granite, andesite and rhyolite tuffs. Topography: Gently sloping fan. 2 percent slope, east aspect. Elevation: 3,200 feet. Drainage: Well drained. Moderate runoff. Soil Moisture: Dry.
Remarks: This site is paired with S68 Ariz-12-2-1 through 8.

HORIZON	DESCRIPTION
	(0-3 cm)
A1	0 to 1 inch, brown (7.5YR 5/4) sandy loam, reddish brown (5YR 4/3) moist; thin platy
RSL	breaking to weak fine granular structure; soft, very friable, nonsticky and nonplastic;
681007	common fine roots; many fine interstitial pores; 10 percent coarse fragments; noneffer-
	vescent; neutral, (pH 7.0); abrupt smooth boundary.
B1	1 to 3 inches, reddish brown (5YR 5/4) heavy sandy loam, dark reddish brown (5YR 3/4)
RSL	moist; weak medium subangular blocky structure; slightly hard, friable, slightly
681008	sticky and slightly plastic; many fine and very fine roots; few fine tubular pores; 10 per-
(3-8 cm)	cent gravel;noneffervescent; mildly alkaline (pH 7.5); clear wavy boundary.
B21t	3 to 12 inches, reddish brown (2.5YR 4/4) gravelly clay loam or sandy clay loam, dark
RSL	reddish brown (2.5YR 3/4) moist; weak medium and fine subangular blocky structure;
681009	hard, friable, sticky and plastic; common fine and very fine roots; common fine and
(8-30 cm)	very fine tubular and common fine exped pores; few thin clay films in pores and on
	ped faces; 20 percent fine and medium gravel; noneffervescent; moderately alkaline
	(pH 8.0); clear wavy boundary.
B22t	12 to 21 inches, reddish brown (2.5YR 4/4) gravelly clay, dark red (2.5YR 3/6) moist;
RSL	moderate fine and medium subangular blocky structure; hard, friable, sticky and
681010	plastic; common fine and very fine roots; common fine and very fine tubular and common
(30-53 cm)	fine exped pores; common thin clay films on ped faces and in pores; 35 percent fine and
	medium gravel; slightly effervescent; moderately alkaline (pH 8.2); clear wavy
	boundary.
B23tca	21 to 30 inches, reddish brown (2.5YR 4/4) and red (2.5YR 4/6) heavy gravelly clay
RSL	loam with white (5YR 8/1) and pink (5YR 7/3) mottles, reddish brown (5YR 4/4) and
681011	yellowish red (5YR 4/6) moist; mottles are light reddish brown (5YR 6/4) moist;
(53-76	massive breaking to weak medium subangular blocky structure; hard, friable, sticky and
cm)	plastic; common fine and very fine roots; common fine and few medium tubular pores;
	few thin clay films on ped faces and in pores; 40 percent gravel; strongly effervescent in
	mottles; moderately alkaline (pH 8.2); clear wavy boundary.
B24tca	30 to 39 inches, reddish brown (2.5YR 4/4) and red (2.5YR 4/6) gravelly heavy clay
RSL	loam, with common medium distinct white (5YR 8/1) and pink (5YR 7/3) mottles and lime
681012	segregations, reddish brown (2.5YR 4/4) and red (2.5YR 4/6) moist, with light reddish
(76-99 cm)	brown (5YR 6/4) mottles, moist; massive breaking to weak medium subangular blocky
	structure; hard, friable, sticky and plastic; common fine and very fine roots; common
	fine and few medium tubular pores; few thin clay films on ped faces and in pores; 40 percent
	gravel; strongly effervescent in mottles; moderately alkaline (pH 8.2); clear wavy
	boundary.
B3ca	39 to 52 inches, mottled reddish yellow (5YR 6/6) and pink (5YR 8/3) gravelly heavy
RSL	clay loam, yellowish red (5YR 4/6), pink (5YR 8/3) and light reddish brown (5YR 6/4)
681013	moist. Lime mottles are many medium and coarse and distinct;massive; hard, friable,
(99-	sticky and plastic; few fine roots; common fine and few medium tubular pores; few thin
132 cm)	clay films on ped faces and in pores; 45 percent fine, medium and coarse gravel; strongly
	effervescent in matrix, violently effervescent in mottles; moderately alkaline
	(pH 8.2); clear wavy boundary.
C1ca	52 to 78 inches, pink (5YR 7/3) and light reddish brown (5YR 6/3) very gravelly sandy
RSL	loam, light reddish brown (5YR 6/4) and reddish brown (5YR 5/4) moist; massive; very
681014	hard, friable, slightly sticky and nonplastic; few fine roots; common fine and very
(132 -	fine and few medium tubular pores; 55 percent gravel; violently effervescent; moderately
193 cm)	alkaline, (pH 8.2); clear wavy boundary.

CONSECUTIVE PEDON NUMBER C 68141 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CONTINENTAL TAXADJUNCT SOIL NO. S68 ARIZ. 12- 2 SAMPLE NO. 81017-81025 E.PIMA-SANTA CRU ARE

SOIL FAMILY: TYPIC HAPLARGID FINE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATOR

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION <2 MM SAND 2-.05	SILT .05-.002	CLAY LT .002	VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	COARSE FRAGMENTS CO. 2-.2U	FINE LT .2U	CARBO NATE 3A1A	II .2-.02 WHOLE SOIL	PCT. OF 75-20	I 20-5 PCT. OF	II 5-2 LT 75
			PERCENT OF LESS THAN 2MM																
81017	0- 8	A11	74.6	17.5	7.9	23.9	18.3	9.7	14.5	8.2	11.7	5.8			27.6	29A	--	17	12
81018	8- 15	A12	68.2	19.5	12.3	17.1	18.5	10.6	14.3	7.7	11.9	7.6			27.1	42A	16	15	11
81019	15- 25	B1	66.3	12.2	21.5	36.1	15.6	5.4	5.9	3.3	6.9	5.3			13.2	40A	13	17	10
81020	25- 48	B21T	46.9	8.8	44.3	18.4	15.3	5.3	5.5	2.4	4.9	3.9			9.7	6A	3	2	1
81021	48- 79	B22T	68.0	5.3	26.7	34.2	22.2	6.4	4.0	1.2	3.4	1.9			6.1	22A	--	10	12
81022	79- 97	B31CA	62.6	13.1	24.3	28.8	19.7	6.2	5.9	2.0	5.3	7.8		2	10.0	73A	37	14	22
81023	97-132	B32CA	64.1	11.6	24.3	33.4	17.6	5.9	5.1	2.1	4.6	7.0		2	9.1	58A	--	28	30
81024	132-183	B33CA	68.6	12.8	18.6	26.5	20.7	8.3	9.5	3.6	6.7	6.1			14.7	19A	5	3	11
81025	0- 38		67.5	15.7	16.8	18.7	13.6	11.0	17.4	6.8	7.0	8.7		TR	22.3	36A	--	26	10

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR-BON 6A1A	NITRO-GEN 6B1A	CARBONATE AS CACO3 LT 2 6F1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L L 4F1	P L 4F2	P I 4A1F	BULK DENSITY 1/3 BAR 4A1E	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
81017	0- 8	0.39	0.035			0.9	TR			NP	NP		1.49	1.51	0.82	4.5	3.6	0.4	0.4
81018	8- 15	0.43	0.041			0.8	TR						1.39	1.41	0.72	14.2	4.7	0.5	0.3
81019	15- 25	0.39				1.1	0.1			29	17		1.35	1.39	0.75	14.3	7.6	1.0	0.7
81020	25- 48	0.57				1.3	0.2			47	26		1.33	1.51	0.97	29.3	16.5	4.3	4.2
81021	48- 79	0.16		TR		0.8	TR						1.41	1.47	0.87	21.6	9.1	1.4	1.2
81022	79- 97	0.14		12		0.4	0.1						1.16	1.24	0.46	31.8	9.9	2.2	1.0
81023	97-132			13		0.4	TR					1.20			0.62		11.6		
81024	132-183			4		0.5	TR						1.31	1.37	0.89	22.3	8.1	1.5	1.3
81025	0- 38	0.47										1.40			0.77		6.8		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI-DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	C NH4-OAC 5A6A	BASE SATURATION SUM+ ACI-DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
81017	0- 8	4.8	0.9	TR	0.4	6.1			6.1	6.0	100+		100+		6.8	6.3
81018	8- 15	4.4	1.6	TR	0.4	6.4			6.4	7.2	100+		90		6.6	5.9
81019	15- 25	6.6	2.5	0.1	0.6	9.8			9.8	11.4	100+		86		6.8	6.1
81020	25- 48	14.6	6.2	0.2	1.0	22.0			22.0	23.3	100+		94		7.0	6.4
81021	48- 79	22.0	7.1	0.3	0.8	30.2			30.2	20.0	100+		100+		8.0	7.0
81022	79- 97	26.7	5.8	0.4	0.6	33.5			33.5	14.2	100+		100+		8.3	7.6
81023	97-132	27.6	6.1	0.6	0.6	34.9			34.9	13.8	100+		100+		8.4	7.7
81024	132-183	27.7	6.6	0.7	0.6	35.6			35.6	16.2	100+		100+		8.5	7.7
81025	0- 38															

CLAY MINERALOGY

SAMPLE	DEPTH	LESS THAN 0.002 MM	I.T. 0.0002 MM MINERAL	RELATIVE

NO	CM.	X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	X RAY IV 7A2E	DTA 7A3 -PERCENT-	DTA 7A3	X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E
81017	0- 8	MT 2	MI 2	KK 2						
81018	8- 15									
81019	15- 25	MI 2	KK 2	MT 1						
81020	25- 48									
81021	48- 79	MT 2	MI 2	KK 2						
81022	79- 97									
81023	97-132									

CODE AMOUNT

MT MONTMORT 1 TRACE
MI MICA 2 SMALL
KK KAOLINIT 3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

CONTINENTAL GRAVELLY SANDY LOAM (taxadjunct) 1/
S68 Ariz-12-2-1 through 8

Location: Santa Cruz County, Arizona. 2.3 miles west-southwest of Amado School. 0.9 mile south-southeast of a windmill and 270 feet west of ranch road. Section 14, T20S, R12E. Photo AMS-590. Date of Sampling: October 9, 1968.
Description by: Richardson and Clemmons. Collectors: Nettleton and Brasher.
Classification: Typic Haplargid, fine-loamy, mixed, thermic.
Vegetation: Desert shrub--grass: mesquite, burroweed, catclaw; three-awn, Rothrock grama, purple grama and fluffgrass. Climate: Mean annual temperature approximately 63.8°F. Mean annual precipitation 11-12 inches. Parent Material: Old alluvium from granite, andesite, rhyolite and tuffs.
Topography: Gently sloping old fan. 2 to 3 percent slope. East-southeast aspect. Elevation: 3300 feet. Drainage: Well drained. Medium runoff. Soil Moisture: Dry.
Remarks: This site is paired with S68 Ariz-12-1-1 through 8.

HORIZON	DESCRIPTION
	(0-8 cm)
A11	0 to 3 inches, reddish brown (5YR 5/4) gravelly sandy loam, dark reddish brown (5YR
RSL	3/4) moist; weak fine and medium platy structure; slightly hard, very friable, non-
681017	sticky and nonplastic; common fine and very fine roots; many fine interstitial pores;
	30 percent fine gravel; noneffervescent; mildly alkaline (pH 7.5); abrupt smooth boundary.
A12	3 to 6 inches, reddish brown (5YR 4/4) gravelly sandy loam, dark reddish brown (5YR
RSL	3/4) moist; weak fine and medium granular structure; slightly hard, very friable,
681018	slightly sticky and nonplastic; common fine and very fine roots; few fine, very fine
(8-15 cm)	and medium tubular pores; 25 percent fine gravel; noneffervescent; slightly acid
	(pH 6.5); clear smooth boundary.
B1	6 to 10 inches, reddish brown (5YR 4/4) gravelly sandy clay loam, dark reddish brown
RSL	(5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard,
681019	friable, slightly sticky and slightly plastic; common fine and very fine roots;
[illegible]	[illegible]

[redacted]

	30 percent fine gravel; noneffervescent; neutral (pH 7.0); clear wavy boundary.
B21t	10 to 19 inches, reddish brown (2.5YR 4/4) gravelly clay, dark red (2.5YR 3/6) moist;
RSL	weak medium and coarse prismatic breaking to moderate medium and coarse subangular
681020	blocky structure; very hard, friable, sticky and plastic; common fine and very fine

[redacted]

(25-48 cm)	and few medium roots; common fine exped pores; common pressure faces; 20 percent fine gravel; noneffervescent; mildly alkaline (pH 7.8); clear wavy boundary.
B22t	19 to 31 inches, red (2.5YR 4/6) gravelly clay or very gravelly clay, red (2.5YR 4/6)
RSL	moist; weak medium subangular blocky structure; very hard, friable, sticky and very
681021	plastic; few fine and very fine roots; few fine and very fine tubular pores; common
(48-79 cm)	thin clay films in pores; 50-60 percent fine and medium gravel; noneffervescent; moderately alkaline (pH 8.0); abrupt wavy boundary.
IIB31ca	31 to 38 inches, reddish brown (2.5YR 5/4) very gravelly clay, reddish brown (2.5YR
RSL	4/4) moist, with pinkish gray (5YR 7/2) lime coatings, light reddish brown (5YR 6/4)
681022	moist; massive, hard, friable, sticky and plastic; few fine and very fine roots; common
(79-97 cm)	fine and few medium tubular pores; few thin clay films in pores; 55 percent gravel;5 percent cobbles; violently effervescent; moderately alkaline (pH 8.0); clear wavy boundary.
IIB32ca	38 to 52 inches, pink (5YR 7/3) very gravelly sandy clay loam, reddish brown (5YR
RSL	5/4) moist, with common medium distinct reddish brown (5YR 5/4) lime mottles, red-

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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

SOIL Karro loam variant SOIL Nos. S64Ariz-2-22 LOCATION Cochise County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 64619 - 64623

Depth in.	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand (Pct. of < 2 mm) Very coarse (2–1)	Sand Coarse (1–0.5)	Sand Medium (0.5–0.25)	Sand Fine (0.25–0.1)	Sand Very fine (0.1–0.05)	Silt 0.05–0.02	Silt Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1 Non carbonate clay		Coarse fragments > 2 Pct	1A2a 2 – 19 (Pct. of < 76 mm)	19–76 (Pct. of < 76 mm)
0-9	Ap1	40.2	38.9	20.9	1.2	4.6	6.7	16.8	10.9	14.9	24.0	34.9	29.3	19		1	1	
9-14	Ap2	36.4	39.6	24.0	0.8	3.9	5.9	15.4	10.4	14.9	24.7	33.8	26.0	21		1	1	
14-19	B2tca	23.6	32.3	44.1	0.6	2.4	3.8	9.6	7.2	11.5	20.8	23.9	16.4	35			tr.	
19-25	B3tca	34.7	28.9	36.4	4.5	7.0	5.2	10.7	7.3	9.1	19.8	22.3	27.4	29			tr.	
25-33+	C1ca	39.6	26.2	34.2	8.7	8.8	5.8	10.4	5.9	8.7	17.5	20.0	33.7	27			tr.	

KARRO LOAM, ARGILLIC VARIANT 1/
S64Ariz-2-22

Location: Cochise County, Arizona. 10 miles south and 4 miles east of Willcox via the Kansas Settlement Road. 250 feet south and 250 feet west of the northeast corner of Sec. 26, T. 15 S, R. 25 E. Date of Sampling: October 21, 1964.
Description: James Jay and M. L. Richardson. Collectors: K. W. Flach, B. Brasher, James Jay, R. K. Preece, and M. L. Richardson.
Classification: Typic Haplargid, fine-loamy, mixed, thermic.
Vegetation: Fallow cropland. Climate: Precipitation about 11 inches annual. Mean annual temperature is 58° F. at Willcox. Mean January temperature 41° F., mean July temperature 77° F. Soil temperature at time of sampling was: 20 inches 72° F., 48 inches 68° F., 84 inches 65° F. Parent Material: Mixed alluvium from rhyolite, ignimbrite, andesite, limestone and quartzite. Topography: Nearly level valley plain near Willcox playa. Slopes are smooth and very slightly convex with gradient of
Elevation: 4205 feet. Drainage: Well drained. Moderately permeable. Slow surface runoff. Soil Moisture: Moist - about 50 percent field capacity. Water table at 100 to 150 feet. Remarks: The argillic variant is intermixed with the normal type. Paired sample S64Ariz-2-21. Field determinations of pH by thymol blue in 1:5 dilution.

HORIZON	DESCRIPTION
Ap1 RSL No. 64619	0-9 inches (0-23 cm), pinkish gray (7.5YR 6/2) loam, brown to dark brown (7.5YR 4/2) when moist; moderate fine and very fine granular structure; slightly hard when dry, very friable when moist, slightly sticky and plastic when wet; many fine and medium roots; many fine interstitial pores; violently effervescent; pH 8.6; clear smooth boundary.
Ap2 RSL No. 64620	9-14 inches (23-36 cm), same color as Ap1; loam; massive, breaking to moderate fine and very fine granular structure; slightly hard when dry, very friable when moist, slightly sticky and plastic when wet; many fine and medium roots; many fine interstitial and a few fine tubular pores; violently effervescent; pH 8.6; clear smooth boundary.
B2tca RSL No. 64621	14-19 inches (36-48 cm), pinkish gray (7.5YR 6/2) with common medium faint mottles of pinkish gray (7.5YR 7/2) light clay, brown (7.5YR 5/4) and pinkish gray (7.5YR 6/2) when moist; moderate fine and medium prismatic breaking to moderate medium and coarse subangular blocky structure; slightly hard when dry, friable when moist, sticky and plastic when wet; common fine and medium roots; common fine and medium tubular and fine interstitial pores; continuous thin clay films on ped faces; violently effervescent; pH 8.6; clear wavy boundary.
B3tca RSL No. 64622	19-25 inches (48-63 cm), pinkish gray and light brown (7.5YR 6/2 & 6/4) with many fine to medium faint mottles of pinkish white (7.5YR 8/2) gravelly (concretions) heavy clay loam, brown (7.5YR 5/2 & 5/4) and light brown (7.5YR 6/2) when moist; massive, breaking to moderate fine and medium subangular blocky structure; very hard when dry, firm when moist, sticky and plastic when wet; few fine tubular pores; common thin clay films on ped faces, in pores, and as bridges; violently effervescent; approximately 20 percent fine and medium lime-silica(?) concretions that are extremely hard and very firm; pH 8.6; gradual wavy boundary.
C1ca RSL No. 64623	25-33 inches (63-84 cm), pink (7.5YR 7/4 & 8/4) clay loam, light brown (7.5YR 6/4) and pink (7.5YR 7/4) when moist; massive, breaking to moderate fine angular and subangular blocky structure; very hard when dry, firm when moist, slightly sticky and plastic when wet; no roots; few fine tubular pores; common fine and medium concretions that are extremely hard and extremely firm; violently effervescent; pH 8.6; gradual smooth boundary.

1/ The Karro series is in a coarse-loamy, carbonatic, thermic family of Ustollic Calciorthids. This pedon has an argillic horizon with more than 18 percent clay and less than 40 percent carbonate.

CONSECUTIVE PEDON NUMBER C 69202 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES MOHAVE SOIL NO. S69 ARIZ. 10- 1 SAMPLE NO. 91071-91078 WALNUT G.-TUCSON AREA

SOIL FAMILY: TYPIC HAPLARGID,FINE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	INT. COARSE FRAGMENTS II .2- .02 WHOLE SOIL	I PCT. OF 75- 20 PCT.	II 20-5 OF LT 75	III 5-2
			PERCENT OF LESS THAN 2MM																
91071	0- 8	A1	48.4	26.9	24.7	3.3	6.6	8.1	17.7	12.7	8.3	18.6				30.5	--A	--	--
91072	8- 15	B1 T	69.9	14.7	15.4	5.9	8.9	12.1	28.5	14.5	7.3	7.4				37.4	--A	--	--
91073	15- 28	B21T	51.3	16.4	32.3	6.5	8.6	8.1	17.4	10.7	8.2	8.2				28.1	--A	--	--
91074	28- 46	B22T	40.2	22.1	37.7	7.2	7.1	4.5	11.6	9.8	8.3	13.8				24.8	--A	--	--
91075	46- 61	B23TCA	36.7	33.6	29.7	10.9	6.1	3.7	8.1	7.9	11.5	22.1			1	24.2	--A	--	--
91076	61- 81	B24TCA	50.3	19.8	29.9	8.5	13.9	8.0	12.4	7.5	7.1	12.7			2	21.1	--A	--	--
91077	81-102	B3 CA	44.2	23.3	32.5	4.8	10.1	7.2	14.1	8.0	7.7	15.6			4	23.2	--A	--	--
91078	102-140+	C CA	51.1	18.9	30.0	8.3	15.5	7.9	11.8	7.6	7.2	11.7			17	21.3	--A	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-19 6E1B	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	P L 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	ORY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT-		-PERCENT-		PCT.	PCT.	NO.40	GRAMS PER CC				-PERCENT-			-PERCENT-				
91071	0- 8	0.84	0.095	1		0.7			1.45			1.00			9.5			7.7		7.3
91072	8- 15	0.18	0.026	TR		0.5			1.50			1.00			5.1			7.3		7.3
91073	15- 28	0.22		1		0.7			1.50			1.00			10.5			7.6		7.3
91074	28- 46			6		0.7			1.50			1.00			13.1			7.7		7.6
91075	46- 61			8		0.6			1.40			1.00			12.1			7.8		7.8
91076	61- 81			10		0.4			1.40			1.00			10.9			8.0		7.9
91077	81-102			15		0.3			1.45			1.00			13.6			8.3		8.1
91078	102-140+			46		0.1			1.45			1.00			13.5			8.5	9.8	8.3

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2A	MG 5B4A 6O2A	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA+ OAC 5A2A	NH4+ OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1A	MG 6O1A	NA 6P1A	K 6Q1A	CO3 6T1A	HCO3 6U1A	CL 6K1A	SO4 6M1A	B 6T1A	PH SAT. PASTE 8C1A
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
91071	0- 8			0.4	0.7	1.1		19.8												
91072	8- 15			0.5	1.2	1.7		9.7												
91073	15- 28			0.4	1.8	2.2		18.1												
91074	28- 46			0.4	1.9	2.3		20.6												
91075	46- 61			1.1	1.5	2.6		18.6												
91076	61- 81			1.9	1.3	3.2		15.4												
91077	81-102			3.6	1.1	4.7		18.8												
91078	102-140+			5.6	0.5	6.1		11.0	1.48	0.5	0.4	15.9	4.3		5.7	1.2	8.3			8.6

SAMPLE NO.	DEPTH CM.	WATER AT 1/3 BAR SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM-- -L.T. .0002 MM- X RAY DTA X RAY I 7A2C	II 7A2E	III 7A2E	IV 7A2E	DTA 7A3 PCT.	X RAY I 7A2E	II 7A2E	III 7A2E	MINERAL CODE	RELATIVE AMOUNT
91071	0- 6		0.4	2													1 TRACE
91072	8- 15		0.5	5				MI 3	MT 1	KK 1						MI MICA	2 SMALL
91073	15- 28		0.4	2				MI 3	MT 1							MT MONTMORT	3 MODERATE
91074	28- 46		0.4	2												KK KAOLINIT	4 ABUNDANT
91075	46- 61		1.1	6				MI 3									5 DOMINANT
91076	61- 81		1.9	12													6 INDETER.
91077	81-102		3.6	19													
91078	102-140+	71.6	4.5	41	24			MT 4	MI 2	KK 1							

SAMPLE PREPARATION CODES

MOHAVE FINE SANDY LOAM
S69Ariz-10-1

Location: Pima County, Arizona. Approximately 2,350 feet east of NW corner of Section 3, T. 15 S., R. 11 E. in road cut south side of road. About 16 miles west and 3 miles north of junction of I-10 and Ajo Road in Tucson. Date of sampling: September 18, 1969.
Description by: Y. H. Havens and D. M. Hendricks. Collectors: Y. H. Havens and D. M. Hendricks.
Classification: Typic Haplargid, fine-loamy, mixed, thermic.
Vegetation: Desert shrub -- grass: mesquite, burroweed and annual grasses. Climate: Mean annual temperature is approximately 68° F. Mean annual precipitation 10-11 inches. Parent material: Old mixed alluvium from mixed sources. Topography: Nearly level. Slope less than 1 percent. Elevation: 2,330 feet. Drainage: Well drained. Medium runoff. Soil moisture: Dry to 20 inches, moist below.

HORIZON	DESCRIPTION
A1 RSL No. 691071	0-8 cm (0-3 inches), brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak thick platy structure; slightly hard, friable, nonsticky, slightly plastic; common fine and very fine roots; few fine and very fine tubular pores; noneffervescent to slightly effervescent; mildly alkaline (pH 7.6); clear wavy boundary.
B1t RSL No. 691072	8-15 cm (3-6 inches), reddish brown (5YR 5/4) heavy sandy loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; common fine and very fine and few coarse roots; common very fine and fine vesicular and tubular pores; few fine gravel; noneffervescent to slightly effervescent in spots; moderately alkaline (pH 7.9); abrupt wavy boundary.
B21t RSL No. 691073	15-28 cm (6-11 inches), reddish brown (5YR 4/4) light clay loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky, plastic; common fine and medium roots; common fine tubular pores; common thin clay films on ped faces and in pores; few fine distinct pink (7.5YR 7/4) lime filaments, light brown (6/4) moist; slightly effervescent; moderately alkaline (pH 7.9); clear wavy boundary.
B22t RSL No. 691074	28-46 cm (11-18 inches), reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky, plastic; common fine and medium roots; common fine tubular and interstitial pores; common thin clay films on ped faces and in pores; common fine distinct pink (7.5YR 7/4) lime filaments and mottles, light brown (6/4) moist; slightly to strongly effervescent; moderately alkaline (pH 8.1); clear wavy boundary.
B23tca RSL No. 691075	46-61 cm (18-24 inches), reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky, plastic; few fine, medium and coarse roots; common fine tubular and interstitial pores; common thin clay films on ped faces; common to many fine to large distinct pink (7.5YR 7/4) lime filaments and soft segregations, light brown (7.5YR 6/4) moist; strongly effervescent; moderately alkaline (pH 8.1); gradual wavy boundary.
B24tca RSL No. 691076	61-81 cm (24-32 inches), brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky, plastic; few fine, medium and coarse roots; common very fine and fine tubular pores; few thin clay films on ped faces; many medium and large distinct pink (7.5YR 7/4) lime filaments and soft lime segregations, light brown (7.5YR 6/4) moist; common very fine manganese concretions; strongly effervescent; moderately alkaline (pH 8.1); clear wavy boundary.
B3ca RSL No. 691077	81-102 cm (32-40 inches), mottled brown (7.5YR 5/4) and pink (7.5YR 7/4) sandy clay loam, dark brown (7.5YR 4/4) and light brown (6/4) moist, mottles are many medium and large and distinct; weak medium and coarse subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few fine and very fine roots; few fine tubular pores; few thin clay films on ped faces; few fine manganese concretions and coatings; few fine gravel; violently effervescent; strongly alkaline (pH 8.5); clear wavy boundary.
IICca RSL No. 691078	102-140 cm (40-55 inches), white (N 8/) clay loam, light gray (10YR 7/2) moist; massive; very hard, friable, sticky, slightly plastic; common fine and very fine roots; few fine tubular pores; common root holes and tubular pores filled with 7.5YR soil material; violently effervescent; very strongly alkaline (pH 9.1).

CONSECUTIVE PEDON NUMBER C 67 62 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES VECONT SOIL NO. S67 ARIZ. 7-16 SAMPLE NO. 7 708-7 713 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC HAPLARGID,FINE,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	SILTS CO. 2-.2U	CLAYS FINE LT .2U	CLAYS CARBONATE 3A1A	1A2A INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL I 75-20	II 20-5 PCT. OF LT 75	III 5-2
			PERCENT OF LESS THAN 2MM																
7 708	0- 25	AP1	19.7	32.6	47.7	1.0	1.7	1.7	7.7	7.6	10.6	22.0				23.4	1	TR	1Z	N
7 709	25- 41	AP2	19.5	32.7	47.8	1.3	2.1	1.7	7.3	7.1	10.6	22.1				22.6	1	TR	1Z	N
7 710	41- 58	B21TCA	19.0	33.5	47.5	1.0	1.9	1.6	6.8	7.7	10.2	23.3				22.5	TR	TR	--	--
7 711	58- 79	B22TCA	19.4	32.1	48.5	1.1	2.1	1.8	7.0	7.4	9.5	22.6				21.6	TR	TR	--	--
7 712	79-117	B3TCA	22.0	30.9	47.1	1.1	2.5	2.2	8.6	7.6	10.5	20.4				23.8	TR	TR	--	--
7 713	117-165	C 1	23.3	29.3	47.4	1.1	2.4	2.1	9.1	8.6	11.9	17.4				26.4	TR	TR	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-19 6E1B	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	P L 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		PERCENT		PERCENT		PCT.	PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT				
7 708	0- 25	0.91	0.074	1		1.1				1.21	1.49	1.00		25.1	15.9	7.2	7.1		8.6	
7 709	25- 41	0.52	0.062	1						1.41	1.75	0.99		27.1	16.8	7.5	7.4		8.7	
7 710	41- 58	0.16		2		1.1				1.46	1.77	1.00		26.2	16.7	6.6	6.6		8.9	
7 711	58- 79	0.15		2						1.49	1.79	1.00		26.1	17.1	6.3	6.3		9.0	
7 712	79-117	0.10		3						1.44	1.75	1.00		27.5	17.9	6.7	6.7		9.2	
7 713	117-165	0.04		5		0.9				1.39	1.68	1.00		28.7	17.8	6.5	6.5		9.5	

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4C	MG 5B3A 6O4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT. PCT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A MMHO	WATER EXTRACT FROM SATURATED PASTE CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	8A1 SO4 6L1B	B 6T1A PPM	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML									
7 708	0- 25			1.7	3.1	4.8			28.9	2.14	7.6	2.7	8.2	1.4		3.8	9.2			7.6
7 709	25- 41			1.5	2.4	3.9			28.8											7.6
7 710	41- 58			2.4	2.1	4.5			28.1											7.7
7 711	58- 79			3.0	1.6	4.6			29.6											7.7
7 712	79-117			3.8	1.3	5.1			27.0											7.8
7 713	117-165			6.1	1.2	7.3			24.9											8.2

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT 8A SAT. PCT.	NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	GYPSUM REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM-- X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	DTA IV 7A2E	L.T. .0002 MM X RAY I 7A3	X RAY II 7A2E	X RAY III 7A2E
7 708	0- 25	59.3	1.2	4	4			MI	4	MT 3	KK 2			
7 709	25- 41		1.5	5										
7 710	41- 58		2.4	9				MI	4	MT 3	KK 2			
7 711	58- 79		3.0	10										
7 712	79-117		3.8	14										
7 713	117-165		6.1	24				MI	4	MT 3	KK 2			

MINERAL CODE	RELATIVE AMOUNT
MI MICA	1 TRACE
MT MONTMORT	2 SMALL
KK KAOLINIT	3 MODERATE
	4 ABUNDANT
	5 DOMINANT
	6 INDETER.

SAMPLE PREPARATION CODES
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.

VECONT CLAY LOAM
S67Ariz-7-16

Location: Maricopa County, Arizona. 1200 feet south and 180 feet east of the west 1/4 corner of Sec. 14, T. 1 S., R. 6 E. Date of Sampling: October 14, 1967.
Description by: E. Adams and J. Jay. Collectors: K. Flach, D. Nettleton, E. Adams, and J. Jay.

CONSECUTIVE PEDON NUMBER C 67 63 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES VECONT SOIL NO. S67 ARIZ. 7-17 SAMPLE NO. 7 714-7 720 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC HAPLARGID,FINE,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05 SAND	.05- .002 SILT	LT .002 CLAY	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	SILTS VFS .1- .05	CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	INT. II .2- .02	COARSE FRAGMENTS I 75- WHOLE SOIL	II 20-5 PCT.	III 5-2
			PERCENT OF LESS THAN 2MM																
7 714	0- 28	AP	36.4	22.5	41.1	1.2	4.0	5.3	16.2	9.7	10.0	12.5				28.8	TR	TR	--	--
7 715	28- 53	B21T	34.0	23.6	42.4	1.3	3.9	5.1	15.1	8.6	11.4	12.2				28.8	TR	TR	--	--
7 716	53- 74	B22T	33.7	24.2	42.1	1.7	4.5	5.0	13.7	8.8	11.6	12.6				27.9	TR	TR	--	--
7 717	74-104	B31TCA	30.1	26.0	43.9	0.8	3.1	4.2	13.2	8.8	11.6	14.4				28.3	TR	TR	--	--
7 718	104-130	B32TCA															TR	TR	--Z	--
7 719	130-150	B33TCA															2	TR	2Z	N
7 720	150-178	B34TCA															TR	TR	--	--

SAMPLE NO.	DEPTH CM.	ORG. CARBON 6A1A	MATTER NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L LL 4F1	T M PL 4F2	I	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT--		-PERCENT-		PCT.	PCT.	NO.40		GRAMS PER CC				----PERCENT---			-PERCENT--				
7 714	0- 28	0.54	0.065	1		0.9				1.47	1.76	1.00		24.1	13.7	6.2	6.2		8.7		
7 715	28- 53	0.17		2						1.58	1.90	1.00		23.3	14.7	6.3	6.3		9.0		
7 716	53- 74			3					1.55			1.00			15.1				9.3		
7 717	74-104			6		0.8				1.51	1.82	1.00		25.2	16.1	6.4	6.4		9.3		
7 718	104-130								1.50						17.1						
7 719	130-150								1.50						12.5						
7 720	150-178									1.60	1.79	1.00		20.5		3.8	3.8				

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 6N4C	MG 6O4C	NA 6P2A	K 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	-MEQ/100G		MMHO	MEQ/1000 ML								PPM	
7 714	0- 28			1.2	1.8	3.0			22.6	1.35	4.3	1.8	8.2	1.4		4.6	4.8			7.7
7 715	28- 53			2.8	1.6	4.4			23.0											7.8
7 716	53- 74			4.1	1.2	5.3			23.2											7.9
7 717	74-104			3.6	0.7	4.3			22.9											8.0
7 718	104-130																			
7 719	130-150																			
7 720	150-178																			

SAMPLE NO.	DEPTH CM.	WATER AT 8A SAT. PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM-- X RAY I 7A2E	II 7A2E	III 7A2E	DTA IV 7A2E	-L.T. .0002 MM- DTA 7A3 PCT.	X RAY I 7A2E	II 7A2E	III 7A2E	MINERAL CODE
7 714	0- 28	52.5	0.8	3	5			MI 4	MT 3	KK 2						MI MICA
7 715	28- 53		2.8	12												MT MONTMORT
7 716	53- 74		4.1	18												KK KAOLINIT
7 717	74-104		3.6	16				MI 4	MT 3	KK 3						
7 718	104-130															
7 719	130-150															
7 720	150-178															

RELATIVE AMOUNT

1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.
N=NOT DETERMINED.

VECONT CLAY LOAM
S67Ariz-7-17

Location: Maricopa County, Arizona. 110 feet east and 50 feet south of center of Sec. 17, T. 1 S., R. 6 E. Date of Sampling: October 14, 1967.
Description by: E. Adams and J. Jay. Collectors: K. Flach, D. Nettleton, E. Adams, and J. Jay.
Classification: Typic Haplargid, fine, mixed, hyperthermic. 1/
Vegetation: Alfalfa. Use: Cropland. Climate: Mean annual precipitation is about 8 inches. Mean annual air temperature is about 80° F. Temperature at 20 inches approximately 80° F. Parent Material: Mixed - acid and basic igneous and metamorphosed sedimentaries. Topography: Flood plains and low fans. Elevation: 1237 feet. Drainage: Well drained. Permeability is slow to very slow. Soil Moisture: Moist when sampled. Remarks: Field determinations of pH by thymol blue indicator in 1:5 dilution. The carbonate segregations in this profile are at a greater depth than in the modal.

HORIZON	DESCRIPTION
Ap RSL No. 67714	0-28 cm (0-11 inches), reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate medium granular structure; hard when dry, friable when moist, sticky and plastic when wet; many fine and medium roots; many very fine and fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
B21t RSL No. 67715	28-53 cm (11-21 inches), reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; weak coarse prismatic structure breaking to moderate medium angular blocky structure; hard when dry, firm when moist, very sticky and very plastic when wet; common fine and medium roots; very few fine tubular and few fine interstitial pores; very few thin clay films line tubular or interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
B22t RSL No. 67716	53-74 cm (21-29 inches), reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; weak coarse prismatic structure breaking to weak medium angular blocky structure; hard when dry, friable when moist, very sticky and very plastic when wet; common fine and medium roots; very few fine tubular and few fine interstitial pores; very few thin clay films line tubular or interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.
B31tca RSL No. 67717	74-104 cm (29-41 inches), reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; massive; hard when dry, friable when moist, very sticky and very plastic when wet; common fine and medium roots; very few fine tubular pores and common fine interstitial pores; very few thin clay films line tubular or interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
B32tca RSL No. 67718	104-130 cm (41-51 inches), reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist with light reddish brown (5YR 6/4) carbonate segregations; weak coarse prismatic structure breaking to moderate medium angular blocky structure; hard when dry, friable when moist; very sticky and very plastic when wet; common fine and medium roots; very few fine tubular and few fine interstitial pores; few thin clay films line tubular or interstitial pores; strongly to violently effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.
B33tca RSL No. 67719	130-150 cm (51-59 inches), reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure breaking to moderate medium angular blocky structure; hard when dry, firm when moist, sticky and plastic when wet; common fine and medium roots; few fine tubular pores; and common fine interstitial pores; common moderately thick clay films on ped faces and in tubular and interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
B34tca RSL No. 67720	150-178 cm (59-70 inches), reddish brown (5YR 5/4 and 4/4) clay loam, dry and moist; weak coarse prismatic structure breaking to moderate medium angular blocky structure; hard when dry, firm when moist, sticky and plastic when wet; few fine roots; few fine tubular and interstitial pores; common moderately thick clay films on ped faces and in tubular and interstitial pores; strongly effervescent; moderately alkaline (pH 8.0).

1/ The pedon lacks a clay increase presumably because the surface has been removed by landleveling.

CONSECUTIVE PEDON NUMBER C 69155 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES FORREST TAXADJUNCT SOIL NO. S69 ARIZ. 2- 9 SAMPLE NO. 9 808-9 813 WILLCOX AREA

SOIL FAMILY: TYPIC HAPLARGID,FINE,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	SILTS CO. .2U	CLAYS FINE LT .2U	CARBONATE 3A1A	INT. 1A2A .02 WHOLE SOIL	COARSE FRAGMENTS I 75-20 PCT. OF WHOLE 20	II 20-5 PCT. OF LT 75	III 5-2
			PERCENT OF LESS THAN 2MM																
9 808	0- 10	A1	48.7	34.5	16.8	7.5	12.8	8.5	13.0	6.9	15.2	19.3			29.1	--A	--	--	--
9 809	10- 33	B21T	42.4	23.3	34.3	10.5	11.3	5.8	9.1	5.7	9.6	13.7			20.2	--A	--	--	--
9 810	33- 79	B22T	30.4	18.5	51.1	5.2	7.1	4.3	7.9	5.9	8.6	9.9			18.9	--A	--	--	--
9 811	79-100	C 1CA	41.1	24.5	34.4	8.8	10.2	5.8	10.0	6.3	9.3	15.2		2	21.3	--A	--	--	--
9 812	100-180	C 2CA	52.1	32.6	15.3	17.4	12.5	6.4	9.9	5.9	9.0	23.6		5	20.1	--A	--	--	--
9 813	0- 38	A1														3A	--	2	1

SAMPLE NO.	DEPTH CM.	ORG. MATTER CARBON 6A1A PERCENT	NITROGEN 6B1A PERCENT	CARBONATE AS CACO3 6E1B LT 2 PERCENT	6E1B 19-2 PERCENT	EXT. IRON FE 6C2B PCT.	ATTERBERG L L 4F1 PCT.	I P I 4F2 NO.40	T BULK DENSITY EST 1/3 BAR 4A1F GRAMS	1/3 BAR 4A1F PER CC	DRY 15 BAR 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C PERCENT	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1 PERCENT	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
9 808	0- 10	0.59	0.058				21	14		1.64	1.71	1.00		12.8	6.0	1.4	1.4	6.3		5.7
9 809	10- 33	0.54	0.057						1.60			1.00			11.3			6.9		6.7
9 810	33- 79	0.44		1			57	24		1.55	1.81	1.00		21.7	16.9	5.3	5.3	7.4		7.3
9 811	79-100	0.27		18					1.75			1.00			10.9			7.6	8.5	7.7
9 812	100-180			38			28	15		1.82	1.88	1.00		10.0	6.2	1.1	1.1	7.7	9.2	7.7
9 813	0- 38			TR					1.60			0.98			8.0			7.4		7.1

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6D2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT. PCT.	C E C NA- DAC 5A2A	NH4- OAC 5A6A	EC 8A1A MMHO	WATER EXTRACT FROM SATURATED PASTE CA	MG	NA	K	CO3	HCO3	CL	SO4	B PPM	PH SAT. PASTE 8C1B
		MEQ/100G						MEQ/100G		MMHO	MEQ/1000 ML									
9 808	0- 10			0.4	1.2	1.6			11.2											
9 809	10- 33			0.4	1.4	1.8			18.4											
9 810	33- 79			0.9	1.9	2.8			26.3											
9 811	79-100			1.1	1.1	2.2			14.9	1.92	5.8	3.4	9.1	0.6		2.8	12.0	3.9		7.6
9 812	100-180			1.3	0.4	1.7			7.6	1.79	2.7	2.3	11.5	0.3		2.4	10.3	3.2		8.0
9 813	0- 38			0.1	1.1	1.2			14.7											

SAMPLE NO.	DEPTH	WATER AT 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 502 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM-- 7A2E I	7A2E II	7A2E III	7A2E IV	7A3 PCT.	-L.T. .0002 MM- 7A2E I	7A2E II	7A2E III
9 808	0- 10		0.4	4				MI 3	KK 2						
9 809	10- 33		0.4	2				MI 4	KK 2						
9 810	33- 79		0.9	3											
9 811	79-100	42.7	0.7	5	4			MI 4	MT 1	KK 1					
9 812	100-180	37.8	0.9	11	7										
9 813	0- 38		0.1	1											

CODE	AMOUNT
MI MICA	1 TRACE
KK KAOLINIT	2 SMALL
	3 MODERATE
MT MONTMORT	4 ABUNDANT
	5 DOMINANT
	6 INDETER.

FORREST LOAM (taxadjunct) 1/
S69Ariz-2-9

Location: Cochise County, Arizona. 2,200 feet north and 2,150 feet east of the southwest corner of Sec. 6, T. 16 S., R. 24 E. East of Southern Pacific Railroad tracks about 3 miles south and 1 mile west of Cochise. Date of sampling: October 15, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Typic Haplargid, fine, mixed, thermic.
Vegetation: Tobosa, scattered mesquite, yucca and Russian thistle. Use: Livestock range. Climate: Precipitation is about 12 to 13 inches. Mean annual air temperature 60°F., January 42°F., July 78°F. Parent Material: Alluvium, principally from rhyolite, andesite, granite, quartzite and limestone.
Topography: Slightly convex to smooth, nearly level to gently sloping valley plains and old fans. Slope, 0.5 percent, northeast facing. Elevation: 4300 feet. Drainage: Well drained. Runoff is medium to slow. Permeability is slow.
Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by Hellige-Truog indicator solution. Paired with sample S69Ariz-2-8. A composite sample of 0 to 15 inches (0 to 38 cm) was taken for organic carbon determination - four sites sampled approximately 20 feet N, E, S and W of pit and composite sample obtained (RSL 69813).

HORIZON	DESCRIPTION
A1 RSL	0 to 10 cm (0 to 4 inches), brown (7.5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; moderate coarse plate structure; slightly hard
69808	friable, sticky, slightly plastic; many fine and medium roots; few medium and coarse tubular pores; noneffervescent; slightly acid (pH 6.5); clear smooth boundary.
B21t RSL 69809	10 to 33 cm (4 to 13 inches), reddish brown (5YR 4/4) light clay, dark reddish brown (5YR 3/4) moist; moderate medium and coarse subangular and angular blocky structure; very hard, friable, sticky, plastic; many very fine and fine roots; few fine and coarse tubular pores; common pressure faces; noneffervescent; neutral (pH 7.0); clear wavy boundary.
B22t RSL 69810	33 to 79 cm (13 to 31 inches), dark reddish brown (2.5YR 3/4) clay, dark reddish brown (2.5YR 3/4) moist; strong medium prismatic structure; very hard, friable, sticky, very plastic; common very fine and fine roots; many pressure faces; noneffervescent; mildly alkaline (pH 7.5); clear wavy boundary.
C1ca RSL 69811	79 to 100 cm (31-39½ inches), reddish yellow (5YR 6/6) gravelly clay loam, yellowish red (5YR 5/6) moist; massive parting to weak medium subangular blocky structure; very hard, friable, sticky, plastic; few very fine and fine roots; common medium and coarse tubular pores; few thin clay films in pores; about 15 percent by volume of 1/2 to 2 inch rounded rhyolite, andesite and quartzite gravel; about 30 percent by volume of medium and large white irregularly shaped soft masses and concretions of lime; violently effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
C2ca RSL	100 to 180 cm (39½ + 71 inches), pink (7.5YR 7/4) loam, yellowish red (5YR 5/6) moist; massive; hard, friable, slightly sticky, slightly

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Haplargid, fine, montmorillonitic, mesic

SOIL Arp gravelly clay loam (taxadjunct) SOIL Nos. S65Ariz-13-5 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65188 - 65192

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Size class and particle diameter (mm) 3A1 Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	* Coarse fragments 1A2a: > 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-2	A1	22.0	41.2	36.8	2.6	3.6	2.8	6.1	6.9	19.8	21.4	30.3	15.1	0	37	28	19	9
2-5	B1t	17.2	42.4	40.4	1.9	3.3	2.2	4.3	5.5	19.5	22.9	27.5	11.7	0	40	4	4	0
5-11	B21t	22.4	44.0	33.6	3.6	5.1	2.8	5.2	5.7	20.7	23.3	29.2	16.7	0	34	5	5	0
11-18	B22t	32.8	40.0	27.2	6.0	8.5	4.3	6.9	7.1	18.5	21.5	29.2	25.7	0	27	**	**	**
18-34	C	35.6	48.3	16.1	4.7	10.4	5.2	8.0	7.3	20.3	28.0	31.8	28.3	0	16	**	**	**
34-49	R																	

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$	Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry	Bulk density	Water content	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH: 8C1a H_2O 1:1		
	Pct.	Pct.		Pct.	Pct.	g/cc	g/cc	g/cc	Pct.	Pct.	Pct	in./in.	in./in.			
0-2	0.60	0.058	10		-						13.1			6.6		
2-5	0.49	0.061	8		-						15.5			6.7		
5-11	0.35	0.052	7		-						15.3			6.7		
11-18	0.25				-						12.8			6.8		
18-34	0.14				-						11.0			7.0		

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	Ext. Acidity	6H2a [redacted]	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum	6G1d KCl Ext. Al^{+++}	Atterberg limits: Plastic limit	Liquid limit	Plastic index	Base saturation 5C1 NH_4OAc
	meq/100 g										Pct. of <0.4 mm			Pct.

ARP GRAVELLY CLAY LOAM (taxadjunct) 1/
S65Ariz-13-5

Location: Western Yavapai County Area, Arizona. 3 miles northwest of Mayer, Arizona on State Highway #69 and 1 mile west on road to Binghampton, mine, 6/10 mile west & 3/10 mile south of the northeast corner of Sec. 8, T12N, R1E. EGE 1959, Photo #27-96. Date of Sampling: May 5, 1965.
Collectors: Flach, Nettleton, Jay, Meurisse, Freeman.
Vegetation: Brush. Oakbrush, squawbush, manzanita, mountain mahogany. Climate: Mean annual precipitation 12-14". Mean annual temperature 57°F. Soil temperature at time of sampling 64°F. at 17". Parent Material: Yavapai schist and phyllite. Relief: Gently rolling hills on a 6 percent convex slope about 50 feet from crest of ridge on a southwest exposure. Elevation: 4750 feet. Drainage: Medium runoff, moderately slow to slowly permeable and well drained.
Remarks: This soil is found on schist and phyllite under a chaparral or grass vegetation. It is on nearly level bench-like areas and moderately steep to steep hills. About 40 percent of the surface is covered with quartzite, schist and phyllite gravel. A few cobbles, stones, and rock outcrops may be present. The schist and phyllite bedrock is vertically oriented. Hellige-Truog field kit was used to determine pH. Paired sample is S65 Ariz-13-4.
Classification: Typic Haplargid, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
A1	0 to 2 inches, dark brown (7.5YR 4/4) gravelly clay loam, dark reddish brown (5YR 3/4) when
RSL No.	moist; moderate fine granular structure; slightly hard, friable, sticky and plastic; few fine
65188	roots; many fine interstitial pores; 40 percent gravel; noneffervescent; slightly acid (pH 6.5); abrupt smooth boundary.
B1t	2 to 5 inches, reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) when moist; moderate
65189	medium and coarse roots; common fine tubular and many fine interstitial pores; few thin, oriented clay bridges; noneffervescent; neutral (pH 7.0); clear smooth boundary.
B21t*	5 to 11 inches, reddish brown (5YR 5/4) clay, dark reddish brown (5YR 3/4) when moist; moderate
RSL No.	fine and medium subangular and angular blocky structure; hard, friable, sticky and plastic;
65190	plentiful fine, medium and coarse roots; few fine tubular and common fine interstitial pores; common thin clay films on ped faces; noneffervescent; neutral (pH 7.0); clear smooth boundary.
B22t	11 to 18 inches, strong brown (7.5YR 5/6) clay, dark brown (7.5YR 4/4) when moist; moderate,
RSL No.	medium, subangular blocky structure; hard, friable, sticky and plastic; few fine roots; few
65191	fine tubular and common fine interstitial pores; common thin clay films on ped faces; noneffervescent; neutral (pH 7.0); clear irregular boundary. This horizon tongues into C horizon.
C*	18 to 34 inches, light yellowish (2.5Y 6/4) weathered schist, olive (5Y 5/3) when moist;
RSL No.	massive; hard, firm, few fine roots; few fine interstitial pores; common thin clay coatings on
65192	rock faces; noneffervescent; medium acid (pH 6.0); clear smooth boundary.
R	34 to 49 inches plus, pale yellow (2.5Y 7/4) extremely hard schist, with few fine, distinct
No sample.	dark gray (10YR 3/1) mineral grains; light olive brown (2.5Y 5/4) when moist; massive; few fine roots in seams; noneffervescent; medium acid (pH 6.0).

*Note - Sampled for BPR. B21t and B22t combined in BPR sample.

1/ The Arp series is in a fine, montmorillonitic, mesic family of Ustollic Haplargids. This pedon has less than 0.5 percent organic matter in the surface 15 inches.

CONSECUTIVE PEDON NUMBER C 69205 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES LEHMANS TAXADJUNCT SOIL NO. S69 ARIZ. 10- 4 SAMPLE NO. 91093-91095 WALNUT G.-TUCSON AREA

SOIL FAMILY: LITHIC HAPLARGID,CLAYEY-SKELETAL,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	INT. II .2- .02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75			
91093	0- 4	A1	67.3	21.4	11.3	19.4	14.7	7.1	14.5	11.6	14.0	7.4				33.9	40A	6	7	27
91094	4- 13	B2 T	41.0	14.0	45.0	20.5	7.4	3.3	5.4	4.4	6.2	7.8				13.7	51A	9	11	31
91095	13- 76	R															33A	--	20	13

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L I M I T LL 4F1	PL 4F2	BULK DENSITY EST. 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.NO.40 GRAMS PER CC						PERCENT			PERCENT	
91093	0- 4	0.54	0.048			1.0	0.1						1.23	1.29	0.77		16.7	6.8	1.6	1.2
91094	4- 13	0.85	0.075			1.2	0.1						1.01	1.18	0.72		36.1	13.9	5.3	3.7
91095	13- 76	0.09				1.0	0.1					1.40			0.79			6.0		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4- OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4- OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA- CL2 8C1E
		MEQ/100G									PERCENT					
91093	0- 4			0.2	0.9	1.1			1.1	9.5					6.9	6.9
91094	4- 13			0.2	1.2	1.4			1.4	20.6					6.4	6.1
91095	13- 76														7.1	7.1

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
						PERCENT						
91093	0- 4	MT 2	MI 2	KK 1							MT MONTMORT	1 TRACE
91094	4- 13	MI 3	KK 2								MI MICA	2 SMALL
91095	13- 76										KK KAOLINIT	3 MODERATE
												4 ABUNDANT
												5 DOMINANT
												6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

LEHMANS VERY GRAVELLY LOAM (taxadjunct) 1/
S69Ariz-10-4

Location: Pima County, Arizona. 1,500 feet west and 150 feet south of northeast corner of Sec. 32, T. 14 S., R. 13 E., about 4 miles west of junction of Ajo Road and I-10 in Tucson.
Date of sampling: October 2, 1969.
Description by: Y. H. Havens and D. M. Hendricks. Collectors: Y. H. Havens and D. M. Hendricks.
Classification: Lithic Haplargid, clayey-skeletal, mixed, thermic.
Vegetation: Paloverde (Cercidium macrum), jojoba (goatnut) (coffeeberry) (Simmondsia californica), range ratany (Krameria parvifolia), false mesquite (Calliandra eriophylla), triangle leafed bursage (Ambrosia deltoidea), cacti, ocotillo (Fouquieria splendens), whitethorn, slender grama (Bouteloua filiformis), and annual grasses. Climate: Mean annual temperature approximately 67-69° F. Mean annual precipitation approximately 10-11 inches. Parent material: Rhyolite.
Topography: Strongly sloping to steep hills or mountains. Elevation: 2,600 feet.
Drainage: Well drained. Soil moisture: Dry.
Remarks: 60 percent gravel and cobbles and few stones on surface with small areas of rock outcrop.

HORIZON	DESCRIPTION
A1 RSL No. 691093	0-4 cm (0-1½ inches), brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 4/2) moist; weak thick platy structure in upper part, weak fine subangular blocky structure in lower part; soft, very friable, slightly sticky, slightly plastic; common fine, medium and coarse roots; common fine interstitial and few very fine tubular pores; approximately 60 to 70 percent coarse fragments; noneffervescent; neutral (pH 7.1); abrupt wavy boundary.
B2t RSL No. 691094	4-13 cm (1½ -5 inches), reddish brown (5YR 4/4) and yellowish red (5YR 4/6) very gravelly light clay, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular and angular blocky structure; hard, friable, sticky, plastic; many fine, medium and coarse roots; few fine interstitial and tubular pores; common moderately thick clay films on ped faces and in pores; 50 to 60 percent gravel and cobbles; noneffervescent; slightly acid (pH 6.2); abrupt irregular boundary.
R RSL No. 691095	13-76 cm (5-30 inches), light gray (5YR 7/1) and white (10YR 8/2) fractured rhyolite bedrock with reddish brown (5YR 4/4) soil material from B2t horizon in fractures and cracks, pinkish gray (5YR 6/2) and light gray (10YR 7/2) moist; massive; extremely

SOIL SERIES GACHADO TAXADJUNCT SOIL NO. S71 ARIZ. 10- 2 SAMPLE NO. 1 13-1 17 ORGAN PIPE MON AREA

SOIL FAMILY: LITHIC HAPLARGID,LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1

SAMPLE NO.		DEPTH CM.		HORZ.	TOTAL FRACTION 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .20	FINE LT .20	CARBONATE 3A1A	1A2A INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75-20	II 20-5	III 5-2
					PERCENT OF LESS THAN 2MM														PCT. OF LT 75			
1	13	0-	5	A	53.6	31.4	15.0	8.3	6.8	4.5	10.8	23.2	21.5	9.9	13.4	1.6		51.9	29A	5	15	9
1	14	5-	11	B21T	45.3	26.4	28.3	6.5	7.5	4.4	9.3	17.6	15.9	10.5	24.7	3.6		39.4	19A	4	6	8
1	15	11-	21	B22T	36.0	26.2	37.8	4.9	5.0	3.5	7.4	15.2	13.3	12.9	33.6	4.2		33.0	13A	--	5	8
1	16	21-	33	B3TCA	44.7	21.6	33.7	13.0	9.4	5.4	7.8	9.1	11.7	9.9				25.0	56*	2	20	15
1	17	33-	43	R															G			

SAMPLE NO.		DEPTH CM.		ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG LL 4F1	PL 4F2	PCT.NO.40	BULK DENSITY EST. 1/3 BAR GRAMS PER CC	DRY	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
				-PERCENT-		-PERCENT-		PERCENT										PERCENT			-PERCENT-	
1	13	0-	5	0.21	0.029	TR		1.1	0.1						1.30		0.83			7.3		
1	14	5-	11	0.15	0.026	TR		1.1	0.1							1.41	1.51	0.89	25.1	19.8	11.1	2.3	2.0
1	15	11-	21	0.22		TR		1.0	0.1							1.19	1.37	0.94	34.5	28.9	14.3	4.8	4.5
1	16	21-	33	0.24		2		0.9	0.1							1.26	1.39	0.62	30.3	29.0	13.9	3.3	2.0
1	17	33-	43			8		0.5	TR						2.65			1.00			2.4		

SAMPLE NO.		DEPTH CM.		EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4- OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4- OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
				MEQ/100G									PERCENT						
1	13	0-	5	10.5	4.5	0.2	1.3	16.5			16.5	17.7	100+		93		7.6	7.1
1	14	5-	11	23.0	6.8	0.2	1.3	31.3			31.3	26.6	100+		100+		7.9	7.2
1	15	11-	21	27.9	6.8	0.3	1.2	36.2			36.2	34.7	100+		100+		7.5	7.4
1	16	21-	33	31.5	5.8	0.4	0.9	38.6			38.6	27.8	100+		100+		8.3	7.7
1	17	33-	43	13.7	0.9	0.2	0.2	15.0			15.0	3.6	100+		100+		8.9	7.9

SAMPLE NO		DEPTH CM.		CLAY MINERALOGY LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM MINERAL X RAY 7A2E I	7A2E II	7A2E III
1	13	0-	5	MT 4	MI 3	KK 2				MI 3	MM 2	
1	14	5-	11	MT 3	MI 3	KK 1				MI 3	MM 2	
1	15	11-	21							MT 3	MI 3	
1	16	21-	33	MT 3	MI 3	KK 1						
1	17	33-	43									

CODE RELATIVE AMOUNT

MT MONTMORT 1 TRACE
MI MICA 2 SMALL
KK KAOLINIT 3 MODERATE
4 ABUNDANT
MM MT/MICA 5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
*=THE 75-250MM FRACTION IS INCLUDED.
G=GROUND WHOLE. HORIZON INDURATED OR GRAVEL TOO SOFT TO BE SEPARATED. ALL DATA FOR WHOLE SOIL.

GACHADO VERY GRAVELLY LOAM (taxadjunct) 1/

S71Ariz-10-2(1-5)

Location: Pima County, Arizona. Approximately 5/16 mile east of the SW corner of Section 32 (projected), T16S, R5W, Salt River base line and meridian, about 6 miles north of Lukeville just east of Highway 85. Date of Sampling: April 5, 1971.

Description by: Y. H. Havens. Collectors: K. W. Flach, D. Hendricks, K. Vogt and E. Chamberlin.

Classification: Lithic Haplargid, loamy, mixed, hyperthermic.

Vegetation: Desert shrubs, creosotebush, saguaro, triangular bursage, ocotillo, cholla and paloverde. Use: Parkland, wildlife habitat and rangeland. Climate: Precipitation 9 to 10 inches. Mean annual air temperature 70° to 71° F. Parent Material: Pyroclastic-latitic and andesitic tuffs including welded tuffs. Topography: Convex moderately sloping valley slopes. Slope 6 percent south facing. Elevation: 1850 feet. Drainage: Well drained. Runoff is moderate. Permeability is moderately slow. Soil Moisture: Dry at time of sampling.

HORIZON	DESCRIPTION
A1 RSL 71013	0 to 5 cm (0 to 2 inches), brown (7.5YR 5/4) very gravelly sandy loam, dark brown (7.5YR 4/4) moist; weak medium platy structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; common fine vesicular pores; 70 to 90 percent gravel by volume, 50 to 90 percent of surface is covered with gravel; noneffervescent; moderately alkaline (pH 8.0 Thymol blue); abrupt wavy boundary.
B21t RSL 71014	5 to 11 cm (2 to 4½ inches), yellowish red (5YR 5/6) gravelly sandy clay loam, yellowish red (5YR 4/6) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky, plastic; few very fine and fine roots; few very fine tubular and common interstitial pores; 20 percent gravel; noneffervescent; moderately alkaline (pH 8.0); clear wavy boundary.
B22t RSL 71015	11 to 21 cm (4½ to 8 inches), yellowish red (5YR 4/6) heavy clay loam, yellowish red (5YR 4/6) moist; moderate medium prismatic structure parting to moderate medium subangular blocky structure; hard, friable, sticky, plastic or very plastic; few very fine and fine roots; few very fine tubular pores; 10 percent gravel by volume; slightly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.
B3tca RSL 71016	21 to 33 cm (8 to 13 inches), yellowish red (5YR 5/6) very gravelly sandy clay loam, yellowish red (5YR 4/6) moist; weak medium and coarse subangular blocky structure; hard, friable, slightly sticky, plastic; few very fine roots; common fine interstitial and few fine tubular pores; 40 percent gravel and 20 percent cobbles; strongly effervescent; moderately alkaline (pH 8.3); abrupt irregular boundary.

CONSECUTIVE PEDON NUMBER C 69167 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CHIRICAHUA TAXADJUNCT SOIL NO. S69 ARIZ. 2-21 SAMPLE NO. 9 861-9 864 WILLCOX AREA

SOIL FAMILY: LITHIC USTOLLIC HAPLARGID,CLYEY-SKLTL,MXD,THRMC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SANDS SILTS CLAYS													1A2A INT.	COARSE FRAGMENTS		
			SAND 2-.05	SILT .05-.002	CLAY LT .002	VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	CO. 2-.2U	FINE LT .2U	CARBO NATE 3A1A	II .2-.02	PCT. OF WHOLE 20	I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM													SOIL	PCT. OF LT 75		
9 861	0- 10	A1	49.1	23.3	27.6	3.9	5.7	5.3	20.2	14.0	12.3	11.0				39.2	76*	52	12	2
9 862	10- 28	B21T	33.3	21.5	45.2	5.5	5.8	3.7	10.0	8.3	9.7	11.8	44.9	0.3		24.3	72*	43	17	1
9 863	28- 38	B22T	27.1	17.0	55.9	9.3	4.8	2.3	5.9	4.8	7.4	9.6				15.8	72*	39	19	2
9 864	38- 46	B23TCA	27.9	18.5	53.6	13.0	4.1	2.0	4.8	4.0	7.6	10.9				14.5	73A	38	31	4

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR-BON 6A1A -PERCENT-	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L I M I T LL 4F1	PL 4F2	EST. 1/3 BAR 4A1F	BULK DENSITY 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
						PERCENT				PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT	
9 861	0- 10	1.02	0.103							29	18		1.33	1.47	0.39		15.8	9.7	3.4	1.3
9 862	10- 28	1.24	0.113							42	22		1.33	1.56	0.43		24.0	14.6	5.5	2.2
9 863	28- 38	1.01	0.109	TR									1.24	1.58	0.45		33.2	19.1	8.4	3.5
9 864	38- 46	1.08	0.122	6								1.24			0.44			19.3		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI-DITY 6H2A	KCL EXT. AL 6G1E	CEC SUM 5A3A	NH4-OAC 5A6A	BASE SATURATION SUM+ ACI-DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
9 861	0- 10			0.1	1.4	1.5			1.5	17.5					7.0	6.8
9 862	10- 28			0.1	1.8	1.9			1.9	23.8					6.6	6.3
9 863	28- 38			0.1	1.7	1.8			1.8	28.3					7.2	7.1
9 864	38- 46			0.2	1.8	2.0			2.0	28.0					7.6	7.4

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III
9 861	0- 10	MI 5	MT 2	KK 2						
9 862	10- 28	MI 5	MT 2	KK 2						
9 863	28- 38									
9 864	38- 46	MI 5	KK 2							

MI MICA
MT MONTMORT
KK KAOLINIT

RELATIVE AMOUNT
1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
*=THE 75-250MM FRACTION IS INCLUDED.
A=STANDARD PREPARATION.

CHIRICAHUA VERY COBBLY CLAY LOAM (taxadjunct) 1/
S69Ariz-2-21

Location: Cochise County, Arizona. 100 feet south and 750 feet east of the northwest corner of Sec. 3, T. 17 S., R. 25 E. North of U. S. Highway 666 about 1½ miles east of Pearce. Date of sampling: October 20, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Lithic Ustollic Haplargid, clayey-skeletal, mixed, thermic.
Vegetation: Tanglehead, tobosa, scattered yucca and few small mesquite. Use: Livestock range. Climate: Precipitation is about 12 to 13 inches. Mean annual air temperature 60°F., January 42°F., July 78°F. Parent Material: Dacite, rhyolite and andesite. Topography: Moderately steep to steep convex hills. Slope, 30 percent, south facing. Elevation: 4400 feet. Drainage: Well drained. Surface runoff is medium to rapid. Permeability is slow. Soil Moisture: Dry

Remarks: Field determinations of pH by Hellige-Truog indicator solution. This sample paired with S69Ariz-2-20.

HORIZON	DESCRIPTION
A1 RSL 69861	0 to 10 cm (0 to 4 inches), brown (7.5YR 5/4) very cobbly clay loam, very dark brown (5YR 3/4) moist; weak fine granular structure; slightly hard, friable, sticky, plastic; many fine and medium roots; few very fine tubular pores; 80 percent of the surface has cover of subangular dacite, rhyolite and andesite gravel, cobbles and stones. The cover is comprised of 20 percent of 1/4 to 3 inch gravel, 50 percent of 4 to 8 inch cobbles, and 10 percent of 12 to 14 inch stones; in the horizon are 30 percent by volume of 4 to 6 inch subangular cobbles and 20 percent by volume of 1/4 to 3 inch subangular gravel; noneffervescent; mildly alkaline (pH 7.5); clear wavy boundary.
B21t RSL 69862	10 to 28 cm (4 to 11 inches), reddish brown (5YR 4/3) cobbly clay, dark reddish brown (5YR 3/3) moist; moderate medium angular and subangular blocky structure; very hard, friable, sticky, plastic; common fine and

CONSECUTIVE PEDON NUMBER C 69166 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES MOANO TAXADJUNCT SOIL NO. S69 ARIZ. 2-20 SAMPLE NO. 9 858-9 860 WILLCOX AREA

SOIL FAMILY: LITHIC USTOLLIC HAPLARGID,CLYY-SKLT,MONT.,THRMC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SANDS SILTS CLAYS													1A2A INT.	COARSE FRAGMENTS		
			SAND 2- .05	SILT .05- .002	CLAY LT .002	VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	II .2- .02	PCT. OF WHOLE SOIL	I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75			
9 858	0- 8	A1	23.7	41.7	34.6	7.1	5.2	2.6	4.7	4.1	15.9	25.8				22.7	71*	53	13	3
9 859	8- 20	B21T	24.0	37.7	38.3	6.8	4.5	2.3	5.2	5.2	15.6	22.1				23.8	78*	47	28	1
9 860	20- 43	B22T	21.1	36.2	42.7	9.6	3.9	1.5	2.9	3.2	11.4	24.8				16.2	65*	37	23	3

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR-BON 6A1A	NITRO-GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG LIQUID LL 4F1	PLASTIC PL 4F2	BULK DENSITY 1/3 BAR EST. 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		-PERCENT-		-PERCENT-		PERCENT				PCT.	NO.40	GRAMS PER CC				PERCENT			-PERCENT-	
9 858	0- 8	1.86	0.143			2.6	0.1			47	30	1.25		0.46				16.4		
9 859	8- 20	1.59	0.149			2.7	0.1			50	28		1.28	1.66	0.37		30.0	16.8	9.1	3.0
9 860	20- 43	1.53	0.151	TR		2.5	0.1					1.28			0.52			21.7		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6D2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI-DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	C E C NH4-OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
9 858	0- 8			0.1	0.9	1.0			1.0	36.1					7.2	7.0
9 859	8- 20			0.1	0.8	0.9			0.9	36.7					6.7	6.6
9 860	20- 43			0.2	0.5	0.7			0.7	44.2					6.8	6.7

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
9 858	0- 8	MT 4	MI 3	KK 2							MT MONTMORT	1 TRACE
9 859	8- 20										MI MICA	2 SMALL
9 860	20- 43										KK KAOLINIT	3 MODERATE
												4 ABUNDANT
												5 DOMINANT
												6 INDETER.

SAMPLE PREPARATION CODES
*=THE 75-250MM FRACTION IS INCLUDED.

MOANO GRAVELLY CLAY LOAM (taxadjunct) 1/
S69Ariz-2-20

Location: Cochise County, Arizona. 800 feet east of northwest corner of Sec. 33, T. 17 S., R. 24 E. 5½ miles west and 1½ north of Pearce.
Date of sampling: October 20, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Lithic Ustollic Haplargid, clayey-skeletal, montmorillonitic, thermic.
Vegetation: Sideoats grama, blue grama, tobosa, fluffgrass and scattered yucca, and mesquite. Use: Rangeland. Climate: Precipitation about 12 to 13 inches. Mean annual air temperature 60°F., January 42°F., July 78°F. Parent Material: Schist. Topography: Strongly sloping convex hills. Slope, 10 percent, east facing. Elevation: 4720 feet. Drainage: Well drained. Surface runoff is medium to rapid. Permeability is slow. Soil Moisture: Dry when sampled.
Remarks: Field determination of pH by Hellige-Truog indicator solution. This sample paired with S69Ariz-2-21.

HORIZON	DESCRIPTION
A1 RSL 69858	0 to 8 cm (0 to 3 inches), dark brown (7.5YR 4/2) gravelly clay loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky, plastic; many very fine roots; about 70 percent surface cover of 1/8 to 1 inch subangular schist gravel; 40 to 50 percent by volume of 1/8 to 1-1/2 inch subangular schist gravel; noneffervescent; neutral (pH 7.0); clear smooth boundary.
B21t RSL 69859	8 to 20 cm (3 to 8 inches), dark reddish brown (5YR 3/4) gravelly clay, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; hard, friable, sticky, plastic; many very fine and fine roots; few very fine tubular pores; few thin clay films on ped faces; about 50 percent by volume of 1/8 to 1-1/2 inch subangular schist gravel; noneffervescent; neutral (pH 7.3); clear smooth boundary.
B22t RSL 69860	20 to 43 cm (8 to 17 inches), reddish brown (5YR 4/4) gravelly heavy clay, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; hard, friable, sticky, plastic; common very fine and fine roots; few thin clay films on ped faces; about 50 percent by volume of 1/8 to 1-1/2 inch subangular schist gravel; noneffervescent; mildly alkaline (pH 7.8); abrupt irregular boundary.
R	43 to 125 cm (17 to 49 inches), gray fractured extremely hard tilted schist bedrock with thin tongues of soil material in fractures, gray when moist. Interior of rock is noneffervescent. Rock faces and soil material in fractures are slightly to strongly effervescent.

1/ The Moano series is in a loamy-skeletal, mixed, mesic family of Lithic Haplustolls. This pedon lacks a mollic epipedon and has an argillic horizon with more than 35 percent clay.

CONSECUTIVE PEDON NUMBER C 69171 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES MOAND TAXADJUNCT SOIL NO. S69 ARIZ. 2-25 SAMPLE NO. 9 881-9 883 WILLCOX AREA

SOIL FAMILY: LITHIC USTOLLIC HAPLARGID,LOAMY-SKLTL,MXD,THRMC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A.02	1A2A INT. II .2-.02 WHOLE	COARSE FRAGMENTS PCT. OF WHOLE 20 I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM													SOIL	PCT. OF LT 75		
9 881	0- 3	A1	68.5	19.1	12.4	6.5	15.5	15.4	19.8	11.3	10.5	8.6				31.9	48A	8	30	10
9 882	3- 13	B2	54.6	22.1	23.3	4.3	9.9	11.0	18.9	10.5	8.3	13.8				29.0	50*	16	18	8
9 883	13- 33	C 1															94A	78	14	2

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A -PERCENT-	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A -PERCENT-	EXT AL 6G5A	ATTERBERG LL 4F1 PCT.	LIMIT PL 4F2 NO.40	T EST. 1/3 BAR 4A1F GRAMS	BULK DENSITY 1/3 BAR 4A1F PER	DRY 4A1H CC	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2 -PERCENT-	EXTNSBLTY LEF 4D1	LE 4D1 -PERCENT-
9 881	0- 3	0.69	0.062			1.7	0.1			NP	NP	1.25		0.70				5.4		
9 882	3- 13	1.05	0.083			2.1	0.1			31	21		1.49	1.64	0.64		18.2	9.2	3.2	2.0
9 883	13- 33	1.44	0.167			3.2	0.1					1.50			0.08			16.7		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	CEC SUM 5A3A	NH4-OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
9 881	0- 3			0.1	0.4	0.5			0.5	13.8					6.3	5.7
9 882	3- 13			0.1	0.3	0.4			0.4	26.5					6.9	6.5
9 883	13- 33			0.3	0.4	0.7			0.7	39.1					7.0	6.7

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY <.002 MM FRACTION X RAY I 7A2E	II 7A2E	III 7A2E	IV 7A2E	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM FRACTION X RAY I 7A2E	II 7A2E	III 7A2E
9 881	0- 3	MT 4	MI 3	KK 1						
9 882	3- 13	MT 4	MI 2	KK 2						
9 883	13- 33									

MINERAL CODE: MT MONTMORT, MI MICA, KK KAOLINIT

RELATIVE AMOUNT: 1 TRACE, 2 SMALL, 3 MODERATE, 4 ABUNDANT, 5 DOMINANT, 6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
*=THE 75-250MM FRACTION IS INCLUDED.

MOANO GRAVELLY HEAVY LOAM (taxadjunct) 1/

S69Ariz-2-25

Location: Cochise County, Arizona. 2,400 feet east and 400 feet north of the southwest corner of Sec. 21, T. 14 S., R. 27 E. North of State Highway 186, about 14 miles east and 3 miles south of Willcox. Date of Sampling: October 22, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Lithic Ustollic Haplargid, loamy-skeletal, mixed, thermic.
Vegetation: Cane beardgrass, sideoats gramma, juniper, agave and a few mesquite. Use: Livestock range. Climate: Precipitation about 13 to 14 inches. Mean annual air temperature 57°F., January 41°F., July 74°F. Parent Material: Pinal schist. Topography: Moderately steep

feet. Drainage: Well drained. Surface runoff is medium. Permeability is moderate: Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by Hellige-Truog indicator solution. This sample was not paired. The Schist bedrock has a hardness of less than 3 on Mho's scale and does not qualify as a lithic contact. This soil is quite similar to the Moano series.

HORIZON	DESCRIPTION
A1 RSL 69881	0 to 3 cm (0 to 1 inch), dark brown (7.5YR 4/4) gravelly heavy loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky, slightly plastic; many fine and medium roots; 50 to 60 percent of 1/8 to 1-1/2 inch subangular schist gravel; noneffervescent; neutral (pH 7.0); abrupt smooth boundary.
B2 RSL	3 to 13 cm (1 to 5 inches), reddish brown (5YR 4/4) gravelly light clay loam, dark reddish brown (5YR 3/4) moist; mod-

CONSECUTIVE PEDON NUMBER C 68132 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CARALAMPI SOIL NO. S68 ARIZ. 12- 4 SAMPLE NO. 8 979-8 986 E.PIMA-SANTA CRU AREA

SOIL FAMILY: USTOLLIC HAPLARGID LOAMY-SKELETAL,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1818,3A1 TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A.02	1A2A INT. .2- OF WHOLE SOIL	COARSE FRAGMENTS I 75-20 PCT.	II 20-5 OF LT 75	III 5-2
			PERCENT OF LESS THAN 2MM																
8 979	0- 5	A1	72.9	10.9	16.2	21.6	23.7	12.2	11.7	3.7	5.8	5.1				14.7	59*	40	17Z	N
8 980	5- 13	B1 T	60.7	9.8	29.5	21.8	15.3	9.1	10.9	3.6	5.4	4.4				14.1	79A	59	12	8
8 981	13- 23	B21T	54.7	10.6	34.7	18.9	15.0	8.0	9.2	3.6	4.7	5.9				12.8	64A	28	19	17
8 982	23- 33	B22T	64.4	12.2	23.4	23.2	18.4	9.1	9.9	3.8	5.4	6.8				13.9	48*	11	20	15
8 983	33- 58	B23T	63.7	18.0	18.3	15.0	16.2	10.5	14.8	7.2	7.8	10.2				22.0	53A	13	22	18
8 984	58- 79	B31T	68.0	18.6	13.4	17.5	18.5	10.5	14.4	7.1	7.3	11.3				21.4	49A	7	19	23
8 985	79-107	B32T	70.9	17.2	11.9	24.4	20.3	9.6	11.5	5.1	6.4	10.8				17.0	43A	10	20	13
8 986	107-142	C	73.5	17.0	9.5	26.1	19.2	10.6	12.8	4.8	7.1	9.9				17.7	39A	3	14	22

SAMPLE NO.	DEPTH CM.	ORG. CAR- BON 6A1A	MATTER NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L I M I T LL 4F1	PL 4F2	EST. 1/3 BAR 4A1F	BULK DENSITY 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.		NO.40 GRAMS PER CC				PERCENT			PERCENT	
8 979	0- 5	1.93	0.146			2.0				39	24		1.17	1.25	0.61		14.0	9.1	2.2	1.3
8 980	5- 13	1.67	0.127			1.8							1.09	1.12	0.39		17.0	15.2	0.9	0.3
8 981	13- 23	1.14	0.083			1.9	0.6			55	33		1.22	1.31	0.54		22.3	15.5	2.4	1.3
8 982	23- 33	0.67	0.052			1.5	0.6					1.30			0.69			12.9		
8 983	33- 58	0.48				1.3	0.2						1.45	1.54	0.61		19.6	12.5	2.0	1.2
8 984	58- 79	0.18				1.0	0.2			NP	NP		1.48	1.59	0.65		23.4	10.0	2.4	1.5
8 985	79-107					0.8	0.1						1.43	1.49	0.70		19.8	8.7	1.4	1.0
8 986	107-142					0.7	TR			NP	NP		1.54	1.63	0.72		16.7	8.7	1.9	1.4

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4- OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4- OAC 5C1	PH NAF 2 MIN 8G1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
8 979	0- 5	7.5	4.7	0.1	0.9	13.2	4.2		17.4	16.2	76		81		5.9	5.4
8 980	5- 13	17.3	9.1	0.1	0.7	27.2			27.2	24.0	100+		100+		6.1	5.6
8 981	13- 23	13.1	11.3	0.1	0.6	25.1			25.1	26.2	100+		96		5.9	5.5
8 982	23- 33	12.9	13.0	0.2	0.4	26.5			26.5	25.2	100+		100+		5.9	5.3
8 983	33- 58	13.8	10.5	0.2	0.3	24.8			24.8	25.6	100+		97		5.8	5.5
8 984	58- 79	13.9	11.6	0.5	0.3	26.3			26.3	24.3	100+		100+		6.4	5.8
8 985	79-107	12.7	10.7	0.4	0.2	24.0			24.0	21.3	100+		100+		6.4	5.8
8 986	107-142	15.4	9.6	0.8	0.3	26.1			26.1	26.1	100+		100+		6.8	5.9

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
						PERCENT						
8 979	0- 5	MT 3	MI 2	KK 2							MT MONTMORT	1 TRACE
8 980	5- 13										MI MICA	2 SMALL
8 981	13- 23										KK KAOLINIT	3 MODERATE
8 982	23- 33	MT 3	MI 2	KK 2								4 ABUNDANT
8 983	33- 58											5 DOMINANT
8 984	58- 79	MT 5	MI 1									6 INDETER.
8 985	79-107											
8 986	107-142	MT 5										

SAMPLE PREPARATION CODES
*=THE 75-250MM FRACTION IS INCLUDED.
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.
A=STANDARD PREPARATION.

CARALAMPI GRAVELLY SANDY LOAM
S68 Ariz-12-4-1 through 8

Location: Santa Cruz County, Arizona, 2½ miles north-northwest of Nogales. Approximately 2800 feet north and 1600 feet west of SE corner Section 36, T23S, R13E in road cut. Photo AMS-702. Date of Sampling: October 10, 1968.
Description by: Richardson and Havens. Collectors: Brasher and Nettleton.
Classification: Ustollic Haplargid, loamy-skeletal, mixed, thermic.
Vegetation: Grasses: curly mesquite, sideoats grama, sprucetop grama, slender grama, cane-beard grass, three-awn, hairy grama, blue grama and plains lovegrass. Brush: (sparse cover) mesquite, guajillo, range ratany and lycium. Climate: Mean annual temperature (Nogales 62.3°F.). Mean annual precipitation 14-15.5 inches. Parent Material: Old alluvium from granite, andesite, rhyolite and related tuffs. Topography: Deeply dissected old terraces or fans, 25 percent slope. Northeast aspect. Elevation: 3680 feet. Drainage: Well drained. Medium runoff. Soil Moisture: Slightly moist.

HORIZON	DESCRIPTION
	(0-5 cm)
A1	0 to 2 inches, dark brown (7.5YR 4/4) gravelly sandy loam, dark reddish brown
RSL	(5YR 3/4) moist; weak fine granular structure; slightly hard, friable, nonsticky
68979	and nonplastic; common very fine and fine roots; common very fine interstitial
	pores; noneffervescent; neutral (pH 7.0); abrupt smooth boundary.
B1t	2 to 5 inches, dark brown (7.5YR 4/2) very gravelly sandy clay loam, dark brown
RSL	(7.5YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable,
68980	slightly sticky and plastic; common very fine and fine roots; many very fine
(5-13 cm)	interstitial pores; noneffervescent; slightly acid (pH 6.5); clear wavy boundary.
B21t	5 to 9 inches, dark reddish brown (5YR 3/4) very gravelly clay loam, dark red-
RSL	dish brown (5YR 3/4) moist; weak fine and medium subangular blocky structure;
68981	slightly hard, friable, sticky and plastic; many very fine and fine roots; common
(13-23 cm)	very fine interstitial and tubular pores; few thin clay films on ped faces; non-
	effervescent; slightly acid (pH 6.5); abrupt wavy boundary.
B22t	9 to 13 inches, yellowish red (5YR 4/6) very gravelly heavy clay loam, dark red
RSL	(2.5YR 3/6) moist; moderate medium subangular blocky structure; hard, friable,
68982	sticky and plastic; many very fine and fine roots; common very fine interstitial
(23-33 cm)	and tubular pores; common thin clay films on ped faces and in pores; nonefferves-
	cent; slightly acid (pH 6.5); clear wavy boundary.
B23t	13 to 23 inches, yellowish red (5YR 4/6) and reddish yellow (5YR 6/6) gravelly
RSL	sandy clay loam, yellowish red (5YR 4/6) moist; weak fine and medium subangular
68983	blocky structure; hard, friable, slightly sticky and slightly plastic; common very
(33-58 cm)	fine and fine roots; few very fine tubular pores; common thin clay films on ped
	faces; noneffervescent; slightly acid (pH 6.5); clear wavy boundary.
B31t	23 to 31 inches, reddish brown (5YR 5/4) very gravelly sandy clay loam, reddish
RSL	brown (5YR 4/4) moist, with common fine faint pink (5YR 7/3) and light reddish
68984	brown (5YR 6/3) mottles, light reddish brown (5YR 6/4) moist; massive breaking to
(58-79 cm)	weak medium subangular blocky structure; hard, friable, slightly sticky and
	slightly plastic; few very fine and fine roots; few very fine tubular pores; few
	thin clay films on ped faces and in pores; noneffervescent; slightly acid (pH 6.5);
	clear wavy boundary.
B32t	31 to 42 inches, light reddish brown (5YR 6/4) very gravelly light sandy clay
RSL	loam or sandy loam, reddish brown (5YR 4/4) moist; massive breaking to weak
68985	medium subangular blocky structure; hard, friable, nonsticky and slightly plastic;
(79-107 cm)	few very fine roots; few thin clay films on ped faces and in pores; nonefferves-
	cent; slightly acid (pH 6.5); clear wavy boundary.
C	42 to 56 inches, light brown (7.5YR 6/4) gravelly sandy loam, dark brown (7.5YR
RSL	4/4) moist; massive; hard, friable, nonsticky and nonplastic; noneffervescent;
68986	slightly acid (pH 6.5).
(107-142 cm)	

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Ustollic Haplargid, coarse-loamy, mixed, mesic

SOIL Palma loamy sand SOIL Nos. S65Ariz-1-10 LOCATION Apache County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65704 - 65712

Depth (In)	Horizon	1B1b Total Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	1/ Coarse fragments 1A2a: ≥ 2 Pct.	2 – 19 Pct. of < 76 mm	19 – 76 Pct. of < 76 mm
		Pct. of < 2 mm																
0- 3	A1	92.5	3.3	4.2	2.1	19.1	22.2	44.1	5.0	1.9	1.4	25.7	87.5	0	4	-	-	-
3- 5	B1	90.2	2.5	7.3	1.8	17.5	20.8	44.8	5.3	1.5	1.0	27.5	84.9	0	7	-	-	-
5-12	B2t	84.4	3.2	12.4	0.7	12.4	18.1	46.9	6.3	1.9	1.3	31.4	78.1	0	12	-	-	-
12-21	B3	87.0	3.5	9.5	0.1	2.7	10.6	65.9	7.7	2.2	1.3	45.7	79.3	0	10	-	-	-
21-41	Cca	88.1	3.2	8.7	0.1	0.5	5.4	70.4	11.7	1.3	1.9	57.0	76.4	0	9	-	-	-
41-54	IIBb21ca	81.1	6.7	12.2	2.0	10.3	18.0	42.4	8.4	2.9	3.8	31.6	72.7	0	12	-	-	-
54-62	IIBb22	83.5	5.8	10.7	1.8	17.2	24.3	35.5	4.7	2.6	3.2	23.1	78.8	0	11	1	1	-
62-73	IIBb23ca	79.6	5.3	15.1	1.1	13.1	27.1	34.5	3.8	1.8	3.5	19.1	75.8	0	15	-	-	-
73-79+	IIIC2	93.4	2.1	4.5	0.7	15.4	41.6	32.6	3.1	1.2	0.9	15.9	90.3	-	-	-	-	-

Depth (In)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct.	Bulk density: 4A1f 1/3 bar g/cc	4A1h Oven dry g/cc		3B2 Cm	Water content Pct.	4B1c 1/3 bar Pct.	4B2 15 bar Pct.	4D1 Extensibility COLEF in./in.	4D1 Extensibility COLE in./in.	pH: 8C1b Saturated Paste	8C1a H_2O 1:1	8C1a H_2O 1:10
0- 3	0.23	0.013	18		-							2.3				8.0	
3- 5	0.34	0.017	20		-	1.70	1.73		1.00		4.5	3.4	0.007	0.007		7.5	
5-12	0.27				-	1.63	1.71		1.00		8.5	5.3	0.016	0.016		6.9	

PALMA LOAMY SAND
S65Ariz-1-10

Location: Apache County, Arizona. A pit located 1300 feet south and 30 feet west of the center of Section 4, T. 15 N., R. 29 E. Photo No. 6213. Approximately 16 miles north of St. Johns. Date of Sampling: September 22, 1965.
Collectors: M.L. Miller, K.N. Larson, J.E. Jay, R.E. Nelson, and B. Brasher.
Vegetation: Never cultivated. Grass-juniper aspect. 20 percent basal density. Blue grama, sand dropseed, Indian ricegrass, galleta, one-seeded juniper, rabbitbrush, snakeweed (Gutierrezia sarothrae). Climate: 13 inches ppt. 50°F. approximate M.A.T. Parent Material: Loamy alluvium of Tertiary age from mixed rocks. Relief: Undulating plain, convex-complex 5 percent slope facing northwest at pit site. Near crest of low ridge. Elevation: 5850 feet. Drainage: Runoff is slow to medium. This soil is well drained. Groundwater is deep. Permeability is moderate.
Remarks: Determination of pH was made with a Hellige-Truog field kit. This soil has a weak argillic horizon. Measure of free carbonate obtained by observing reaction to dilute HCl.
Classification: Ustollic Haplargid, coarse-loamy, mixed, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 65704	0 to 3 inches, brown (10YR 5/3) loamy sand, dark brown (10YR 4/3) when moist; weak medium and coarse platy structure; soft to slightly hard, very friable, nonsticky and nonplastic; few fine and medium roots; few fine and medium tubular pores; noneffervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
B1 RSL No. 65705	3 to 5 inches, reddish brown (5YR 4/4) light sandy loam, reddish brown (5YR 4/4) when moist; weak medium and coarse subangular blocky structure; hard, friable, nonsticky and nonplastic; plentiful fine and medium roots; many fine interstitial and common fine tubular pores; noneffervescent; moderately alkaline (pH 8.0); clear smooth boundary.
B?t	5 to 12 inches, reddish brown (5YR 4/4) sandy loam, dark reddish brown (5YR 3/4)
RSL No. 65706	when moist; weak coarse prismatic breaking to weak medium and coarse subangular blocky structure; hard, friable, nonsticky and slightly plastic; plentiful fine and medium roots; common fine interstitial and common fine and medium tubular pores; common thin oriented clay bridges holding mineral grains together and in pores; noneffervescent; neutral (pH 7.0); clear smooth boundary.
B3 RSL No. 65707	12 to 21 inches, brown (7.5YR 5/4) light fine sandy loam, dark brown (7.5YR 4/4) when moist; massive; hard, friable, nonsticky and nonplastic; few fine, medium and coarse roots; few fine and medium tubular pores; noneffervescent; moderately alkaline (pH 8.0); clear smooth boundary.
Cca RSL No. 65708	21 to 41 inches, light brown (7.5YR 6/4) fine sandy loam, dark brown (7.5YR 4/4) when moist, massive; slightly hard, friable, nonsticky and nonplastic; few fine, medium and coarse roots; many fine interstitial and few fine and medium tubular pores; strongly effervescent with common fine and medium distinct white (N 8/) lime filaments and veins; moderately alkaline (pH 8.0); clear smooth boundary.
IIBb21ca RSL No. 65709	41 to 54 inches, reddish brown (5YR 5/4) light sandy clay loam, reddish brown (5YR 4/4) when moist, massive; hard, friable, slightly sticky and slightly plastic; few fine roots; few fine tubular and common fine interstitial pores; strongly to violently effervescent with many fine and medium distinct white (N 8/) lime filaments and few soft lime concretions; moderately alkaline (pH 8.0); clear smooth boundary.
IIBb22 RSL No. 65710	54 to 62 inches, reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) when moist; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; few fine tubular and common fine interstitial pores; strongly to violently effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
IIBb23ca RSL No. 65711	62 to 73 inches, reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) when moist, massive; hard, friable, slightly sticky and slightly plastic; few fine roots; few fine tubular and common fine interstitial pores; strongly to violently

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Ustollic Haplargid, fine-loamy, mixed, mesic
SOIL Clovis loamy sand SOIL Nos. S65Ariz-1-8 LOCATION Apache County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65679 - 65686

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	3A1 Int. II (0.2–0.02)	3A1 (2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	1/ Coarse fragments 1A2a: ≥ 2 (Pct)	2 – 19 (Pct. of < 76 mm)	19 – 76 (Pct. of < 76 mm)
		Pct. of < 2 mm																
0- 3	A1	88.5	7.0	4.5	1.4	15.5	24.6	36.1	10.9	4.2	2.8	33.4	77.6	0	5	-	-	-
3- 8	B1	79.8	8.6	11.6	1.3	11.4	20.4	34.5	12.2	6.5	2.1	37.0	67.6	0	12	-	-	-
8-16	B21t	66.1	6.7	27.2	1.0	8.8	18.5	30.3	7.5	3.1	3.6	25.5	58.6	0	27	-	-	-
16-24	B22tca	59.0	13.9	27.1	1.2	10.2	17.2	25.3	5.1	3.9	10.0	20.4	53.9	4	23	-	-	-
24-30	B3ca	48.2	22.9	28.9	1.3	8.5	12.4	21.5	4.5	6.8	16.1	21.8	43.7	9	20	-	-	-
30-58	IIC1	88.7	4.4	6.9	2.2	18.9	30.0	32.2	5.4	1.9	2.5	20.7	83.3	0	7	-	-	-
58-64	IIIC2ca	74.1	10.5	15.4	1.2	19.0	28.9	21.4	3.6	2.8	7.7	14.2	70.5	1	14	-	-	-
64-76+	IVC3	84.4	6.3	9.3	2.3	21.1	29.4	26.5	5.1	2.8	3.5	18.6	79.3	0	9	4	4	-

Depth (In.)	6A1a Organic carbon (Pct.)	6B1a Nitrogen (Pct.)	C/N	6C2a Ext. Iron as Fe (Pct.)	6E1b Carbonate as $CaCO_3$ (Pct.)	Bulk density: 4A1f 1/3 bar (g/cc)	Bulk density: 4A1h Oven dry (g/cc)	(g/cc)	3B2 Cm	Water content (Pct.)	4B1c 1/3 bar (Pct.)	4B2 15 bar (Pct.)	4D1 Extensibility COLEF in./in.	4D1 Extensibility COLE in./in.	pH: 8C1b Saturated Paste	pH: 8C1a H_2O 1:1	pH: 8C1a H_2O 1:10
0- 3	0.41	0.028	15		-	1.75	1.77		1.00		5.0	2.5	0.004	0.004		7.5	
3- 8	0.32	0.031	10		-	1.68	1.76		1.00		10.0	4.4	0.017	0.017		7.5	
8-16	0.52				-	1.54	1.68		1.00		16.4	11.2	0.030	0.030		7.4	
16-24	0.37				10	1.50	1.62		1.00		16.4	10.3	0.027	0.027		8.4	
24-30	0.41				23	1.33	1.41		1.00		23.6	10.7	0.020	0.020	7.8	8.5	
30-58	0.10				3	1.79	1.85		1.00		5.8	2.9	0.010	0.010	7.5	8.2	
58-64	0.13				7	1.62	1.71		1.00		12.3	6.2	0.018	0.018	7.5	7.9	
64-76+	0.10				3										7.6	8.0	

Depth (In.)	Extractable bases 6N2a Ca	6O2a Mg	6P2a Na	5B1a 6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity 5A2a NaOAc	5A1a NH_4OAc	Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter								mmho/cm
0- 3	4.5	0.6	0.2	0.3	5.6			4.9									
3- 8	6.2	2.0	0.3	0.2	8.7			8.6									
8-16	13.2	5.4	0.6	0.5	19.7			20.6									
16-24	23.3	5.6	0.8	0.4	30.1			17.5									
24-30	20.9	5.2	1.1	0.3	27.5			14.7	1.6	1.0	4.8	0.1		-	3.0	0.8		0.71
30-58	13.2	1.9	0.7	0.1	15.9			5.2	18.4	9.4	13.8	0.3		-	2.3	5.3	33.4	3.22
58-64	19.4	3.0	1.6	0.3	24.3			10.6	31.0	12.2	24.0	0.3		-	1.3	18.9	48.7	5.16
64-76+	14.2	1.9	1.9	0.2	18.2			7.8	22.4	7.7	20.4	0.4		-	1.4	17.2	32.3	4.39

Depth (In.)	8A Water at Saturation (Pct.)	5D2 Exchangeable Na (Pct.)	5B1b Exch. Na meq / 100g	6F1a Gypsum (Pct.)	5C1 Base Sat. NH_4OAc (Pct.)	Clay mineralogy (<0.002 mm.) 7A: Mont. (X-ray)	Verm. (X-ray)	Mica (X-ray)	Kaolin. (X-ray)	% Kaolinite DTA
0- 3		4			100+	xxx		x	t.	
3- 8		3			100+					
8-16		3		-	96	xxxx			xx	5
16-24		5		-	100+	xxxx			xx	
24-30	43.5	7	1.0	-	100+					
30-58	20.7	12	0.6	-	100+					
58-64	33.0	8	0.9	tr.	100+					
64-76+	26.3	18	1.4	-	100+	xxxx			x	7

1/ From characterization sample (5 kg) except as noted.

Micromorphology

65679 Sandy skeletal fabric, thin clay skins on most grains.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

CLOVIS LOAMY SAND
S65Ariz-1-8

Location: Apache County, Arizona. A pit located 1320 feet south and 53 feet east of the center of Sec. 4, T. 15 N., R. 29 E., Photo No. 6213, approximately 16 miles north of Saint Johns. Date of Sampling: September 22, 1965.
Collectors: M.L. Miller, K.N. Larson, J.E. Jay, R.E. Nelson, B. Brasher.
Vegetation: Never cultivated. Grass with basal density of 25 percent. Blue grama, galleta, spike dropseed, rabbitbrush, snakeweed (Gutierrzia sarothrae), few scattered one-seeded juniper trees. Climate: 13 inches ppt. 50° F. approximate M.A.T. Parent Material: Loamy alluvium from mixed rocks, sands and gravels of Tertiary age. Relief: Undulating plain, concave-complex 1 percent slope facing northwest at pit site. Elevation: 5845 feet. Drainage: Runoff is slow. This soil is well drained. Groundwater is deep. Permeability is moderately slow.
Remarks: Determination of pH was made with a Hellige-Truog field kit. Measure of free carbonate obtained by observing reaction to dilute HCl. This soil has an argillic horizon.
Classification: Ustollic Haplargid, fine-loamy, mixed, mesic.

HORIZON	DESCRIPTION
A1 RSL. No. 65679	0 to 3 inches, brown (10YR 5/3) loamy sand or sandy loam, dark brown (10YR 3/3) when moist; moderate medium and coarse platy structure; slightly hard, very friable, nonsticky and nonplastic; abundant fine and medium roots; many fine interstitial and tubular pores; noneffervescent; mildly alkaline (pH 7.5); clear smooth boundary.
B1 RSL No. 65680	3 to 8 inches, reddish brown (5YR 5/4) sandy clay loam, dark reddish brown (5YR 4/3) when moist; moderate medium and coarse subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; abundant fine and medium roots; common fine tubular and interstitial pores; noneffervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
B21t RSL No. 65681	8 to 16 inches, reddish brown (5YR 5/4) sandy clay loam or clay loam, dark reddish brown (5YR 3/4) when moist; weak medium and coarse prismatic breaking to moderate medium and coarse angular and subangular blocky structure; very hard, friable, slightly sticky and plastic; plentiful fine and medium roots; common fine interstitial and tubular pores; common thin clay films on ped faces and in tubular and interstitial pores; noneffervescent; neutral (pH 7.0); gradual smooth boundary.
B22tca RSL No. 65682	16 to 24 inches, reddish brown (5YR 5/4) sandy clay loam or clay loam, dark reddish brown (5YR 3/4) when moist, with few to common medium distinct pink (7.5YR 7/4) mottles, brown (7.5YR 5/4) when moist; weak medium and coarse prismatic breaking to moderate medium and coarse subangular and angular blocky structure; very hard, friable, slightly sticky and plastic; plentiful fine roots; common fine tubular and interstitial pores; common thin clay films on ped faces and in tubular and interstitial pores; strongly to violently effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.
B3ca RSL No. 65683	24 to 30 inches, pink (7.5YR 8/4) light clay loam, light brown (7.5YR 6/4) when moist; massive; hard, friable, slightly sticky and plastic; plentiful fine roots; common fine interstitial and tubular pores; violently effervescent, estimated 20 to 25 percent $CaCO_3$; moderately alkaline (pH 8.2); clear wavy boundary.
IIC1 RSL No. 65684	30 to 58 inches, brown (10YR 5/3) loamy sand, dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; common fine interstitial and few fine tubular pores; strongly effervescent; moderately alkaline (pH 8.2); abrupt wavy boundary.
IIIC2ca RSL No. 65685	58 to 64 inches, light brown (7.5YR 6/4) heavy sandy loam, dark brown (7.5YR 4/4) when moist; massive; hard, friable, slightly sticky and plastic; plentiful fine and medium roots; common fine interstitial and few fine tubular pores; violently effervescent; moderately alkaline (pH 8.2); abrupt wavy boundary.
IVC3 RSL No. 65686	64 to 76 inches +, brown (10YR 5/3) loamy sand, dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine and medium roots; common fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.2).

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVIC

SOIL FAMILY: Ustollic Haplargid, fine-loamy, mixed, mesic

SOIL Gaddes gravelly sandy loam* SOIL Nos. S65Ariz-13-8 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65225 - 65230

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand (Pct. of < 2 mm): 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: 0.05–0.02	Int. III (0.02–0.002)	3A1 Int. II (0.2–0.02)	(2–0.1)		3A1a Non-carbonate clay	* Coarse fragments 1A2a: > 2 (Pct.)	2 – 19 (Pct. of < 76mm)	19 – 76 (Pct. of < 76mm)
0-3	A1	66.3	23.2	10.5	18.3	18.0	9.6	13.8	6.6	11.9	11.3	25.5	59.7		10	16	16	0
3-11	B21t	63.7	20.5	15.8	26.2	17.1	6.8	9.2	4.4	10.8	9.7	19.9	59.3		18	22	22	0
11-24	B31t-C1	57.7	24.2	18.1	16.4	15.1	8.2	11.9	6.1	11.4	12.8	23.7	51.6		16	41	41	0
24-36	B32t-C2	52.5	22.8	24.7	26.9	12.5	4.2	5.9	3.0	10.7	12.1	16.8	49.5		25	47	47	0
36-45	B33t-C3	64.4	18.8	16.8	30.2	16.2	5.8	8.2	4.0	10.4	8.4	18.7	60.4		17	44	44	0
45-54+	C4	67.6	17.8	14.6	32.9	17.4	5.7	7.6	4.0	10.4	7.4	18.1	63.6		15	45	45	0

Depth (In.)	6A1a Organic carbon (Pct.)	6B1a Nitrogen (Pct.)	C/N	6C2a Ext. Iron as Fe (Pct.)	6E1b Carbonate as $CaCO_3$ (Pct)		Bulk density: 4A1f 1/3 bar (g/cc)	4A1h Oven dry (g/cc)		3B2 Cm	Water content (Pct)	4B1c 1/3 bar (Pct.)	4B2 15 bar (Pct.)	4D1 Extensibility COLEF (in./in.)	4D1 Extensibility COLE (in./in.)	pH: 8C1a H_2O 1:1		
0-3	1.42	0.094	15	0.8	-								5.6			6.9		
3-11	0.54	0.029	18	1.2	-		1.53	1.58		0.86		14.5	7.7	0.010	0.009	6.4		
11-24	0.22			0.8	-		1.74	1.81		0.69		13.5	8.3	0.012	0.008	7.8		
24-36	0.21			1.1	-		1.56	1.67		0.66		20.0	14.5	0.021	0.014	7.6		
36-45	0.14			0.9	-		1.54	1.60		0.69		16.8	9.6	0.014	0.009	7.5		
45-54+	0.16			0.7	-		1.77	1.81		0.65		12.6	8.0	0.006	0.004	7.6		

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum		6G1d KCl Ext. Al^{+++}		Atterberg limits: Plastic limit	Liquid limit	Plastic index			Base saturation: 5C1 NH_4OAc (Pct.)	(Pct)
	meq/100 g											Pct. of <0.4 mm						
0-3	11.9	1.9	0.2	0.4	12.9		14.4										100+	
3-11	12.7	3.3	0.1	0.3	16.4		18.3										90	
11-24	17.0	5.1	0.3	0.3	22.7		23.2										98	
24-36	29.4	10.8	0.4	0.4	41.0		41.3										99	
36-45	22.0	8.2	0.4	0.2	30.8		31.4										98	
45-54+	16.9	5.8	0.4	0.2	23.3		24.7					18	32	14			94	

Depth (In.)	Clay mineralogy (<0.002 mm) 7A: Mont.	Verm.	Mica	Kaolin	
	X-ray				
0-3	xxx	-	xx	xx	
3-11	xxx	-	xx	xx	
11-24	xxxx	-	-	xx	
24-36					
36-45	xxxx	-	-	xx	
45-54+	xx	xxx	-	x	

* Soil contains partly weathered gravel and sand, part of which can be crushed depending on the force applied. Gravel and sand, therefore, were determined by shaking overnight in a hexametaphosphate solution. Silt and clay, all chemical determinations, and 15 bar water retention were determined on crushed samples of the whole soil. All data are re-calculated to percent or meq /100 g of the <2 mm fraction.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

GADDES GRAVELLY SANDY LOAM
S65Ariz-13-8

Location: Western Yavapai County, Arizona. About 4 miles east of Dewey, Arizona on the Cherry Road, then 1/10 mile south of road. 150 feet northeast of 1/4 corner of Sec. 6, T13N, R2E. Photo #202. AMS Project 134, Lot FA. Date of Sampling: May 6, 1965.
Collectors: Flach, Alexander, Nettleton, Jay, Meurisse, Wendt.
Vegetation: Brush. Oakbrush, mountain mahogany, squawbush, snakeweed. Climate: Mean annual precipitation 12 to 14". Mean annual temperature 55°F. Soil temperature at time of sampling, 52°F. at 20" and 51° at 60". Parent Material: Weathered granite (grus) and closely related materials. Relief: Nearly level or undulating pediment surface on a 3 percent convex slope with a south aspect. Elevation: 4920 feet. Drainage: Medium runoff, moderate to moderately slowly permeable and well drained.
Remarks: Nonmodal. The dark surface is too thin for a mollic horizon but has more than 1 percent O.M. Hellige-Truog field kit was used to determine pH. Paired sample is S65 Ariz-13-16.
Classification: Ustollic Haplargid, fine-loamy, mixed, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 65225	0 to 3 inches, brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) when moist; weak medium platy breaking to moderate fine granular structure; slightly hard, very friable, non-sticky and slightly plastic; plentiful fine and medium roots; many fine interstitial pores; 40-50 percent fine gravel; 80 percent of surface covered by fine gravel and a few cobbles; noneffervescent; slightly acid (pH 6.5); clear wavy boundary.
B21t RSL No. 65226	3 to 11 inches, reddish brown (5YR 5/4) gravelly light clay, reddish brown (5YR 4/4) when moist; weak to moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and plastic; plentiful fine, medium and coarse roots; few fine tubular and many fine interstitial pores; common thin clay film on ped faces and in pores; 25-30 percent fine gravels; non-effervescent; moderately alkaline (pH 8.0); clear, wavy boundary.
B31t-C1* RSL No. 65227	11 to 24 inches, reddish brown (5YR 5/4) very gravelly weathered granite (grus), yellowish red (5YR 5/6) when moist, with dark gray (5YR 3/1) flecks; massive; hard, friable, nonsticky and slightly plastic; few medium and coarse roots; few fine tubular and many fine interstitial pores; few thin clay films on ped faces and oriented clay as bridges; 75 percent fine and medium gravel; noneffervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
B32t-C2* RSL NO. 65228	24 to 36 inches, reddish brown (5YR 5/4) very gravelly weathered granite (grus) yellowish red (5YR 4/6) when moist, with very fine dark gray (5YR 3/1) flecks; massive; very hard, friable, nonsticky and slightly plastic; few fine, medium and coarse roots; few fine and medium tubular and many fine interstitial pores; many thin clay coatings on sand grains; 75 percent fine and medium gravel; noneffervescent; moderately alkaline (pH 8.0); clear, smooth boundary.
B33t-C3 RSL No.	36 to 45 inches, reddish brown (5YR 5/4) very gravelly weathered granite (grus) yellowish red (5YR 4/6) when moist with many fine dark gray (5YR 3/1) flecks; massive; very hard, friable

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Ustollic Haplargid, fine-loamy, mixed, mesic

SOIL Showlow gravelly loam (taxadjunct) SOIL Nos. S65Ariz-13-12 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65269 - 65275

Depth (In.)	Horizon	1B1b Total Sand (2–0 05)	Total Silt (0.05–0 002)	Total Clay (< 0 002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int III (0.02–0 002)	Int. II (0.2–0.02)	(2–0 1)	3A1a Carbonate clay	3A1a Non-carbonate clay	* Coarse fragments LA2a >= 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-2	A1	59.2	22.6	18.2	7.9	12.4	9.5	18.9	10.5	13.6	9.0	34.2	49.7	0	18	39	16	23
2-6	B1t	48.8	20.5	30.7	5.1	9.1	9.0	16.8	8.8	12.1	8.4	30.0	40.0	0	31	**39	**8	**31
6-15	B21t	49.4	13.9	36.7	10.0	8.9	6.4	15.0	9.1	6.4	7.5	24.0	40.3	0	37	40	24	16
15-23	B22t	60.7	13.4	25.9	15.3	12.3	7.6	16.2	9.3	6.0	7.4	24.5	51.4	0	26	29	29	0
23-41	B3t	63.1	16.0	20.9	13.5	13.2	8.4	17.8	10.2	6.1	9.9	26.4	52.9	0	21	37	25	12
41-63	C1	64.3	16.8	18.9	14.7	14.3	8.5	16.8	10.0	5.9	10.9	25.5	54.3	0	19	38	35	3
63-74+	C2ca	67.2	15.3	17.5	13.1	13.5	8.5	19.6	12.5	6.3	9.0	30.0	54.7	0	18	47	38	9

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$		Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry		3B2	Water content	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLE	4D1 Extensibility COLE	pH: 8C1a H_2O 1:1		
	Pct	Pct.		Pct.	Pct.		g/cc	g/cc	g/cc	Cm	Pct.	Pct.	Pct.	in./in.	in./in.			
0-2	1.65	0.112	15	0.9	-		1.52	1.56		0.73		12.8	8.1	0.008	0.006	6.9		
2-6	1.08	0.087	12	1.2	-		1.45	1.61		0.74		18.9	12.7	0.036	0.026	6.7		
6-15	0.42	0.039	11	1.2	-		1.41	1.61		0.74		24.4	16.2	0.047	0.034	6.4		
15-23	0.18			1.0	-		1.53	1.73		0.81		23.5	12.8	0.041	0.033	6.8		
23-41	0.06			0.8	-		1.52	1.68		0.75		22.5	11.9	0.033	0.024	7.5		
41-63	0.03			0.7	1		1.55	1.69		0.74		18.8	11.5	0.029	0.021	8.2		
63-74+	0.03			0.7	tr		1.61	1.68		0.65		14.9	10.2	0.014	0.009	8.1		

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum	CEC / clay	6G1d KCl Ext. Al^{+++}						Base saturation 5C1 NH_4OAc	
	meq/100 g															Pct.	Pct

[redacted]

SHOWLOW GRAVELLY LOAM (taxadjunct) 1/
S65Ariz-13-12

Location: Western Yavapai County Area, Arizona. About 1½ miles south of the junction of the Rancho Moana and Williamson Valley roads on the county road between Skull Valley and Williamson Valley, then 300 feet west. NE¼ Sec. 14, T15N, R4W. Photo EGE 22-156. Date of Sampling: May 7, 1965.
Collectors: Flach, Nettleton, Jay, Meurisse, Winkelaar, Wiesner, Wendt
Vegetation: Brush - grass. Oakbrush, algerita, squawbush, tree oak, blue grama and sideoats grama. Climate: Mean annual precipitation 14-16". Mean annual temperature 55°F. Soil temperature at the time of sampling was 62°F. at 20" and 57°F. at 60". Parent Material: Mixed alluvium from granite, quartz, and some basalt. Relief: Midslope on a strongly sloping alluvial fan, on a 16 percent convex, east facing slope. Elevation: 4825 feet. Drainage: Medium runoff, moderately slowly permeable and well drained.
Remarks: This soil is formed in old alluvium, dominantly from granite and schist with some basalt, under a chaparral-type vegetation. It occurs on gently to steeply sloping alluvial fans at elevations of 4000 to 6000 feet. Hellige-Truog field kit was used to determine pH. Paired samples are S65 Ariz-13-9 and S65 Ariz-13-18.
Classification: Ustollic Haplargid, fine-loamy, mixed, mesic.

HORIZON	DESCRIPTION
A1	0 to 2 inches, dark grayish brown (10YR 4/2) gravelly loam, dark brown (7.5YR 3/2) when
RSL No.	moist; moderate fine granular structure; slightly hard, friable, slightly sticky and plastic;
65269	abundant fine and medium roots; many interstitial pores; 40 percent gravels with a few cobbles on surface; noneffervescent; neutral (pH 7.0); clear, smooth boundary.
B1t	2 to 6 inches, brown (7.5YR 4/2) heavy clay loam, dark brown (7.5YR 3/2) when moist; moder-
RSL No.	ate fine and medium subangular blocky structure; hard, friable, slightly sticky and very
65270	plastic; plentiful fine roots; few fine tubular and many fine interstitial pores; few thin clay films on ped faces and in pores; common fine gravels (5 percent); noneffervescent; neutral (pH 7.0); clear wavy boundary.
B21t*	6 to 15 inches, brown (7.5YR 4/4) clay, yellowish red (5YR 4/6) when moist; moderate, medium,
RSL No.	subangular blocky structure; hard, firm, sticky and very plastic; few fine and medium roots;
65271	few fine tubular and many interstitial pores; common thin clay films on ped faces and in pores; common fine gravels(5-10 percent); noneffervescent; neutral (pH 7.0); gradual smooth boundary.
B22t	15 to 23 inches, brown (7.5YR 4/4) finely gravelly clay, yellowish red (5YR 5/6) when moist;
RSL No.	massive; very hard, firm, sticky and plastic; few fine and medium roots; few fine tubular
65272	and many fine interstitial pores; common moderately thick clay films on ped faces and in pores; 20 percent fine gravel; noneffervescent; neutral (pH 7.0); gradual smooth boundary.
B3t	23 to 41 inches, pink (7.5YR 7/4) sandy clay loam, yellowish red (5YR 5/6) when moist;
RSL No.	massive; very hard, firm, sticky and slightly plastic; few fine and medium roots; few fine
65273	tubular and many fine interstitial pores; few moderately thick clay film on ped faces and in pores; noneffervescent; mildly alkaline (pH 7.8); clear smooth boundary.
C1*	41 to 63 inches, light brown (7.5YR 6/4) heavy sandy loam; yellowish red (5YR 5/6) when
RSL No.	moist; massive; very hard, friable, slightly sticky and slightly plastic; few very fine and
65274	fine roots; few fine tubular and many fine interstitial pores; noneffervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
C2ca	63 to 74 inches plus, light brown (7.5YR 6/4) heavy sandy loam, yellowish red (5YR 5/6) when
RSL No.	moist; massive; hard, firm, slightly sticky and slightly plastic; many interstitial and very
65275	few fine tubular pores; few oriented clay as bridges; noneffervescent to strongly effervescent; moderately alkaline (pH 8.0).

* Sampled for BPR. B21t and B22t combined for BPR sample.
C1 and C2ca combined for BPR sample.

1/ The Showlow series is in a fine, montmorillonitic, mesic family of Ustollic Haplargids. This pedon has less than 35 percent clay.

CONSECUTIVE PEDON NUMBER C 68134 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CARALAMPI TAXADJUNCT SOIL NO. S68 ARIZ. 12- 6 SAMPLE NO. 8 989-8 990 E.PIMA-SANTA CRU AREA

SOIL FAMILY: USTOLLIC HAPLARGID FINE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A	1A2A INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75-20	II 20-5 PCT. OF	III 5-2 LT 75
			PERCENT OF LESS THAN 2MM																	
8 989	0- 38	A	59.8	18.5	21.7	8.5	15.7	9.8	16.0	9.8	6.3	12.2				25.4	45*	13	9	21
8 990	5- 56	B T	54.8	14.1	31.1	16.5	14.3	9.2	11.2	3.6	6.8	7.3				15.4	35A	8	12	15

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DITH-CIT FE 6C2B	EXT AL 6G7A	PYROP EXT FE 6C5A	AL 6G5A	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY 1/3 BAR EST. 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.NO.40		GRAMS PER CC				PERCENT			PERCENT	
8 989	0- 38	1.47	0.116									1.13		0.74				13.0		
8 990	5- 56											1.35		0.77				13.0		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACIDITY 6H2A	KCL EXT. AL 6G1E	CEC SUM 5A3A	NH4-OAC 5A6A	BASE SATURATION SUM+ ACIDITY 5C1	SUM+ AL	NH4-OAC	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
8 989	0- 38															
8 990	5- 56	12.3	11.7	0.1	0.6	24.7			24.7	22.2	100+		100+		6.2	5.7

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY <0.002 MM X RAY DTA 7A2E I	7A2E II	7A2E III	7A2E IV	7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
8 989	0- 38											1 TRACE
8 990	5- 56	MT 4	MI 3	KK 2							MT MONTMORT	2 SMALL
											MI MICA	3 MODERATE
											KK KAOLINIT	4 ABUNDANT
												5 DOMINANT
												6 INDETER.

SAMPLE PREPARATION CODES
*THE 75-250MM FRACTION IS INCLUDED.

CARALAMPI VERY GRAVELLY LOAM (tentative) 1/

[illegible]

northwest of Highway 82 on Lake Patagonia road in road cut. Approximately 500 feet north and 600 feet west of southeast corner, Sec. 31, T22S, R15E. Photo AMS-670. Date of Sampling: October 11, 1968.

Description by: Richardson and Havens. Collectors: Nettleton and Brasher.

Classification: Ustollic Haplargid, fine-loamy, mixed, thermic.

Vegetation: Grassland-minor brush. Brush: Few guajillo, mimosa, ocotillo and cacti. Grass: Purple grama, sideoats grama, curly mesquite, wolftail and three-awn. Climate: Mean annual temperature 62°F. Mean annual precipitation 14-15 inches. Parent Material: Mixed old alluvium from andesite, dacite and related tuffs plus some granite rocks. Topography: Moderately steep dissected old fan. 25 percent slope, north aspect. Elevation: 4200 feet. Drainage: Well drained. Soil Moisture: Moist.

Remarks: Composite samples only.

HORIZON	DESCRIPTION
	(0-5 cm)
A1	0 to 2 inches, dark brown (10YR 4/3) very gravelly loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine interstitial pores; noneffervescent; medium acid (pH 6.0); abrupt wavy boundary.
B1t (5-15 cm)	2 to 6 inches, reddish brown (5YR 4/4) very gravelly clay loam, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; many fine and very fine roots; common fine interstitial pores; common thin clay films on ped faces; noneffervescent; slightly acid (pH 6.5); clear wavy boundary.
B21t (15-25 cm)	6 to 10 inches, reddish brown (2.5YR 4/4) very gravelly clay loam, dark reddish brown (2.5YR 3/4) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common fine and medium roots; common fine interstitial pores; common thin clay films on ped faces; noneffervescent; slightly acid (pH 6.5); clear wavy boundary.
B22t	10 to 22 inches, reddish brown (2.5YR 4/4) heavy clay loam, dark red

CONSECUTIVE PEDON NUMBER C 68135 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CARALAMPI TAXADJUNCT SOIL NO. S68 ARIZ. 12- 7 SAMPLE NO. 8 991-8 992 E.PIMA-SANTA CRU AREA

SOIL FAMILY: USTOLLIC HAPLARGID FINE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SANDS SILTS CLAYS													1A2A INT.	COARSE FRAGMENTS		
			SAND 2- .05	SILT .05- .002	CLAY LT .002	VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	CO. 2- .2U	FINE LT .2U	CARBONATE 3A1A	.2- .02	PCT. OF WHOLE SOIL	I 75+ 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75		
8 991	0- 38	A	61.0	25.3	13.7	12.5	11.2	6.4	17.0	13.9	10.5	14.8				35.5	40*	7	14	16
8 992	10- 61	B T	58.4	12.9	28.7	15.6	15.3	10.7	13.1	3.7	5.2	7.7				14.8	41*	22	10	7

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT EXT FE 6C2B	AL 6G7A	PYROP EXT FE 6C5A	AL 6G5A	ATTERBERG LL 4F1	PL 4F2	BULK DENSITY EST. 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.NO.40		GRAMS PER CC				PERCENT			PERCENT	
8 991	0- 38	1.36	0.107									1.13		0.78				15.3		
8 992	10- 61											1.35		0.74				14.1		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4- OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4- OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA- CL2 8C1E
		MEQ/100G									PERCENT					
8 991	0- 38															
8 992	10- 61	10.8	7.8	0.1	0.5	19.2			19.2	19.2	100+		100+		6.4	5.9

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY LESS THAN 0.002 MM X RAY 7A2E I	7A2F II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2F III	MINERAL CODE	RELATIVE AMOUNT
8 991	0- 38											1 TRACE
8 992	10- 61	MT 4 MI 2 KK 1									MT MONTMORT	2 SMALL
											MI MICA	3 MODERATE
											KK KAOLINIT	4 ABUNDANT
												5 DOMINANT
												6 INDETER.

SAMPLE PREPARATION CODES
*=THE 75-250MM FRACTION IS INCLUDED.

CARALAMPI GRAVELLY LOAM (taxadjunct) 1/
S68 Ariz-12-7-1 through 5

Location: Santa Cruz County, Arizona, about 10 miles northeast of Nogales on road to Lake Patagonia. 1.6 miles northwest of Highway 82 and 800 feet east of cattle guard at bottom of hill. About 500 feet north, 1100 feet west of SE corner Section 31, T22S, R15E. Photo AMS-670. Date of Sampling: October 11, 1968.
Description by: Richardson and Havens. Collectors: Nettleton and Brasher.
Classification: Ustollic Haplargid, fine-loamy, mixed, thermic.
Vegetation: Grass - scattered brush. Grass: Curly mesquite, sideoats grama, three-awn, tanglehead, Indian wheat, wolftail. Brush: Guajillo, mimosa, few mesquite.
Climate: Mean annual temperature 62°F. Mean annual precipitation 14-15 inches.
Parent Material: Old alluvium from andesite, dacite, granite and tuff. Topography: Dissected old fan. 25 percent slope. North aspect. Elevation: 4100 feet. Drainage: Well drained. Medium runoff. Soil Moisture: Moist.
Remarks: Composite samples only. No effervescence in profile could be found to 12 feet.

HORIZON	DESCRIPTION
	(0-10 cm)
A1	0 to 4 inches, dark brown (7.5YR 4/2) gravelly loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots; many fine interstitial pores; 40 percent coarse fragments; noneffervescent; slightly acid (pH 6.5); abrupt wavy boundary.
B1t	4 to 11 inches, reddish brown (5YR 4/4) gravelly sandy clay loam or subangular blocky breaking to moderate fine granular structure; slightly hard, friable, sticky and plastic; many very fine and fine roots; common fine and very fine tubular and common fine interstitial pores; few thin clay films on ped faces and in pores; 35 percent coarse fragments; noneffervescent; slightly acid (pH 6.5); clear wavy boundary.
B2t (28-56 cm)	11 to 22 inches, reddish brown (5YR 4/4) gravelly sandy clay loam, dark reddish brown (5YR 3/4) moist; weak fine and medium subangular blocky structure; hard, friable, sticky and plastic; common fine and very fine roots; common fine and very fine tubular pores; few thin clay films on ped faces and in pores; 45-50 coarse fragments; noneffervescent; neutral (pH 7.0); abrupt wavy boundary.
B3t (56-94 cm)	22 to 37 inches, light reddish brown (5YR 6/3 and 6/4) very gravelly sandy clay loam, reddish brown (5YR 4/3 and 4/4) moist; massive; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine and very fine tubular pores; common thin clay films in pores and pressure faces adjacent to gravel; 50-60 percent coarse fragments; noneffervescent; neutral to mildly alkaline (pH 7.0 to 7.5); abrupt wavy boundary.
C (94-183 cm)	37 to 72 inches plus, brown (7.5YR 5/4) and strong brown (7.5YR 5/6) stratified gravelly to very gravelly sandy loam and sandy clay loam.

CONSECUTIVE PEDON NUMBER C 68136 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CARALAMPI TAXADJUNCT SOIL NO. S68 ARIZ. 12- 8 SAMPLE NO. 8 993-8 994 E.PIMA-SANTA CRU AREA

SOIL FAMILY: USTOLLIC HAPLARGID FINE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

			SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1												1A2A			
			TOTAL FRACTION			SANDS				SILTS			CLAYS			INT.	COARSE FRAGMENTS	
SAMPLE NO.	DEPTH CM.	HORZ.	SAND 2- .05	SILT .05- .002	CLAY LT .002	VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	II PCT. OF WHOLE SOIL	I 75- 20	II 20-5 PCT. OF	III 5-2 LT 75
			PERCENT OF LESS THAN 2MM															
8 993	0- 38	A	47.5	28.5	24.0	3.1	4.0	3.8	19.0	17.6	11.0	17.5				41.8	37*	18	7	8
8 994	3- 53	B T	58.0	19.6	22.4	19.4	15.9	7.3	10.3	5.1	7.3	12.3				17.2	30*	9	8	9

		ORG.MATTER		CARBONATE	SESQUIOXIDES				ATTERBERG			BULK DENSITY		CM	WATER CONTENT			EXTNSBLTY	
SAMPLE NO.	DEPTH CM.	CAR- BON 6A1A	NITRO GEN 6B1A	AS CACO3 LT 2 6E1B	2-20 6E1B	DI-CIT EXT FE 6C2B	AL 6G7A	PYROP EXT FE 6C5A	AL 6G5A	LL 4F1	PL 4F2	I 4A1F	M I T 4A1F	EST. 1/3 BAR 4A1H	DRY 3B2	1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	LEF 4D1	LE 4D1
		-PERCENT-		-PERCENT-		------PERCENT-------				PCT. NO.40		GRAMS PER CC				----PERCENT---			-PERCENT-	
8 993	0- 38	0.86	0.070									1.13		0.80				16.2		
8 994	3- 53											1.35		0.82				14.9		

		--EXTRACTABLE BASES----					EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	--C E C-- SUM 5A3A	NH4- OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4- OAC 5C1	-----PH------		
SAMPLE NO.	DEPTH CM.	CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM								NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA- CL2 8C1E
		MEQ/100G									----PERCENT----					
8 993	0- 38															
8 994	3- 53	24.8	15.6	0.1	0.4	40.9			40.9	38.8	100+		100+		6.6	6.2

		CLAY MINERALOGY										
SAMPLE NO	DEPTH CM.	LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
8 993	0- 38											1 TRACE
8 994	3- 53	MT 4	MI 3	KK 2							MT MONTMORT	2 SMALL
											MI MICA	3 MODERATE
											KK KAOLINIT	4 ABUNDANT
												5 DOMINANT
												6 INDETER.

SAMPLE PREPARATION CODES
*=THE 75-250MM FRACTION IS INCLUDED.

Santa Cruz County Area

CARALAMPI GRAVELLY LIGHT SANDY CLAY LOAM (taxadjunct) 1/

S68 Ariz-12-8-1 through 4

Location: Santa Cruz County, Arizona, approximately 3 miles north of Patagonia in NW¼ NE¼ Section 25, T21S, R15E. Date of Sampling: October 11, 1968.
Description by: Havens and Richardson Collectors: Nettleton and Brasher.
Classification: Ustollic Haplargid, fine-loamy, mixed, thermic.

Vegetation: Mostly grass - minor brush. Grass: Curly mesquite, sideoats grama, purple grama, slender grama, canebeard grass, tanglehead, three-awn. Brush: Few mesquite, guajillo, few agave. Climate: Mean annual temperature 62°F. Mean annual precipitation 16 inches. Parent Material: Old alluvium from granite, andesite and rhyolite - high in tuff and volcanic ash. Topography: Old alluvial fan. 25 percent slope. South aspect. Elevation: 4500 feet. Drainage: Well drained. Soil Moisture: Moist.
Remarks: Composite samples only.

HORIZON	DESCRIPTION
	(0-3 cm)
A1	0 to 1 inch, brown (7.5YR 5/2) gravelly light sandy clay loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; common fine interstitial pores; neutral (pH 7.0) abrupt smooth boundary.
B21t (3-28 cm)	1 to 11 inches, reddish brown (5YR 5/4) gravelly sandy clay loam, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, sticky and plastic; many very fine and fine roots; common very fine interstitial and few fine tubular pores; common thin clay films on ped faces; 30 percent gravel; noneffervescent; neutral (pH 7.2); clear wavy boundary.
B22t (28-58 cm)	11 to 23 inches, reddish brown (5YR 5/4) gravelly sandy clay loam, reddish brown (5YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; many very fine and medium roots; few very fine and fine tubular pores; few thin clay films on ped faces and in pores; 40 percent gravel; noneffervescent; neutral (pH 7.2); clear wavy boundary.
C1 (58-114 cm)	23 to 45 inches, light brown (7.5YR 6/4) very gravelly sandy clay loam, brown (7.5YR 5/4) moist; massive; very hard, firm, sticky and plastic; common very fine tubular pores; 45 percent coarse fragments; noneffervescent; mildly alkaline (pH 7.5).
Composite A RSL 68993	0 to 15 inches, sample collected from road cut. (0-38 cm)
Composite B 68994	1 to 21 inches, sample upper 20 inches of the argillic horizon from the road cut. (3-53 cm)

1/ The Caralampi series is in a loamy-skeletal, mixed, thermic family of Ustollic Haplargids. This pedon has less than 35 percent

CONSECUTIVE PEDON NUMBER C 69154 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES FORREST TAXADJUNCT SOIL NO. S69 ARIZ. 2- 8 SAMPLE NO. 9 798-9 807 WILLCOX AREA

SOIL FAMILY: USTOLLIC HAPLARGID,FINE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	SILTS CO. 2- .2U	CLAYS FINE LT .2U	CARBONATE 3A1A.02	INT. II .2- WHOLE 20	COARSE FRAGMENTS I 75- PCT. OF SOIL	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75		
9 798	0- 5	A11	53.3	34.2	12.5	7.8	13.2	8.0	13.6	10.7	15.1	19.1				33.5	39A	--	37	2
9 799	5- 10	A12	49.7	32.0	18.3	8.2	17.0	7.2	10.1	7.2	13.8	18.2				27.0	5A	--	1	4
9 800	10- 28	B1 T	38.9	26.0	35.1	8.0	11.0	4.9	8.6	6.4	10.0	16.0				21.3	4A	--	1	3
9 801	28- 41	B21T	36.3	28.1	35.6	6.9	8.3	4.6	9.4	7.1	12.5	15.6				25.2	6A	--	1	5
9 802	41- 51	B22T	49.1	23.8	27.1	15.3	13.0	5.7	8.8	6.3	10.6	13.2				22.0	6A	--	1	5
9 803	51- 74	B23T	37.1	22.7	40.2	10.0	9.2	4.1	7.6	6.2	10.6	12.1				21.2	7A	--	TR	7
9 804	74- 89	C 1CA	28.3	44.8	26.9	5.4	7.4	3.3	6.2	6.0	12.0	32.8			7	21.6	5A	--	TR	5
9 805	89-125	C 2CA	32.6	46.5	20.9	5.9	5.8	3.6	8.6	8.7	16.3	30.2			7	30.3	2A	--	TR	2
9 806	125-150	C 3CA	45.0	39.0	16.0	8.7	7.6	5.1	11.7	11.9	20.7	18.3				39.6	23A	11	10	2
9 807	0- 38	A1	21.1	50.2	28.7	1.0	2.6	2.3	8.7	6.5	16.2	34.0			10	28.4	3A	--	--	3

SAMPLE NO.	DEPTH CM.	ORG. MATTER CAR- BON	NITRO GEN	CARBONATE AS CACO3 LT 2	19-2	EXT. IRON FE	ATTERBERG L L	I M	P L	BULK DENSITY EST 1/3 BAR	DENSITY 1/3 BAR	DRY	CM	WATER CONTENT 1/10 BAR	1/3 BAR	15 BAR	EXTENSBLTY LEF	LE	PH H2O 1/1	PH H2O 1/10	CACL2
[illegible]																					
9 798	0- 5	0.78	0.073	TR		0.6	21		17		1.45	1.52	0.74		13.7	6.1	1.6	1.2	6.4		6.2
9 799	5- 10	0.51	0.047			0.7					1.55	1.64	0.97		14.9	7.0	1.9	1.8	6.3		6.0
9 800	10- 28	0.58	0.062			1.0					1.42	1.65	0.98		23.1	12.6	5.1	5.0	6.6		6.4
9 801	28- 41	0.58	0.053			0.9	45		21		1.59	1.81	0.96		20.0	12.6	4.4	4.3	7.2		7.0
9 802	41- 51	0.39				0.9					1.60	1.78	0.96		17.6	10.2	3.6	3.5	7.3		7.1
9 803	51- 74	0.33			2	1.1	52		22		1.44	1.71	0.96		27.8	14.2	5.9	5.6	7.7		7.6
9 804	74- 89				33	0.4	33		17		1.49	1.62	0.97		18.2	9.4	2.8	2.7	7.7		7.8
9 805	89-125				30	0.4					1.65	1.76	0.98		16.7	7.2	2.2	2.1	7.8		7.8
9 806	125-150				18	0.4					1.67	1.78	0.84		14.4	6.4	2.1	1.8	7.9	9.0	7.9
9 807	0- 38					0.8			1.50				0.99			11.2			6.8		6.8

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6G2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
9 798	0- 5			0.3	1.7	2.0			11.7											
9 799	5- 10			0.3	1.3	1.6			13.4											
9 800	10- 28			0.2	1.5	1.7			22.9											
9 801	28- 41			0.5	1.2	1.7			22.8											
9 802	41- 51			0.5	0.9	1.4			17.7											
9 803	51- 74			0.9	1.2	2.1			22.3											
9 804	74- 89	[illegible]																		
9 805	89-125			1.2	0.4	1.6			10.9											
9 806	125-150			1.3	0.3	1.6			9.6	1.08	1.5	1.3	10.0	0.1		2.3	5.2			8.0
9 807	0- 38			0.4	1.5	1.9			19.6											

FORREST LOAM (taxadjunct) 1/
S69Ariz-2-8

Location: Cochise County, Arizona. 1,200 feet north and 1,200 feet west of the southeast corner of Sec. 13, T. 17 S., R. 24 E. West of U. S. Highway 666, about 3½ miles north and 3/4 mile west of Pearce. Date of sampling: October 15, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Ustollic Haplargid, fine-loamy, mixed, thermic.
Vegetation: Blue grama, tobosa, three-awn, burroweed and scattered yucca. Use: Livestock range. Now in subdivision area for homesites. Climate: Precipitation is about 12 to 13 inches. Mean annual air temperature 60°F., January 42°F., July 78°F. Parent Material: Alluvium, principally from rhyolite, andesite, granite, quartzite and limestone. Topography: Slightly convex to smooth, nearly level to gently sloping valley plains and old fans. Slope, 0.5 percent, northeast facing. Elevation: 4320 feet. Drainage: Well drained. Runoff is medium to slow. Permeability is slow.
Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by Hellige-Truog indicator solution. Paired with sample S69Ariz-2-9. A composite sample of 0 to 15 inch layer (0 to 38 cm) was taken for organic carbon determination - four sites sampled approximately 20 feet N, E, S, and W of pit and composite sample obtained (RSL 69807).

HORIZON	DESCRIPTION
A11 RSL 69798	0 to 5 cm (0 to 2 inches), brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak thin platy structure; slightly hard, friable, slightly sticky, slightly plastic; common very fine and fine roots; many very fine and fine vesicular pores; 2 to 3 percent by volume of 1/2 to 1 inch rounded rhyolite and quartzite gravel; noneffervescent; slightly acid (pH 6.5); abrupt smooth boundary.
A12	5 to 10 cm (2 to 4 inches), brown (7.5YR 5/4) heavy loam, dark brown (7.5YR 4/4) on dark

CONSECUTIVE PEDON NUMBER C 68129 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES BERNARDINO TAXADJUNCT SOIL NO. S68 ARIZ. 12-14 SAMPLE NO. 8 959-8 963 E.PIMA-SANTA CRU AREA

SOIL FAMILY: USTOLLIC HAPLARGID, FINE-LOAMY, MIXED, THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05 SAND	2- .05 SILT	LT .002 CLAY	SANDS VCS 2-1	SANDS CS 1-.5	SANDS MS .5-.25	SANDS FS .25-.10	SANDS VFS .1-.05	SILTS CSI .05-.02	SILTS FSI .02-.002	CLAYS CO. 2-.2U	CLAYS FINE LT .2U	CLAYS CARBONATE 3A1A	INT. II 1A2A .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75-20 PCT. OF LT 75	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM																	
8 959	0- 8	A1	46.3	25.8	27.9	1.5	3.1	7.6	20.4	13.7	13.6	12.2				38.9	--A	--	--	--
8 960	8- 20	A3	56.1	18.9	25.0	3.5	4.7	11.4	25.3	11.2	10.4	8.5				34.8	--A	--	--	--
8 961	20- 30	B2 T	50.5	17.9	31.6	4.2	5.4	11.5	21.5	7.9	8.5	9.4				27.1	--A	--	--	--
8 962	30- 43	B3 TCA	40.8	30.4	28.8	5.0	5.7	8.1	14.7	7.3	10.6	19.8			5	25.6	--A	--	--	--
8 963	43-107	C CA	40.3	43.8	15.9	2.7	7.7	7.2	14.3	8.4	19.4	24.4			3	35.1	39A	--	30	9

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	CARBONATE AS CACO3 2-20 6E1B	SESQUIOXIDES DI-CIT EXT FE 6C2B	SESQUIOXIDES PYROP EXT AL 6G7A	SESQUIOXIDES DI-CIT EXT FE 6C5A	SESQUIOXIDES PYROP EXT AL 6G5A	ATTERBERG LIMIT LL 4F1	ATTERBERG LIMIT PL 4F2	BULK DENSITY 1/3 BAR 4A1F	BULK DENSITY DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	WATER CONTENT 1/3 BAR 4B1C	WATER CONTENT 15 BAR 4B2	EXTNSBLTY LEF 4D1	EXTNSBLTY LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.NO.40		GRAMS PER CC			PERCENT			PERCENT		
8 959	0- 8	2.57	0.201	5		1.1	0.2			42	28	0.87	1.03	1.00		24.7	13.1	5.8	5.8
8 960	8- 20	1.52	0.127	1		1.2	0.1			31	20	1.32	1.41	1.00		19.4	10.2	2.2	2.2
8 961	20- 30	1.23	0.120	6		1.1	0.2			37	22	1.33	1.46	1.00		22.7	12.2	3.2	3.2
8 962	30- 43	0.87	0.086	31		0.6	0.2			39	22	1.02	1.15	1.00		38.7	11.4	4.1	4.1
8 963	43-107	0.24		59		0.4	TR			33	26	1.15	1.19	0.78		30.3	8.3	1.1	0.9

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	CEC SUM 5A3A	CEC NH4-OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	BASE SATURATION SUM+ AL	BASE SATURATION NH4-OAC 5C1	PH NAF 2 MIN 8C1D	PH H2O 1/1 8C1A	PH CA-CL2 8C1E
		MEQ/100G									PERCENT					
8 959	0- 8	43.9	2.1	0.1	1.7	47.8			47.8	25.9	100+		100+		7.8	7.4
8 960	8- 20	31.3	1.4	0.1	0.8	33.6			33.6	21.2	100+		100+		7.9	7.5
8 961	20- 30	40.5	2.0	0.1	0.6	43.2			43.2	24.4	100+		100+		7.8	7.5
8 962	30- 43	41.8	3.0	0.1	0.6	45.5			45.5	22.6	100+		100+		8.0	7.6
8 963	43-107	39.5	3.8	1.0	0.5	44.8			44.8	20.3	100+		100+		8.3	7.7

CLAY MINERALOGY

SAMPLE NO	DEPTH CM.	LESS THAN 0.002 MM X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	DTA IV 7A2E	DTA 7A3 -PERCENT-	L.T. 0.0002 MM X RAY I 7A3	X RAY II 7A2E	X RAY III 7A2E	MINERAL CODE	RELATIVE AMOUNT
8 959	0- 8	MT 3	MI 2	KK 1						MT MONTMORT	1 TRACE
8 960	8- 20	MT 4	MI 3	KK 2						MI MICA	2 SMALL
8 961	20- 30	MT 4	MI 2	KK 2						KK KAOLINIT	3 MODERATE
8 962	30- 43	MT 5	MI 1	KK 1							4 ABUNDANT
8 963	43-107	MT 4	MI 3	KK 2							5 DOMINANT
											6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

BERNARDINO CLAY LOAM (taxadjunct) 1/
S68 Ariz-12-14-1 through 5

Location: Santa Cruz County, Arizona, 3-1/2 miles west of Elgin on north side of road opposite a windmill, approximately the S¼ corner Section 26, T20S, R17E. Photo AMS-255. Date of Sampling: Oct. 17, 1968.

Description by: Havens. Collectors: Nettleton and Brasher.
Classification: Ustollic Haplargid, fine-loamy, mixed, thermic.
Vegetation: Blue grama, black grama, purple grama, wolftail, three-awn and curly mesquite. Climate: Mean annual temperature 61°F. Mean annual precipitation 15 inches. Parent Material: Mixed old alluvium from andesite, rhyolite and related tuff. Topography: Rolling plains, 4 to 5 percent slope. Southeast aspect. Elevation: 4975 feet. Drainage: Well drained. Medium runoff. Soil Moisture: Dry.

HORIZON	DESCRIPTION
	(0-8 cm)
A1	0 to 3 inches, reddish brown (5YR 5/4) light clay loam,
RSL	dark reddish brown (5YR 3/4) moist; moderate fine granular
68959	structure; slightly hard, friable, slightly sticky and plastic; many fine and medium roots; common fine interstitial and tubular pores; noneffervescent; abrupt smooth boundary.
A3	3 to 8 inches, reddish brown (5YR 4/4) heavy clay loam,
RSL	dark reddish brown (5YR 3/4) moist; moderate medium
68960	subangular blocky structure; hard, friable, sticky and
(8-20 cm)	plastic; many fine and medium roots; common fine and medium tubular pores; few thin clay films on ped faces and in pores; noneffervescent; clear smooth boundary.
B2t	8 to 12 inches, reddish brown (5YR 4/4) clay, dark red
RSL	(2.5YR 3/6) moist; moderate medium prismatic structure;
68961	very hard, friable, sticky and plastic; many fine and
(20-30 cm)	medium roots; common fine and medium tubular pores; common moderately thick clay films on ped faces and in pores; noneffervescent; clear smooth boundary.
B3tca	12 to 17 inches, reddish brown (5YR 5/3) and (5/4) clay
RSL	loam or clay, reddish brown (5YR 4/4) and pink (5YR 7/3)
68962	moist, with many medium and large distinct pinkish white
(30-43 cm)	(5YR 8/2) lime segregations; weak medium and coarse subangular blocky structure; hard, friable, sticky and plastic; common fine roots; few coarse tubular pores; few thin clay films on ped faces and in pores; strongly to violently effervescent; clear wavy boundary.
Cca	17 to 42 inches, mottled pinkish white (7.5YR 8/2) and
RSL	pinkish gray (6/2) and brown (7.5YR 5/4) heavy loam or
68963	clay loam, pinkish white (7.5YR 8/2), light brown (6/3)
(43-107 cm)	and dark brown (4/4) moist; massive; slightly hard, very friable, slightly sticky and plastic; few fine roots; violently effervescent.

1/ The Bernardino series is in a fine, mixed, thermic family of Ustollic Haplargids. This pedon has an argillic horizon with less than 35 percent clay.

CONSECUTIVE PEDON NUMBER C 69208 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES BERNARDINO SOIL NO. S69 ARIZ. 2- 2 SAMPLE NO. 91108-91114 WALNUT G.-TUCSON AREA

SOIL FAMILY: USTOLLIC HAPLARGID,FINE,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05 SAND	.05- .002 SILT	LT .002 CLAY	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	SILTS-- CO. 2-.2U	FINE LT .2U	CLAYS---- CARBONATE 3A1A	1A2A INT. .2-.02 PCT. OF WHOLE SOIL	COARSE FRAGMENTS- I 75-20 PCT. OF	II 20-5 LT 75	III 5-2
			PERCENT OF LESS THAN 2MM																
91108	0- 5	A1	66.9	15.5	17.6	10.1	13.1	10.9	23.5	9.3	9.0	6.5				31.7	68A	17	32	19
91109	5- 15	B21T	51.7	11.5	36.8	9.6	10.7	9.6	16.5	5.3	4.7	6.8				18.1	11A	--	2	9
91110	15- 23	B22T	45.4	12.9	41.7	14.8	9.3	6.1	10.6	4.6	4.6	8.3				14.4	34A	--	15	19
91111	23- 33	B23T	53.1	14.7	32.2	20.8	12.2	6.0	9.5	4.6	4.8	9.9				14.4	54A	--	28	26
91112	33- 43	B3 T	52.6	16.3	31.1	12.0	12.9	7.1	13.7	6.9	6.0	10.3				20.6	41A	--	23	18
91113	51- 79	C 2CA	77.8	10.8	11.4	22.1	21.6	10.9	17.3	5.9	4.2	6.6				19.5	32A	--	8	24
91114	79-127	C 3CA	74.2	14.1	11.7	29.0	16.2	8.4	13.9	6.7	5.5	8.6			2	19.9	61A	3	45	13

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY EST. 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT	
91108	0- 5	1.63	0.121			0.9	TR					1.25		0.50				9.3		
91109	5- 15	1.50	0.134			1.1	0.1						1.18	1.45	0.95		30.0	15.3	7.1	6.7
91110	15- 23	1.14	0.097			1.0	0.1						1.12	1.43	0.82		33.5	18.3	8.5	6.8
91111	23- 33	0.88	0.074			0.7	0.1						1.14	1.38	0.67		32.8	15.9	6.6	4.2
91112	33- 43	0.60	0.063			0.6	0.1						1.34	1.63	0.75		26.8	15.9	6.7	4.9
91113	51- 79			9		0.3	TR						1.40	1.41	0.80		21.9	6.6	0.2	0.2
91114	79-127			13		0.2	TR					1.40			0.55			6.6		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4-OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
91108	0- 5			0.4	1.1	1.5			1.5	19.2					7.2	7.0
91109	5- 15			0.4	1.1	1.5			1.5	29.9					7.0	7.0
91110	15- 23			0.6	1.0	1.6			1.6	36.5					6.9	6.4
91111	23- 33			0.5	1.0	1.5			1.5	35.0					7.1	6.7
91112	33- 43			0.5	1.0	1.5			1.5	32.9					7.1	6.9
91113	51- 79			0.5	0.5	1.0			1.0	17.1					7.6	7.5
91114	79-127			0.7	0.5	1.2			1.2	18.2					7.6	7.7

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM MINERAL X RAY 7A2E I	7A2E II	7A2E III	CODE	RELATIVE AMOUNT
91109	5- 15	MT	3								MT	MONTMORT
91110	15- 23											
91111	23- 33	MT	5									
91112	33- 43	MT	5									
91113	51- 79											
91114	79-127											

1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

BERNARDINO GRAVELLY LOAM
S69Ariz-2-2

Location: Cochise County, Arizona. 2,300 feet east and 800 feet south of northwest corner of Sec. 36, T. 19 S., R. 23 E., south side of road. About 3 miles NE of Tombstone on Gleeson Road. Date of sampling: September 25, 1969.
Description by: Y. H. Havens and D. M. Hendricks. Collectors: Y. H. Havens and D. M. Hendricks.
Classification: Ustollic Haplargid, fine, mixed, thermic.
Vegetation: Curly mesquite, hairy, blue, sideoats and black grama, yucca, snakeweed, tree mesquite, and rhus. Climate: Mean annual temperature approximately 63° F. Mean annual precipitation approximately 14 inches. Parent material: Mixed alluvium from andesite, rhyolite, tuff, limestone, basalt and some quartzite. Topography: Strongly sloping old fan. Elevation: Approximately 4,930 feet. Drainage: Well drained. Soil moisture: Dry.

HORIZON	DESCRIPTION
A1 RSL No. 691108	0-5 cm (0-2 inches), brown (7.5YR 5/2) gravelly loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky, slightly plastic; common very fine and fine roots; common fine interstitial pores; noneffervescent; neutral (pH 7.3); clear smooth boundary.
B21t RSL No. 691109	5-15 cm (2-6 inches), dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; hard to very hard, friable, sticky, plastic; common very fine and fine roots; few very fine tubular and interstitial pores; few thin clay films on ped faces and in pores; 5 percent gravel; noneffervescent; neutral (pH 7.3); clear wavy boundary.
B22t RSL No. 691110	15-23 cm (6-9 inches), dark reddish brown (5YR 3/4) clay, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular and angular blocky structure; very hard, friable, sticky, plastic; common fine and medium roots; few very fine tubular and interstitial pores; common thin clay films on ped faces and in pores; 8 to 10 percent gravel; noneffervescent; neutral (pH 7.2); clear wavy boundary.
B23t RSL No. 691111	23-33 cm (9-13 inches), reddish brown (5YR 5/3) gravelly light clay, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; very hard, friable, sticky, plastic; common very fine and fine roots; few very fine tubular pores; common thin clay films on ped faces and in pores; 20 percent gravel; noneffervescent; neutral (pH 7.2); clear wavy boundary.
B3t RSL No. 691112	33-43 cm (13-17 inches), reddish brown (5YR 5/3) light clay, dark reddish brown (5YR 3/4) moist; weak medium and coarse prismatic breaking to moderate medium and coarse angular and subangular blocky structure; very hard, firm, sticky, plastic; common very fine roots; few very fine tubular pores; common thin clay films on ped faces and in pores; 5 percent gravel; noneffervescent; mildly alkaline (pH 7.8); clear wavy boundary.
C1 (not sampled)	43-51 cm (17-20 inches), pinkish gray (7.5YR 6/2) gravelly heavy sandy loam, brown (7.5YR 5/4) moist; massive; hard, very friable, slightly sticky, slightly plastic; few fine and medium roots; common very fine interstitial pores; 15 to 20 percent gravel; slightly effervescent in spots; moderately alkaline (pH 8.1); this layer is discontinuous.
C2ca RSL No. 691113	51-79 cm (20-31 inches), stratified white (7.5YR N 8/) gravelly light sandy clay loam, and pinkish gray (7.5YR 6/2) sandy loam, pinkish white (7.5YR 8/2) and brown (7.5YR 5/4) moist; strata are 1 to 3 inches thick; massive; hard, friable, slightly sticky, slightly plastic; few fine roots; common very fine interstitial pores; 15 percent gravel; violently effervescent, strongly effervescent in brown strata; moderately alkaline (pH 8.1); abrupt wavy boundary.
C3ca RSL No. 691114	79-127 cm (31-50 inches), stratified white (7.5YR N 8/) gravelly light sandy clay loam, and pinkish gray (7.5YR 6/2) light sandy loam, pinkish white (7.5YR 8/2) and brown (7.5YR 5/4) moist; strata are 2 to 5 inches thick; massive; hard, very friable, nonsticky, slightly plastic; few fine roots; many fine and medium vesicular pores; 30 percent gravel; violently effervescent, strongly effervescent in brown strata; moderately alkaline (pH 8.4).

CONSECUTIVE PEDON NUMBER C 68149 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES WHITE HOUSE SOIL NO. S68 ARIZ. 12- 9 SAMPLE NO. 81070-81079 E.PIMA-SANTA CRU AREA

SOIL FAMILY: USTOLLIC HAPLARGID,FINE,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05 SAND	.05- .002 SILT	LT .002 CLAY	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	SILTS CO. 2- .2U	CLAYS FINE LT .2U	CLAYS CARBONATE 3A1A	1A2A INT. II .2- .02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75- 20	II 20-5	III 5-2
						PERCENT OF LESS THAN 2MM												PCT. OF LT 75			
81070	0- 8	A1	46.0	37.9	16.1	5.9	7.4	6.2	15.5	11.0	21.0	16.9	8.7	7.4		41.6	16A	--	12	4
81071	8- 23	B1 T	33.7	35.2	31.1	3.7	4.6	4.1	12.3	9.0	19.4	15.8	11.9	19.2		36.4	3A	--	3Z	N
81072	23- 41	B21T	15.4	15.5	69.1	3.3	3.0	1.7	4.4	3.0	7.3	8.2	17.9	51.2		13.1	--A	--	--	--
81073	41- 56	B22T	16.2	15.9	67.9	3.8	2.7	1.9	4.7	3.1	6.4	9.5				12.4	--A	--	--	--
81074	56- 66	B23TCA	22.1	19.8	58.1	4.6	5.2	2.9	5.6	3.8	6.7	13.1				13.8	--A	--	--	--
81075	66- 99	B31TCA	40.4	25.1	34.5	8.0	10.2	5.1	10.1	7.0	8.4	16.7	19.3	15.2		20.9	--A	--	--	--
81076	99-124	B32TCA	44.3	26.6	29.1	9.1	12.5	5.6	9.6	7.5	9.5	17.1				22.4	--A	--	--	--
81077	124-157	B33CA	54.2	18.1	27.7	8.4	18.3	6.1	12.7	8.7	3.0	15.1				19.4	39A	14	24	1
81078	157-198	2C CA	52.4	23.5	24.1	8.1	11.0	5.6	17.3	10.4	9.8	13.7				31.0	25A	23	2Z	N
81079	1/ 0- 38																8A	--	7	1

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-19 6E1B	EXT. IRON FE 6C2B	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 8C1A	H2O 8C1A	CACL2 8C1E
		PERCENT		PERCENT		PCT.	PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT				
81070	0- 8	1.10	0.099			1.9	22	18		1.38	1.42	0.91		15.8	7.0	1.0	0.9	5.3		4.4
81071	8- 23	1.07	0.100			2.2	30	17		1.42	1.51	0.98		18.2	10.6	2.1	2.0	5.8		5.0
81072	23- 41	0.98	0.092			2.4				1.24	1.58	1.00		36.9	23.5	8.4	8.4	6.9		6.5
81073	41- 56	0.52		1		2.4	60	30		1.23	1.59	1.00		38.7	24.4	8.9	8.9	7.8		7.4
81074	56- 66	0.44		9		2.1				1.27	1.61	1.00		37.1	21.6	8.2	8.2	8.0		7.3
81075	66- 99	0.17		10		2.8				1.33	1.51	1.00		31.1	18.8	4.3	4.3	8.1		7.6
81076	99-124			1		3.1	49	30		1.29	1.45	1.00		32.4	20.5	4.0	4.0	8.0		7.5
81077	124-157			1		2.3				1.31	1.45	0.76		31.8	19.1	3.4	2.6	7.9		7.3
81078	157-198			1		2.3	42	26		1.26	1.36	0.86		31.8	17.5	2.6	2.2	7.8		7.3
81079	0- 38	1.10	0.100						1.30			0.96			10.3					

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6G2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT. PCT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
81070	0- 8	4.6	2.1	0.1	0.9	7.7	66		11.6											
81071	8- 23	10.3	3.7	0.1	1.0	15.1	91		16.6											
81072	23- 41	20.2	9.0	0.7	1.5	31.4	93		33.6											
81073	41- 56	30.8	13.0	1.2	1.5	46.5	100+		35.9											
81074	56- 66	40.5	16.2	1.2	1.3	59.2	100+		35.5											
81075	66- 99	47.5	17.0	2.3	1.1	67.9	100+		50.7											
81076	99-124	42.4	15.3	2.3	0.9	60.9	100+		45.6											
81077	124-157	36.0	14.0	2.2	0.9	53.1	100+		42.5	1.45	3.8	1.9	7.1	0.3	TR	1.7	6.6	0.6		
81078	157-198	34.7	11.5	2.1	0.8	49.1	100+		42.9	1.90	6.5	1.6	8.1	0.3	TR	1.5	13.1			
81079	0- 38																			

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY LESS THAN 0.002 MM X RAY I 7A2E	II 7A2E	III 7A2E	DTA IV 7A3	DTA PCT.	MINERALOGY L.T. .0002 MM X RAY I 7A2E	II 7A2E	III 7A2E	MINERAL CODE		RELATIVE AMOUNT	
81070	0- 8		0.1	1				MI 3	KK 2							MI	MICA	1	TRACE
81071	8- 23		0.1	1				MI 3	KK 2	MT 1			KK 3	MI 2	MT 1	KK	KAOLINIT	2	SMALL
81072	23- 41		0.7	2									MI 3	KK 2	MT 1	MT	MONTMORT	3	MODERATE
81073	41- 56		1.2	3				MT 3	MI 3	KK 2								4	ABUNDANT
81074	56- 66		1.2	3														5	DOMINANT
81075	66- 99		2.3	5									MT 5	MI 2	KK 2			6	INDETER.
81076	99-124		2.3	5				MT 4	MI 3	KK 2									
81077	124-157	35.0	1.8	4	4	TR													
81078	157-198	51.2	1.7	4	4			MT 4	MI 2	KK 2									
81079	0- 38																		

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.
1/= Composite from 10 pedons.

WHITE HOUSE GRAVELLY LOAM
S68 Ariz-12-9-1 through 9

Location: Santa Cruz County, Arizona, 3 miles south and 4.5 miles east of Sonoita and 1.3 miles east-southeast of Highway 83 and 0.1 mile south of El Paso Natural Gas Pipe line in the San Ignacio Del Babocomari Grant, Compass bearing--Mt. Wrightson is S87°W from this pit. Also Empire Mountain is N20°E of pit. Photo AMS-256. Date of Sampling: October 14, 1968.
Description by: Havens and Clemmons. Collectors: Nettleton and Brasher.
Classification: Ustollic Haplargid, fine, mixed, thermic.
Vegetation: Grass aspect - blue grama, wolftail, plains bristlegrass, three-awn, sprucetop grama, curly mesquite. Climate: Mean annual temperature 62°F. Mean annual precipitation 16 inches. Parent Material: Old alluvium from andesite, dacite, rhyolite and related tuffs. Topography: Nearly level to gently sloping plain, 1 to 2 percent slope, northeast aspect. Elevation: 4975 feet. Drainage: Well drained. Soil Moisture: Dry.
Remarks: This soil was paired with S68 Ariz-12-11-1 through 9.

HORIZON	DESCRIPTION
	(0-8 cm)
A1 RSL 681070	0 to 3 inches, brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/2) moist; weak thick platy breaking to moderate fine granular structure; slightly hard, friable, nonsticky and slightly plastic; many very fine and fine roots; common fine interstitial pores; noneffervescent; slightly acid (pH 6.2); abrupt smooth boundary.
B1t RSL 681071 (8-23 cm)	3 to 9 inches, reddish brown (5YR 5/4) clay loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; common fine and very fine roots; few fine and very fine tubular pores; few thin clay films on ped faces; few fine gravel; noneffervescent; neutral (pH 6.8); clear smooth boundary.
B21t RSL 681072 (23-41 cm)	9 to 16 inches, reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate medium and coarse prismatic structure; hard, firm, sticky and plastic; common fine and very fine roots; few very fine interstitial pores; many moderately thick clay films on ped faces; few fine gravel; noneffervescent; neutral (pH 7.0); gradual smooth boundary.
B22t	16 to 22 inches, reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist;

[redacted]

RSL 681073 (41-56 cm)	weak medium prismatic breaking to moderate subangular and angular blocky structure; hard, firm, sticky and plastic; common fine roots; many moderately thick clay films on ped faces; 2 to 5 percent gravel; small slickensides in lower part; noneffervescent; mildly alkaline (pH 7.4); clear wavy boundary.
B23tca RSL 681074 (56-66 cm)	22 to 26 inches, dark red (2.5YR 3/6) clay, dark red (2.5YR 3/6) moist; moderate medium and coarse subangular and angular blocky structure; hard, firm, sticky and plastic; common fine roots; few fine tubular pores; many moderately thick clay films and common pressure faces; common medium slickensides; 5 percent gravel; slightly effervescent; moderately alkaline (pH 8.0); clear wavy boundary
B31tca RSL 681075 (66-99 cm)	26 to 39 inches, mottled red (2.5YR 4/6) and pink (5YR 7/4) clay loam, dark red (2.5YR 3/6) and light reddish brown (5YR 6/4) moist, mottles are many medium and large and distinct; massive breaking to weak medium subangular blocky structure; hard, friable, sticky and plastic; few fine roots; common thin clay films on ped faces; 5-10 percent gravel; strongly effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
B32tca RSL 681076 (99-124 cm)	39 to 49 inches, mottled yellowish red (5YR 5/6) and pink (5YR 7/4) gravelly sandy clay loam, yellowish red (5YR 4/6) and light reddish brown (5YR 6/4) moist; mottles are many medium and large and distinct; massive; hard, very friable, slightly sticky and plastic; few very fine interstitial pores; few thin clay films on ped faces; slightly to violently effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
B33ca RSL 681077 (124-157 cm)	49 to 62 inches, mottled yellowish red (5YR 5/8) and pink (5YR 7/3) gravelly sandy clay loam, yellowish red (5YR 4/8) and light reddish brown (5YR 6/3) moist, mottles are many medium and large and distinct; massive; hard, friable, sticky and plastic; few very fine interstitial pores; slightly to strongly effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
IICca RSL 681078 (157-198 cm)	62 to 78 inches, mottled red (2.5YR 5/8) and pinkish white (5YR 8/2) very gravelly light sandy clay loam, red (2.5YR 4/8) and pinkish gray (5YR 7/2) moist, mottles are many medium and large and distinct; massive; hard, friable; sticky and plastic; slightly to strongly effervescent; moderately alkaline (pH 8.0).
Composite A RSL 681079 (0-38 cm)	0 to 15 inch horizon sampled from 10 pedons selected at 10-foot intervals along a 100-foot, N-S transect centered at the backhoe pit. Note: Discontinuous stone line in pit to left of area described.

CONSECUTIVE PEDON NUMBER C 68150 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES WHITE HOUSE SOIL NO. S68 ARIZ. 12-11 SAMPLE NO. 81080-81089 E.PIMA-SANTA CRU AREA

SOIL FAMILY: USTOLLIC HAPLARGID,FINE,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION <2 mm SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS I 75-20 WHOLE SOIL	II 20-5 PCT. OF	III 5-2 LT 75
			PERCENT OF LESS THAN 2MM														PCT.		
81080	0- 3	A11	53.0	26.0	21.0	3.2	7.4	9.1	23.4	9.9	14.5	11.5				37.3	9A	--	7	2
81081	3- 13	A12	47.9	23.8	28.3	3.8	6.4	7.6	20.0	10.1	12.3	11.5				33.3	2A	--	2Z	N
81082	13- 20	B1 T	40.1	21.4	38.5	5.7	5.3	5.8	15.3	8.0	10.9	10.5				27.2	--A	--	--	--
81083	20- 43	B21T	26.4	16.9	56.7	1.2	3.3	4.3	10.7	6.9	8.1	8.8				21.3	--A	--	--	--
81084	43- 66	B22T	27.6	19.2	53.2	2.5	3.7	4.0	10.5	6.9	8.4	10.8				21.5	--A	--	--	--
81085	66- 94	B23TCA	40.1	26.3	33.6	9.7	7.4	5.0	10.8	7.2	7.6	18.7			1	21.1	31A	31	--	--
81086	94-112	B31TCA	41.4	28.0	30.6	8.3	9.3	5.8	10.3	7.7	6.4	21.6			1	20.0	39A	24	15Z	N
81087	112-140	B32TCA															53A	35	18Z	N
81088	140-190	B33TCA															60A	39	21Z	N
81089	0- 38																--A	--	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP EXT FE 6C5A	AL 6G5A	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY EST. 1/3 BAR 4A1F	DRY 4A1F	4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT. NO.40		GRAMS PER CC				PERCENT			PERCENT	
81080	0- 3	1.75	0.140			1.0	0.1					1.30		0.96				8.6		
81081	3- 13	1.30	0.110			1.2	0.1			29	17		1.35	1.44	0.99		18.0	10.0	2.2	2.1
81082	13- 20	1.14	0.102			1.5	0.1						1.28	1.58	1.00		32.8	13.7	7.3	7.3
81083	20- 43	1.14		TR		1.7	0.2						1.29	1.58	1.00		34.8	20.2	7.0	7.0
81084	43- 66	0.61		2		1.5	0.1			45	27		1.35	1.67	1.00		33.0	19.9	7.3	7.3
81085	66- 94	0.32		19		0.8	0.1						1.40	1.65	0.81		28.8	13.9	5.6	4.5
81086	94-112	0.20		26		0.6	TR					1.45			0.74			12.6		
81087	112-140			2		0.8	0.1			35	21		1.45	1.53	0.61		13.0	9.6	1.8	1.1
81088	140-190			1		0.6	TR					1.45			0.55			8.8		
81089	0- 38	1.16	0.099									1.30			1.00			11.3		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI-DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4-OAC 5A6A	BASE SATURATION SUM+ ACI-DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
81080	0- 3	6.8	3.5	0.1	0.9	11.3	5.6		16.9	15.2	67		74		5.9	5.3
81081	3- 13	10.4	4.6	0.1	0.8	15.9	4.7		20.6	18.2	77		87		6.0	5.5
81082	13- 20	15.3	4.5	0.1	0.8	20.7			20.7	22.6	100+		92		6.3	5.8
81083	20- 43	21.2	10.2	0.2	1.3	32.9			32.9	32.3	100+		100+		6.7	6.2
81084	43- 66	34.8	7.5	0.5	1.4	44.2			44.2	31.6	100+		100+		7.6	7.4
81085	66- 94	37.2	7.9	0.6	1.0	46.7			46.7	24.2	100+		100+		7.9	7.6
81086	94-112	35.4	6.5	0.8	0.7	43.4			43.4	22.8	100+		100+		8.1	7.6
81087	112-140	21.3	3.7	0.7	0.7	26.4			26.4	20.5	100+		100+		8.1	7.4
81088	140-190	19.5	2.8	0.5	0.6	23.4			23.4	17.2	100+		100+		8.2	7.5
81089	0- 38															

CLAY MINERALOGY

SAMPLE NO	DEPTH CM.	LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM MINERAL X RAY CODE 7A2E I	7A2F II	7A2E III
81080	0- 3									
81081	3- 13	MT 4	MI 3	KK 2						
81082	13- 20									
81083	20- 43									
81084	43- 66	MI 4	MT 3	KK 2						
81085	66- 94									
81086	94-112									
81087	112-140	MT 4	MI 3	KK 2						
81088	140-190									
81089	0- 38									

RELATIVE AMOUNT

1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

MT MONTMORT
MI MICA
KK KAOLINIT

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.

WHITE HOUSE LOAM
S68 Ariz-12-11-1 through 9

Location: Santa Cruz County, Arizona, approximately 5 miles east of Lochiel, Arizona and 300 feet south of Forest Service Road #4. Approximately 2400 feet east and 1200 feet south of NW corner Section 20, T24S, R18E. Photo 14-130 EEX (AMS 694). Date of Sampling: October 15, 1968
Description by: Clemmons and Havens. Collectors: Nettleton and Brasher.
Classification: Ustollic Haplargid, fine, mixed, thermic.
Vegetation: Grassland: blue grama, curly mesquite, sideoats grama, three-awn. Invading Shrub: Senecio.
Climate: Mean annual precipitation 16 to 18 inches. Mean annual temperature approximately 61°F.

Parent Material: Old alluvium from andesite, dacite, rhyolite and related tuffs. Topography: Nearly level to gently sloping plains. Slope 1 to 2 percent. Southwest aspect. Elevation: 4850 feet.
Drainage: Well drained. Medium runoff. Soil Moisture: Moist.
Remarks: This site was paired with S68 Ariz-12-9-1 through 9. From pit Mt. Wrightson is N36°W, peak on Huachuca N30°E, second peak on Huachuca N67°E.

HORIZON	DESCRIPTION
	(0-3 cm)
A11 RSL 681080	0 to 1 inch, brown (7.5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; weak fine and medium granular structure; soft, friable, slightly sticky and slightly plastic; common fine and medium roots; noneffervescent; mildly alkaline (pH 7.4); abrupt smooth boundary.
A12 RSL 681081 (3-13 cm)	1 to 5 inches, reddish brown (5YR 4/4) light clay loam, dark reddish brown (5YR 3/4) moist; massive breaking to weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; common fine tubular pores; few thin clay films in pores; noneffervescent; mildly alkaline (pH 7.6); clear smooth boundary.
B1t RSL 681082 (13-20 cm)	5 to 8 inches, dark reddish brown (5YR 3/4) heavy clay loam, dark reddish brown (5YR 3/4) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common fine and very fine roots; common fine tubular pores; common thin clay films on ped faces and in pores; noneffervescent; mildly alkaline (pH 7.6); clear wavy boundary.
B21t RSL 681083 (20-43 cm)	8 to 17 inches, dark reddish brown (2.5YR 3/4) clay, dark reddish brown (2.5YR 3/4) moist; moderate medium and coarse prismatic structure; very hard, firm, sticky and very plastic; common fine and very fine roots; few fine tubular pores; common moderately thick clay films on ped faces and in pores; noneffervescent; mildly alkaline (pH 7.6); gradual wavy boundary.
B22t RSL 681084 (43-66 cm)	17 to 26 inches, reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; weak medium and coarse prismatic breaking to strong medium subangular and angular blocky structure; very hard, firm, sticky and very plastic; common fine and few very fine roots; few fine tubular pores; common moderately thick clay films on ped faces and in pores; common medium slickensides; noneffervescent, slightly effervescent in spots in lower part; Mildly alkaline (pH 7.8); clear wavy boundary.
B23tca RSL 681085 (66-94 cm)	26 to 37 inches, reddish brown (5YR 5/4) gravelly clay, reddish brown (5YR 4/4) moist; with many medium and large and distinct pink (5YR 7/3) lime mottles, light reddish brown (5YR 6/3) moist; moderate fine and medium subangular blocky structure; very hard, friable, sticky and very plastic; common very fine and fine roots; few fine tubular pores; common thin clay films on ped faces and in pores; violently effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
B31tca RSL 681086	37 to 44 inches, mottled reddish brown (5YR 5/4) and pink (5YR 7/3) very gravelly clay, reddish brown (5YR 4/4) and light reddish brown (5YR 6/3) moist, mottles are many medium and large and distinct; nearly massive breaking to moderate fine and medium subangular

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Ustollic Haplargid, fine, montmorillonitic, mesic
SOIL Arp gravelly clay loam SOIL Nos. S65Ariz-13-4 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65183 - 65187

Depth (In)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand (2–1)	Sand (1–0.5)	Sand (0.5–0.25)	Sand (0.25–0.1)	Sand (0.1–0.05)	Silt (0.05–0.02)	Silt Int III (0.02–0.002)	3A1 Int. II (0.2–0.02)	3A1 (2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	* Coarse fragments 1A2a >2	2–19	19–76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-2	A1	35.8	37.3	26.9	6.6	6.5	4.6	9.8	8.3	19.3	18.0	33.4	27.5	0	27	42	35	7
2-4	B1t	23.0	33.5	43.5	3.1	4.1	3.5	6.6	5.7	13.4	20.1	22.8	17.3	0	44	29	12	17
4-11	B21t	15.2	31.4	53.4	2.1	2.7	2.0	4.5	3.9	10.2	21.2	16.7	11.3	0	53	19	15	4
11-16	B22t	11.2	34.5	54.3	1.8	2.1	1.4	3.0	2.9	9.5	25.0	14.0	8.3	0	54	12	12	0
16-30	C	24.1	50.1	25.8	7.1	5.7	2.5	4.4	4.4	11.7	38.4	13.5	19.7	0	26	37	35	2
30-47	R																	

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$	Bulk density 4A1f 1/3 bar	Bulk density 4A1h Oven dry	3B2	Water content 4B1c 1/3 bar	Water content 4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH 8C1a H_2O 1:1
	Pct	Pct.		Pct.	Pct	g/cc	g/cc	Cm	Pct.	Pct	in./in.	in./in.	
0-2	0.82	0.063	13	3.1	-					11.3			6.7
2-4	1.02	0.086	12	3.1	-	1.30	1.60	0.83	28.4	18.7	0.071	0.058	6.7
4-11	0.81	0.066	12	3.7	-	1.25	1.79	0.90	37.8	27.0	0.127	0.111	6.9
11-16	0.91	0.071	13	4.3	-	1.21	1.64	0.94	40.1	29.2	0.106	0.098	7.0
16-30	0.20			5.0	-	1.36	1.73	0.77	34.3	22.1	0.085	0.062	7.3

Depth (In.)	Extractable bases 5B1a 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity 5A1a NH_4OAc	5A3a Sum	6G1d KCl Ext. Al^{+++}	Atterberg limits Plastic limit	Liquid limit	Plastic index	Base saturation 5C1 NH_4OAc
	meq/100 g									Pct. of <0.4 mm			Pct.
0-2	17.4	9.0	0.2	0.5	27.1		29.5						92
2-4	26.5	11.8	0.2	0.5	39.0		43.2						90
4-11	35.4	14.2	0.4	0.3	50.3		54.3						93
11-16	38.0	15.6	0.4	0.2	54.2		56.3						96
16-30	33.8	13.2	0.6	0.3	47.9		49.5			26	70	44	97

Depth (In)	Clay mineralogy (<0.002 mm) 7A Mont.	Verm.	Mica	Kaolin
	X-ray			
0-2	xxxx	-	-	x
2-4	xxxx	-	-	x
4-11	xxxx	-	-	x
11-16	xxxx	-	-	x
16-30	xxxx	-	-	x

* All values from characterization sample.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

ARP GRAVELLY CLAY LOAM
S65Ariz-13-4

Location: Western Yavapai County Area, Arizona. About 2/10 mile east of Poland Junction substation. 3/10 mile south and 1/10 mile east of northwest corner Sec. 4, T12N, R1E. Photo #326. AMS Project 134, Lot FA. Date of Sampling: May 5, 1965.
Collectors: Flach, Nettleton, Jay, Wendt, Freeman
Vegetation: Brushgrass. Oakbrush, squawbush, manzanita, sideoats grama, three-awns, and annuals. Climate: Mean annual precipitation 14". Mean annual temperature 57°F. Soil temperature at time of sampling 66°F. at 16". Parent Material: Yavapai schist and phyllite. Relief: Moderately sloping hill or ridge on a 5 percent convex southwest slope about 50 feet from crest of ridge. Elevation: 4,850 feet. Drainage: Medium runoff, moderately slowly permeable and well drained.
Remarks: This soil is found on schist and phyllite under a chaparral or grass vegetation. It is on nearly level bench-like areas and moderately steep or steep hills. The schist or phyllite bedrock is vertically oriented. Hellige-Truog field kit was used to determine pH. Paired sample is S65 Ariz-13-5.
Classification: Ustollic Haplargid, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 65183	0 to 2 inches, dark reddish gray (5YR 4/2) gravelly clay loam, dark reddish brown (5YR 3/2) when moist; strong very fine granular structure; loose, friable, sticky and plastic; few very fine roots; many interstitial pores; 35 percent schist, quartzite and phyllite gravel, and a few cobbles; noneffervescent; mildly alkaline (pH 7.5); abrupt smooth boundary.
B1t RSL 65184	2 to 4 inches, dark reddish brown (5YR 3/2) dry and moist, heavy clay loam; strong fine and medium subangular blocky structure; very hard, firm, sticky and very plastic; abundant very fine and fine roots; common very fine and fine interstitial and tubular pores; noneffervescent; moderately alkaline (pH 8.0); clear smooth boundary.
B21t* RSL No. 65185	4 to 11 inches, dark red (2.5YR 2/4) clay, dark reddish brown (2.5YR 3/4) when moist; weak medium prismatic breaking to moderate medium subangular blocky structure; very hard, friable, very sticky and very plastic; plentiful very fine and fine roots; few very fine and fine interstitial and few fine tubular pores; pressure faces common; noneffervescent; moderately alkaline (pH 8.0); clear smooth boundary.
B22t RSL No. 65186	11 to 16 inches, dark reddish brown (2.5YR 3/4) dry and moist clay; moderate medium angular blocky structure; very hard, friable, very sticky and very plastic; plentiful very fine roots; few very fine and fine interstitial and few fine tubular pores; common pressure faces with thin clay films; noneffervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
C* RSL No. 65187	16 to 30 inches, yellowish red (5YR 5/6) weathered phyllite, reddish brown (5YR 4/4) and very dark gray (5YR 3/1) when moist; massive; very hard, very firm; few fine, medium and coarse roots; few fine interstitial pores; common thin to thick clay films in cracks; noneffervescent; mildly alkaline (pH 7.5); clear wavy boundary.
R No sample	30 to 47 inches plus, strong brown (7.5YR 5/6) and black (5YR 2/1) phyllite; massive; extremely hard; few fine roots in seams; few fine interstitial pores; common thin to thick discontinuous clay films along fragment faces; noneffervescent; mildly alkaline (pH 7.5).

*Note - Sampled for BPR. B21t and B22t combined in BPR sample.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Ustollic Haplargid, fine, montmorillonitic, mesic

SOIL Showlow loam SOIL Nos. S6Ariz-9-27 LOCATION Navajo County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 56166 - 56172

Depth	Horizon	1B1b Total Sand	Total Silt	Total Clay	Sand Very	Sand Coarse	Sand Medium	Sand Fine	Sand Very fine	Silt	Silt Int. III	Int II (0.2-0.02)	(2-0.1)	3A1a Carbon-	3A1a Non carbon-	1/ Coarse fragments 2A2 >2	2 - 19	19 - 76
0-1	A11	46.0	42.3	11.7	4.4	8.6	7.4	13.1	12.5	26.5	15.8	46.8	33.5			24		
1-3	A12	37.7	44.3	18.0	3.9	7.7	6.4	10.6	9.1	22.7	21.6	38.0	28.6			18		
3-12	B1t	32.2	39.3	28.5	2.4	6.3	5.5	9.3	8.7	20.6	18.7	34.8	23.5			11		

SHOWLOW LOAM
56Ariz-9-27-1 through 7

Location: Navajo County, Arizona 2.1 miles east of Aripine post office near the E ¼ corner of Sec. 12, T 11 N, R 18 E, about 50 feet north of State Hwy. #160. Date of Sampling: May 15, 1956. Collectors: M. S. James, W. G. Harper, Gerald Kester, R. E. Nelson, George Wendt. Vegetation: Blue grama, juniper, pinon, oak, ponderosa. Climate: Estimated annual precipitation about 18 inches. Nearest weather station (Pinedale): Mean annual temperature 48.9° F.; January average 29.4° F.; July average 69.4° F.; mean annual precipitation 18.84 inches. Parent Material: Tertiary or Quaternary stratified alluvium. Relief: Eroded old nearly level to gently rolling valley plain. Slope of 0-2 percent. Elevation: 6,400 feet. Drainage: Profile well drained; medium to rapid runoff; very slow permeability.

Remarks: Profile slightly moist when sampled. Very slight wind and water erosion. Occasional rounded pebbles ranging up to about 2 inches in diameter are in the upper horizons. 27 to 30 percent gravel and a few rounded cobbles are below a depth of 31 inches. Cobbles range up to about 5 inches in diameter. They consist principally of quartzite, granodiorite, sandstone and rhyolite. When samples were collected from the 31 to 44-inch and 44 to 52-inch horizons, a large part of the gravel larger than 1 inch in diameter was discarded. This was estimated to be about 16 percent of sample.

A11 RSL No. 56166 — 0-1" -- Brown (7.5YR 5/2) dry, black (2.5/2) moist; loam; very weak vesicular and weak coarse platy; slightly hard when dry, very friable when moist, slightly sticky when wet; many grass and tree roots; moderately permeable; noncalcareous; pH 7; abrupt, smooth lower boundary.

A12 RSL No. 56167 — 1-3" -- Dark grayish brown (10YR 4/2) dry, black (2/2) moist; heavy loam; moderate fine platy; slightly hard when dry, very friable when moist, slightly sticky when wet; many grass and tree roots; moderately permeable; noncalcareous; pH 7; abrupt, smooth lower boundary.

B1t RSL No. 56168 — 3-12" -- Reddish brown (2.5YR 4/3) dry, (5YR 4/3) moist; heavy clay loam; moderate medium to fine subangular blocky aggregates with thin patchy clay films; hard when dry, friable when moist, very plastic and sticky when wet; many grass and tree roots; moderately slow permeability; noncalcareous; pH 7; gradual, smooth lower boundary.

B21t RSL No. 56169 — 12-24" -- Reddish brown (3.5YR 4/3) dry, dark reddish brown (3/3) moist; clay; moderate coarse prisms that break to moderate very coarse and coarse angular blocky; thick continuous clay films on vertical and horizontal faces; extremely hard when dry, extremely firm when moist, very plastic and very sticky when wet; many tree roots but practically no grass roots; very slowly permeable; noncalcareous; pH 8; clear, smooth lower boundary.

B22tca RSL No. 56170 — 24-31" -- Reddish brown (2.5YR 4/4) dry, (3.5/4) moist; clay with very few fine to medium prominent white lime flecks in the lower part; strong coarse to medium angular blocky; extremely hard when dry, extremely firm when moist, very plastic and sticky when wet; many slickensides at a 45° angle; few tree roots; very slowly permeable; mildly calcareous where a few flecks of lime occur in the lower portion of this horizon; pH 8; clear, wavy lower boundary.

C1ca — 31-44" -- Reddish brown (5YR 5/4) dry, (4/4) moist; gravelly clay loam with common medium, faint, light reddish brown (5YR 4/6) mottlings; massive and compact; extremely hard when

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Ustollic Haplargid, fine, montmorillonitic, mesic

SOIL Showlow gravelly loam SOIL Nos. S65Ariz-13-9 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65256 - 65268

Depth (In.)	Horizon	1B1b Total Sand (2-0 05)	Total Silt (0.05-0.002)	Total Clay (< 0.002)	Sand (Very coarse (2-1))	Sand (Coarse (1-0.5))	Sand (Medium (0.5-0 25))	Sand (Fine (0 25-0.1))	Sand (Very fine (0 1-0.05))	Silt (0.05-0.02)	Silt (Int. III (0 02-0.002))	Int. II (0.2-0 02)	(2-0 1)	3A1a Carbonate clay	3A1a Non-carbonate clay	* Coarse fragments 1A2a > 2	2 - 19	19 - 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-2	A1	53.0	30.4	16.6	8.9	11.7	8.3	13.6	10.5	18.4	12.0	35.8	42.5	0	17	34	22	12
2-5	B1t	42.2	29.8	28.0	6.1	8.7	6.6	11.8	9.0	17.1	12.7	32.6	33.2	0	28	26	13	13
5-14	B21t	32.9	18.0	49.1	8.2	8.8	4.6	6.8	4.5	9.0	9.0	16.9	26.4	0	49	21	15	6
14-22	IIB22t	46.5	12.3	41.2	16.6	13.7	5.2	7.3	3.7	5.5	6.8	12.9	42.8	0	41	67**	29**	30**
22-29	IIIB3tca	55.8	14.7	29.5	18.0	15.6	7.2	10.6	4.4	6.3	8.4	15.8	51.4	1	29	59**	40**	16**
29-35	IIIC1ca	67.9	13.8	18.3	17.0	22.6	12.1	12.0	4.2	6.7	7.1	15.9	63.7	0	18	35**	20**	12**
35-42	IIIC2ca	69.7	11.7	18.6	14.6	21.6	12.0	15.7	5.8	5.7	6.0	18.7	63.9	0	19	24	24	0
42-48	IVC3ca															44	44	0
48-52	VC4															43	36	7
52-56	VIC5ca															26	26	0
56-63	VIIC6															35	35	0
63-71	VIIIC7ca															23	23	0

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$	Carbonate as $CaCO_3$ crushed whole soil	Bulk density 4A1f 1/3 bar	Bulk density 4A1h Oven dry	Bulk density	3B2	Water content	Water content 4B1c 1/3 bar	Water content 4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH 8C1a H_2O 1:1		
	Pct	Pct		Pct.	Pct.		g/cc	g/cc	g/cc	Cm	Pct.	Pct.	Pct.	in./in.	in./in.			
0-2	1.18	0.092	13	1.6	-								6.6			6.4		
2-5	0.78	0.074	11	1.8	-		1.53	1.61		0.83		16.9	9.9	0.018	0.015	6.6		
5-14	0.68	0.071	10	2.2	-		1.27	1.51		0.89		33.2	17.8	0.061	0.053	7.4		
14-22	0.50	0.056	9	2.0	tr		1.52	1.68		0.46		25.1	15.8	0.033	0.015	7.7		
22-29	0.20			1.5	8	5	1.50	1.57		0.55		21.5	12.3	0.015	0.008	8.3		
29-35	0.07			1.4	3	3	1.57	1.61		0.76		16.1	8.4	0.008	0.006	8.3		
35-42	0.03			1.3	2	2							8.3			8.2		
42-48	-			1.4	5	8							9.3			8.2		
48-52	0.02			1.3	1								5.0			8.4		
52-56	0.02			1.3	4	6							7.1			8.4		
56-63	0.10			1.4	1								5.9			8.5		
63-71	0.02			1.3	2	5							6.2			8.6		

Depth (In.)	Extractable bases 5B1a 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity 5A1a NH_4OAc	Cation Exch. Capacity 5A3a Sum	CEC clay	6G1d KCl Ext. Al^{+++}	Base saturation 5C1 NH_4OAc	
	meq/100 g										Pct	Pct
0-2	14.9	5.6	0.1	0.9	21.5		12.8		77		100+	
2-5	11.8	4.0	0.2	0.5	16.5		18.9		68		87	
5-14	21.5	8.9	0.2	0.8	31.4		34.0		69		92	
14-22	21.7	9.0	0.4	0.8	31.9		32.3		78		99	
22-29	24.4	7.0	0.4	0.6	32.4		22.4		76		100+	
29-35	23.0	5.7	0.5	0.4	29.6		16.7		91		100+	
35-42	19.2	5.4	0.6	0.4	25.6		16.6		89		100+	
42-48	23.4	6.6	0.8	0.4	31.2		19.4				100+	
48-52	14.2	3.8	0.5	0.2	18.7		11.0				100+	
52-56	19.4	4.8	0.7	0.3	25.2		14.7				100+	
56-63	15.8	4.3	0.7	0.3	21.1		13.1				100+	
63-71	18.2	4.3	0.8	0.3	23.6		13.3				100+	

Depth (In.)	Clay mineralogy (<0.002 mm) 7A Mont.	Verm.	Mica	Kaolin	
	X-ray				
0-2	xx		xxx	x	
2-5					
5-14	xxx		xx	x	
14-22	xxx		xx	x	
22-29					
29-35					
35-42	xxx		xx	t	
42-48					
48-52					
52-56					
56-63					
63-71					

* Values from characterization sample (5Kg)(except as noted).

** 2-19 mm from characterization sample, 19-76 mm from field weight; >2 mm includes volume estimate of >76 mm fraction.

Remarks:	Depth	Horizon	CEC meq /100g	Sum of bases	Carbonate as $CaCO_3$ Pct.
	71-76"	IXC8ca	10.0	16.0	1

\- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

SHOWLOW GRAVELLY LOAM

S65Ariz-13-9

Location: Western Yavapai County, Arizona. 3/4 mile east of Dewey, Arizona to Henderson Ranch headquarters, then 1½ mile northeast of headquarters. 4/10 mile north and 1/10 mile west of southeast corner of Sec. 35, T14N, R1E. Photo #203, AMS Project 134, Lot FA. Date of Sampling: May 11, 1965.
Collectors: Flach, Alexander, Nettleton, Jay, Meurisse, Wendt.
Vegetation: Grass. Three-awns, sideoats grama, black grama, ring muhly, sand dropseed and annuals. Climate: Mean annual precipitation 12". Mean annual temperature 55°F. Soil temperature at time of sampling 59°F. at 20" and 56°F. at 60". Parent Material: Alluvium from granite, schist, phyllite. Relief: Nearly level, convex, on the crest of alluvial fan on 2 percent slope with a southwest aspect. Elevation: 4,800 feet. Drainage: Medium runoff, moderately slowly permeable and well drained.
Remarks: This soil is formed in old alluvium from granite, schist, and phyllite under a grass cover. It is on nearly level to moderately steep dissected alluvial fans. Hellige-Truog field kit was used to determine pH. Paired samples are S65 Ariz-13-12 and S65 Ariz-13-18

Classification: Ustollic Haplargid, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 65256	0 to 2 inches, reddish brown (5YR 5/4) gravelly loam, dark reddish brown (5YR 3/4) when moist; weak fine and medium platy structure; hard, friable, slightly sticky and plastic; plentiful fine and medium roots; many fine and medium vesicular pores; 20-30 percent fine gravels with thin surface gravel pavement; noneffervescent; medium acid (pH 6.0); abrupt, smooth boundary.
B1t RSL No. 65257	2 to 5 inches, reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) when moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; abundant fine and medium roots; common fine and medium tubular and many interstitial pores; few thin clay films on ped faces; noneffervescent; neutral (pH 7.0); clear, smooth boundary.
B21t* RSL No. 65258	5 to 14 inches, reddish brown (5YR 4/4) gravelly clay, dark reddish brown (5YR 3/4) when moist; moderate medium to coarse prismatic; breaking to moderate medium to coarse subangular and angular blocky structure; very hard, friable, slightly sticky, very plastic; plentiful fine and medium roots; few fine tubular and common fine interstitial pores; continuous thin and moderately thick clay films on ped faces and in pores; 20-30 percent gravel; noneffervescent; mildly alkaline (pH 7.5); clear smooth boundary.
IIB22t RSL No. 65259	14 to 22 inches, yellowish red (5YR 4/6) dry and moist; gravelly clay; massive, rock controlled structure; very hard, friable, sticky and very plastic; few fine and medium roots; few fine tubular and common fine interstitial pores; many thin and moderately thick clay films on rock faces and in pores; 30-40 percent gravel; noneffervescent; neutral (pH 7.0); clear, smooth boundary.
IIIB3tca RSL No. 65260	22 to 29 inches, yellowish red (5YR 5/6) gravelly sandy clay loam, yellowish red (5YR 4/6) when moist; massive; very hard, friable; slightly sticky and very plastic; very few fine roots; few fine tubular and many fine interstitial pores; common thin clay film in pores, as bridges and on gravels and sand grains; 30-40 percent gravel; strongly effervescent; moderately alkaline (pH 8.0); clear, wavy boundary.
IIIC1ca* RSL No. 65261	29 to 35 inches, reddish yellow (5YR 6/6) gravelly light sandy clay loam, yellowish red (5YR 5/6) when moist; massive; hard, friable, slightly sticky and plastic; few fine roots; many fine interstitial and few fine tubular pores; few thin clay films in pores and as bridges; 30-40 percent gravels; strongly to violently effervescent; moderately alkaline (pH 8.0); clear, smooth boundary.
IIIC2ca RSL No. 65262	35 to 42 inches, yellowish red (5YR 5/6) gravelly sandy loam, yellowish red (5YR 4/6) when moist; massive; hard, friable, slightly sticky and slightly plastic; no roots; many fine interstitial and few fine tubular pores; few thin clay films in pores and as bridges; 40-45 percent gravels; strongly to violently effervescent; moderately alkaline (pH 8.0); abrupt, smooth boundary.
IVC3ca RSL No. 65263	42 to 48 inches, reddish yellow (5YR 6/6) very fine sandy loam, yellowish red (5YR 4/6) when moist; massive; very hard, friable, slightly sticky and plastic; few fine tubular and many fine interstitial pores; very few thin clay film in pores and as bridges; strongly to violently effervescent, fine and very fine ($CaCO_3$) filaments; moderately alkaline (pH 8.0); abrupt smooth boundary.
VC4 RSL No. 65264	48 to 52 inches, yellowish red (5YR 5/6) very gravelly loamy sand, yellowish red (5YR 4/6) when moist with common fine and very fine ($CaCO_3$) filaments (5YR 7/4) dry and (5YR 5/4) moist; massive; loose dry and moist, nonsticky and nonplastic; many fine interstitial pores; 60-70 percent gravels; noneffervescent to slightly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
VIC5ca RSL No. 65265	52 to 56 inches, reddish yellow (5YR 7/6) gravelly sandy loam, yellowish red (5YR 5/6) when moist; massive; hard, very friable, nonsticky and nonplastic; common fine and medium tubular and many fine interstitial pores; very few thin clay films as bridges; 30 percent gravel; strongly to violently effervescent; moderately alkaline (pH 8.0); abrupt, smooth boundary.
VIIC6 RSL No. 65266	56 to 63 inches, light reddish brown (5YR 6/4) very gravelly light sandy loam, yellowish red (5YR 4/6) when moist, common medium mottles of $CaCO_3$ (5YR 7/4) dry and (5YR 5/4) moist; massive; loose dry and moist; nonsticky and nonplastic; many fine interstitial pores; 60-70 percent gravel; noneffervescent to slightly effervescent; moderately alkaline (pH 8.0); abrupt, smooth boundary.
VIIIC7ca RSL No. 65267	63 to 71 inches, reddish yellow (5YR 6/6) clay loam, yellowish red (5YR 4/6) when moist with common medium $CaCO_3$ filaments (5YR 7/4) dry and (5YR 5/4) moist; massive; firm, nonsticky and slightly plastic; common fine tubular and many fine interstitial pores; strongly to violently effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
IXC8ca RSL No. 65268	71 to 76 inches, reddish brown (5YR 5/4) very gravelly loamy sand, reddish brown (5YR 4/4) when moist; massive; loose dry and moist; nonsticky and nonplastic; many fine interstitial pores; 70 percent gravel; noneffervescent to weakly effervescent; moderately alkaline (pH 8.0); abrupt, smooth boundary.

*Sampled for BPR. B21t and IIB22t horizons were combined in sample for BPR.
C1 through C8 horizons combined in sample for BPR.

CONSECUTIVE PEDON NUMBER C 68133 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CARALAMPI TAXADJUNCT SOIL NO. S68 ARIZ. 12- 5 SAMPLE NO. 8 987-8 988 E.PIMA-SANTA CRU AREA

SOIL FAMILY: USTOLLIC HAPLARGID FINE,MONTMORILLONITIC,THERM RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B.3A1 1A2A

NO.	CM.	2- .05	.05- .002	LT .002	2-1	1- .5	.5- .25	.25- .10	.1- .05	.05- .02	.02- .002	2- .2U	LT .2U	NATE 3A1A	.2- .02	OF WHOLE SOIL	75- 20	20-5 PCT. OF	5-2 LT 75
		PERCENT OF LESS THAN 2MM																	
8 987	0- 38 A	51.5	14.8	33.7	6.2	13.6	9.5	14.6	7.6	5.8	9.0				21.6	61*	30	18	11
8 988	13- 63 B T	60.2	3.5	36.3	29.8	20.0	6.5	3.3	0.6	2.1	1.4				3.9	44*	5	20	17

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT EXT FE 6C2B	AL 6G7A	PYROP EXT FE 6C5A	AL 6G9A	ATTERBERG LL 4F1	PL 4F2	BULK DENSITY EST. 1/3 BAR 4A1F	DRY 4A1F	CM 4A1H	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.NO.40		GRAMS PER CC			PERCENT			PERCENT	
8 987	0- 38	0.98	0.087									1.13		0.60			13.4		
8 988	13- 63											1.35		0.71			15.4		

CARALAMPI VERY GRAVELLY SANDY LOAM (taxadjunct) 1/

S68 Ariz-12-5-1 through 7

Location: Santa Cruz County, Arizona, 6 miles NW of Nogales, .45 miles south-southeast of Ruby Road on west side of old Ruby Road in road cut. Approximately 1900 feet south and 200 feet east of the NW corner Section 14, T23S, R13E. Photo AMS-673. Date of Sampling: October 17, 1968.
Description by: Richardson and Clemmons. Collectors: Nettleton and Brasher.
Classification: Ustollic Haplargid, fine, montmorillonitic, thermic.
Vegetation: Grass-shrub. Shrubs: Mesquite, guajillo and mimosa. Grasses: Sideoats, purple grama, canebeard grass, sprucetop grass. Climate: Mean annual temperature 62.3°F. Mean annual precipitation 14-16 inches. Parent Material: Old alluvium from granite, andesite, rhyolite and related tuffs. Topography: Dissected old alluvial fans. 12 percent slope, east aspect. Elevation: 3,975 feet.
Drainage: Well drained. Medium runoff. Soil moisture: Dry.
Remarks: Composite sample taken to determine coarse fragment content.

HORIZON	DESCRIPTION
	(0-5 cm)
A1	0 to 2 inches, brown (7.5YR 5/4) very gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak medium platy structure; slightly hard, very friable, nonsticky and nonplastic; many fine and very fine and few medium roots; many fine interstitial pores; 50 percent gravel, 5 percent cobble; noneffervescent; neutral (pH 6.8); abrupt smooth boundary.
A3 or B1 (2-13 cm)	2 to 5 inches, dark brown (7.5YR 4/2) very gravelly sandy clay loam, dark brown (7.5YR 3/2) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky and plastic; many fine and very fine roots; common fine interstitial and tubular pores; 50 percent gravel; noneffervescent; neutral (pH 7.0); abrupt wavy boundary.
B21t (13-30 cm)	5 to 12 inches, yellowish red (5YR 5/6) gravelly heavy clay loam, yellowish red (5YR 4/6) moist; weak fine and medium subangular blocky structure; hard, friable, sticky and plastic; common fine and very fine and few medium roots; few fine and very fine tubular pores; few thin clay films on ped faces and in pores; 40 percent gravel; noneffervescent; neutral (pH 7.2); clear wavy boundary.
B22t (30-43 cm)	12 to 17 inches, reddish brown (5YR 5/3) very gravelly heavy clay loam, reddish brown (5YR 4/3) moist; weak medium subangular blocky structure; very hard, friable, sticky and plastic; common fine and very fine and few medium roots; few fine and very fine tubular pores; common thin clay films on ped faces and in pores; 55 percent gravel; noneffervescent; neutral (pH 7.2); clear wavy boundary.
B31t (43-69 cm)	17 to 27 inches, reddish brown (5YR 5/4) very gravelly heavy clay loam, dark reddish brown (5YR 3/4) moist; massive; very hard, friable, sticky and plastic; few fine and very fine and few medium roots; few fine and very fine tubular pores; common thin clay films on ped faces and in pores; 55 percent gravel; noneffervescent; neutral (pH 7.2); clear wavy boundary.
B32t (69-94 cm)	27 to 37 inches, yellowish red (5YR 5/6) very gravelly sandy clay loam, yellowish red (5YR 5/6) moist; massive; very hard, friable, sticky and plastic; few fine, very fine and medium roots; few fine and very fine tubular pores; few thin clay films on ped faces; 60 percent gravel; noneffervescent; mildly alkaline (pH 7.4); abrupt wavy boundary.
B33t (94-130 cm)	37 to 51 inches, yellowish red (5YR 5/6) very gravelly heavy clay loam, yellowish red (5YR 4/6) moist; massive; very hard, friable, sticky and plastic; few very fine and medium roots; common fine and very fine tubular pores; few thin clay films in pores and on ped faces; 65 percent gravel; noneffervescent; mildly alkaline (pH 7.8).
Composite A	(0-38 cm)
68987	0 to 15 inches sample collected from the road cut.
Composite B	5 to 25 inches sample of upper 20 inches of the argillic horizon from
68988	the road cut.
	(13-63 cm)

1/ The Caralampi series is in a loamy-skeletal, mixed, thermic family of Ustollic Haplargids. This pedon has less than 35 percent coarse fragments by volume and more than 35 percent clay by weight in its control section.

CONSECUTIVE PEDON NUMBER C 69152 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES STEWART TAXADJUNCT SOIL NO. S69 ARIZ. 2- 6 SAMPLE NO. 9 780-9 788 WILLCOX AREA

SOIL FAMILY: TYPIC NADURARGID,LOAMY,MIXED,THERMIC,SHALLOW RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	VCS 2-1	SANDS CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A.02	1NT. II .2-.02	COARSE FRAGMENTS 1A2A PCT. OF WHOLE SOIL	I 75-20 PCT. OF LT 75	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM																	
9 780	0- 5	A21	63.6	31.9	4.5	2.1	6.5	7.3	27.4	20.3	16.8	15.1				55.1	--A	--	--	--
9 781	5- 15	A22SA	50.1	36.6	13.3	1.6	4.8	5.5	21.7	16.5	15.5	21.1				46.2	--A	--	--	--
9 782	15- 23	B2 SA	56.3	25.6	18.1	1.6	8.9	9.0	22.0	14.8	11.9	13.7				40.1	--A	--	--	--
9 783	23- 46	C1SASIM	64.2	30.6	5.2	1.6	5.9	9.3	28.1	19.3	17.0	13.6				51.8	--A	--	--	--
9 784	46- 56	C2SASIM	55.1	34.0	10.9	1.3	4.1	7.6	30.1	12.0	17.7	16.3				45.3	--A	--	--	--
9 785	56- 84	C3SAG	56.2	31.0	12.8	1.5	3.5	4.8	28.7	17.7	18.3	12.7				54.1	--A	--	--	--
9 786	84- 94	C4SAG	91.2	7.2	1.6	3.4	11.1	21.4	43.7	11.6	5.0	2.2				38.4	--A	--	--	--
9 787	94-107	C5SAG	48.7	36.7	14.6	7.2	6.7	5.8	15.0	14.0	23.6	13.1				46.5	--A	--	--	--
9 788	28- 38	C1SASIM															--G	--	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR-BON 6A1A	NITRO-GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	P L 4F2	BULK DENSITY 1/3 BAR 4A1F	4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT--		-PERCENT-		PCT.	PCT.NO.40		GRAMS PER CC				----PERCENT---			-PERCENT--				
9 780	0- 5	0.52	0.039	TR		0.2	NP	NP		1.56	1.58	1.00		8.9	3.0	0.4	0.4	7.4		7.3
9 781	5- 15	0.27	0.031	6		0.2				1.62	1.66	1.00		12.5	5.7	0.8	0.8	9.6	10.3	9.4
9 782	15- 23	0.23		4		0.2	NP	NP		1.52	1.56	1.00		19.4	15.3	0.9	0.9	10.1	10.4	10.0
9 783	23- 46			1		0.3				1.60	1.63	1.00		21.7	9.1	0.6	0.6	9.9	10.1	9.7
9 784	46- 56			TR		0.3				1.52	1.63	1.00		22.1	9.4	2.4	2.4	9.8	10.3	9.6
9 785	56- 84			1		0.2				1.52	1.70	1.00		22.6	9.0	3.8	3.8	9.8	10.2	9.6
9 786	84- 94			TR		0.1				1.60	1.73	1.00		15.0	1.5	2.6	2.6	9.4	10.0	8.7
9 787	94-107			3		0.1			1.60			1.00			9.5			9.7	10.4	9.7
9 788	28- 38									1.62	1.65	1.00		20.9		0.6	0.6			

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6D2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA+ OAC 5A2A	NH4+ OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		-MEQ/100G					PCT.	-MEQ/100G		MMHO	----------MEQ/1000 ML----------								PPM	
9 780	0- 5			1.9	1.7	3.6			8.4											
9 781	5- 15			22.4	1.6	24.0			17.2	12.1	0.7	0.2	154.0	0.5	4.5	28.0	17.7	110.6		8.9
9 782	15- 23			54.1	1.9	56.0			34.5	15.9	0.4	0.1	218.0	0.3	31.5	26.3	21.1	140.4		9.7
9 783	23- 46			32.0	0.9	32.9			25.1	5.25	0.7	0.2	74.3	0.2	13.4	12.3	5.6	28.7		9.9
9 784	46- 56			27.4	0.8	28.2			21.9	4.77	1.3	0.6	58.8	0.1	11.1	12.7	8.3	25.3		9.7
9 785	56- 84			22.4	0.7	23.1			19.0	5.47	5.5	0.2	69.4	0.1	13.4	12.5	8.3	32.4		9.7
9 786	84- 94			4.9	0.1	5.0			4.0	2.44	0.6	0.2	39.5	0.2	8.2	6.7	3.9	10.1		9.4
9 787	94-107			20.6	0.4	21.0			16.1	6.3	0.3	0.1	82.0	0.1	13.8	13.1	8.7	37.4		9.6
9 788	28- 38																			

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT 8A PCT.	NA SAT. 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY --LESS THAN 0.002 MM--- X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 PCT.	MINERALOGY -L.T. .0002 MM- X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
9 780	0- 5		1.9	23				MI 3								MI MICA	1 TRACE
9 781	5- 15	27.0	18.2	100+	100+			MI 4	KK 1							KK KAOLINIT	2 SMALL
9 782	15- 23	45.0	44.3	100+	100+			MI 3								MT MONTMORT	3 MODERATE
9 783	23- 46	39.3	29.1	100+	100+			MT 3	MM 3	MI 3	KK 1					MM MT/MICA	4 ABUNDANT
9 784	46- 56	38.5	25.1	100+	60												5 DOMINANT
9 785	56- 84	37.2	19.8	100+	41												6 INDETER.
9 786	84- 94	27.0	3.8	96	62			MI 3	MT 1	KK 1							
9 787	94-107	41.4	17.2	100+	100+												
9 788	28- 38																

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

[redacted]

STEWART FINE SANDY LOAM (taxadjunct) 1/
S69Ariz-2-6

Location: Cochise County, Arizona. 2,500 feet east and 850 feet north of the southwest corner of Sec. 11, T. 14 S., R. 24 E. East of U. S. Highway 666, about 2½ miles southwest of Willcox.
Date of sampling: October 15, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Typic Nadurargid, loamy, mixed, thermic, shallow.
Vegetation: Alkali sacaton, alkali lovegrass, and spike dropseed. Use: Livestock range. Climate: Precipitation about 11 to 12 inches. Mean annual air temperature 58°F., January 41°F., July 78°F. Parent Material: Alluvium, principally from rhyolite, andesite, quartzite and granite. Topography: Level and nearly level flats and low terraces bordering playas. Slope, 0.2 percent, southwest facing. Elevation: 4200 feet. Drainage: Somewhat poorly drained. Runoff is slow. Permeability is very slow. Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by hymol lue indicator in 1:5 dilution. This sample was not paired. The horizons designated as sa show an almost complete coating of salt crystals on exposed surfaces and pit banks when given time and opportunity to dry out.

HORIZON	DESCRIPTION
A21 RSL 69780	0 to 5 cm (0 to 2 inches), light gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) moist; moderate thin platy structure; slightly hard, very friable, nonsticky, nonplastic; many fine and medium roots; many fine and medium vesicular and few fine tubular pores; slightly effervescent; very strongly alkaline (pH 9.4); abrupt smooth boundary.
A22sa RSL 69781	5 to 15 cm (2 to 6 inches), light gray (10YR 7/2) fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky, nonplastic; many fine and medium roots; common fine tubular pores; slightly effervescent; very strongly alkaline (pH 9.6); abrupt wavy boundary.
B2sa RSL 69782	15 to 23 cm (6 to 9 inches), brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky, slightly plastic; many fine and medium roots; few fine tubular pores; few thin clay films in pores; some very dark gray stains on ped faces; slightly effervescent; very strongly alkaline (pH 9.6); abrupt smooth boundary.
C1sasim RSL 69783*	23 to 46 cm (9 to 18 inches), light yellowish brown (10YR 6/4) lime-silica cemented hardpan, dark yellowish brown (10YR 4/4) moist; massive; extremely hard, very firm; common very fine and fine roots; many fine and very fine vesicular and tubular pores; many dark gray stains on part of the surface, underside and on joint faces of the pan, brownish yellow coating in old root channels; few fine filaments of lime; slightly effervescent; very strongly alkaline (pH 9.6); clear wavy boundary.
C2sasim RSL 69784	46 to 56 cm (18 to 22 inches), light gray (10YR 7/2) lime-silica cemented hardpan, grayish brown (10YR 4/2) moist; massive; very hard, very firm; many fine and very vesicular and tubular pores; slightly effervescent; very strongly alkaline (pH 9.6); clear wavy boundary.
C3sag RSL 69785	56 to 84 cm (22 to 33 inches), light gray (10YR 7/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, slightly sticky, slightly plastic; common fine and very fine vesicular and tubular and few coarse tubular pores; few thin clay films in old root channels; slightly effervescent; very strongly alkaline (pH 9.6); abrupt wavy boundary.
C4sag RSL 69786	84 to 94 cm (33 to 37 inches), light gray (10YR 7/1 and 7/2 and 2.5YR 7/2) very fine sand and loamy sand in 1 to 6 inch strata; grayish brown (10YR 5/2) and (2.5Y 5/2) moist; massive; slightly hard, very friable, nonsticky, nonplastic; many very fine interstitial pores; very slightly effervescent; very strongly alkaline (pH 9.6); abrupt wavy boundary.
C5sag RSL 69787	94 to 107 cm (37 to 42 inches), pale yellow (5Y 7/3) and light gray (2.5Y 7/2) loam, sandy loam and loamy sand in 1 to 6 inch strata; olive (5Y 4/3) and dark grayish (2.5Y 4/2) moist, the coarser textures normally have the lighter and yellower colors; massive; hard, firm to friable, nonsticky, non-to slightly plastic; few fine tubular pores; slightly effervescent; very strongly alkaline (pH 9.6); abrupt wavy boundary.
C6sag	107 to 130 cm (42 to 51 inches), pale yellow (5Y 7/3) sand, olive (5Y 5/3) moist; single grain; loose, nonsticky, nonplastic; common fine interstitial pores; about 5 to 8 percent by volume 2 to 5 mm subangular quartz gravel; slightly effervescent; very strongly alkaline (pH 9.6); abrupt wavy boundary.
C7sag	130 to 152 cm (51 to 60 inches), pale yellow (5Y 7/3) stratified loamy sand and sandy loam, olive (5Y 5/3) moist; massive; hard, friable, slightly sticky, slightly plastic; contains about 2 to 3 percent by volume of 2 to 5 mm subangular quartz gravel; 8 to 10 percent by volume of large irregularly shaped white soft lime masses; slightly to violently effervescent; very strongly alkaline (pH 9.6).
*C1sasim RSL 69788	28 to 38 cm (11 to 15 inches), special sample.

1/ The Stewart series is in a loamy, mixed, thermic family of Typic Durorthids. This pedon has a natric horizon.

CONSECUTIVE PEDON NUMBER C 69153 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES DUNCAN TAXADJUNCT SOIL NO. S69 ARIZ. 2- 7 SAMPLE NO. 9 789-9 797 WILLCOX AREA

SOIL FAMILY: TYPIC NADURARGID,VERY-FINE,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	SILTS VFS .1- .05	CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBONATE 3A1A	1A2A INT. II .2- .02	COARSE FRAGMENTS OF WHOLE SOIL	I 75- 20 PCT.	II 20-5 OF LT 75	III 5-2
			PERCENT OF LESS THAN 2MM																	
9 789	0- 5	A21	53.0	38.6	8.4	1.7	5.2	6.4	21.8	17.9	22.8	15.8		17.7		54.5	--A	--	--	--
9 790	5- 13	A22	45.7	44.6	9.7	1.6	4.5	5.0	19.4	15.2	22.5	22.1	8.9	0.8		50.3	--A	--	--	--
9 791	13- 28	B21T	23.1	36.3	40.6	1.2	2.7	2.7	8.9	7.6	13.3	23.0	39.9	0.7	5	26.3	--A	--	--	--
9 792	28- 48	B22TSA	24.2	39.0	36.8	2.6	3.6	2.6	7.3	8.1	12.2	26.8	31.8	5.0	3	24.9	--A	--	--	--
9 793	48- 79	B23TSA	21.1	30.3	48.6	0.4	1.6	2.0	7.5	9.6	12.8	17.5	45.4	3.2	10	27.3	--A	--	--	--
9 794	79- 89	B3CASA	15.6	33.0	51.4	2.2	2.8	1.8	3.9	4.9	8.0	25.0	51.1	0.3	16	15.3	--A	--	--	--
9 795	89-100	CCASIM	70.7	16.4	12.9	18.6	20.5	10.7	14.4	6.5	6.4	10.0			4	20.2	--G	--	--	--
9 796	100-115	B21TCAB	27.0	31.2	41.8	4.8	6.5	4.0	6.8	4.9	6.6	24.6			1	15.4	--A	--	--	--
9 797	115-150	B22TB	31.2	27.9	40.9	1.2	3.7	4.3	12.5	9.5	9.6	18.3				27.0	--A	--	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L I M I T LL 4F1	PL 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		PERCENT		PERCENT		PCT.	PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT				
9 789	0- 5	0.64	0.066	TR		0.3	NP	NP		1.62	1.64	1.00		11.9	4.9	0.4	0.4	7.9		7.8
9 790	5- 13	0.37	0.041	TR		0.3				1.68	1.72	1.00		12.5	4.6	0.8	0.8	8.4		7.6
9 791	13- 28	0.56	0.063	12		0.2	62	27		1.35	1.59	1.00		27.5	25.0	5.6	5.6	8.8	10.1	8.9
9 792	28- 48	0.32		17		0.1				1.13	1.36	1.00		35.4	26.2	6.4	6.4	9.4	10.3	9.4
9 793	48- 79	0.29		19		0.2	64	23		1.23	1.70	1.00		37.1	30.9	11.4	11.4	9.8	10.4	9.9
9 794	79- 89			44		0.1			1.25			1.00			36.2			9.7	10.4	9.7
9 795	89-100			80		0.1				2.19	2.20	1.00		5.8	7.3	0.2	0.2	9.4	10.2	8.6
9 796	100-115			28		0.4	72	28	1.15			1.00			26.1			8.8	10.0	8.8
9 797	115-150			1		0.7				1.12	1.52	1.00		37.0	34.7	10.7	10.7	8.5		8.5

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	WATER EXTRACT FROM SATURATED PASTE EC 8A1A	CA 6N1B	MG 6Q1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
9 789	0- 5			1.7	1.8	3.5			10.6											
9 790	5- 13			3.2	1.5	4.7			10.3											
9 791	13- 28			41.5	1.7	43.2			32.9	2.33	0.4	0.2	40.5	0.1	1.0	14.4	5.9	3.9		8.4
9 792	28- 48			50.6	1.8	52.4			35.0	4.66	0.3	0.1	58.2	0.1	7.5	13.6	15.7	16.1		9.0
9 793	48- 79			53.9	1.7	55.6			37.1	7.9	0.5	0.6	104.0	0.1	34.2	23.4	13.4	30.5		9.9
9 794	79- 89			49.5	1.3	50.8			32.2	5.36	0.5	0.3	65.8	0.1	19.6	16.2	8.0	18.1		9.9
9 795	89-100			10.8	0.6	11.4			11.4	2.06	0.2	0.1	23.7	0.1	2.9	15.1	2.0			9.0
9 796	100-115			24.2	1.1	25.3			30.6	1.49	0.2	0.1	16.9	0.1	2.4	10.3	2.2			8.7
9 797	115-150			22.5	0.9	23.4			34.1											

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT 8A SAT. PCT.	NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY I 7A2E	II 7A2E	III 7A2E	IV 7A2E	DTA PCT. 7A3	-L.T. .0002 MM- X RAY I 7A2E	II 7A2E	III 7A2E	MINERAL CODE	RELATIVE AMOUNT
9 789	0- 5		1.7	16				MI 3	MT 1	KK 1						MI MICA	1 TRACE
9 790	5- 13		3.2	31				MI 2								MT MONTMORT	2 SMALL
9 791	13- 28	94.1	37.7	100+	74			MI 2	MT 1							KK KAOLINIT	3 MODERATE
9 792	28- 48	80.3	45.9	100+	100+			MT 3	MI 2								4 ABUNDANT
9 793	48- 79	117.1	41.7	100+	100+			MI 3	MT 2	KK 1			MT 5				5 DOMINANT
9 794	79- 89	149.6	39.7	100+	100+			MT 3	MI 3								6 INDETER.
9 795	89-100	32.8	10.0	88	61			MT 3	MI 3	KK 1							
9 796	100-115	86.7	22.7	74	44			MI 3	MT 2	KK 1							
9 797	115-150		22.5	66				MI 3	MT 1	KK 1							

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
G=GROUND WHOLE. HORIZON INDURATED OR GRAVEL TOO SOFT TO BE SEPARATED. ALL DATA FOR WHOLE SOIL.

DUNCAN LOAM (taxadjunct) 1/
S69Ariz-2-7

Location: Cochise County, Arizona. 100 feet north and 2200 feet east of the SW corner, Section 23, T13S, R24E. About 2 miles west and 2 miles north of Willcox. Date of Sampling: October 15, 1969.

[redacted]

Classification: Typic Nadurargid, very-fine, mixed, thermic.
Vegetation: Alkali sacaton and scattered mesquite. Use: Livestock forage. Climate: Precipitation is about 11 to 12 inches. Mean annual air temperature 58°F., January 41°F., July 77°F. Parent Material: Alluvium, principally from andesite, rhyolite, granite, and limestone. Topography: Nearly level old alluvial flats bordering playas. Slopes slightly convex, 0.2 percent, southwest facing. Elevation: 4192 feet. Drainage: Well drained. Runoff is slow. Permeability is very slow. Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by thymol blue indicator in 1:5 dilution. This sample was not paired. Exposed surfaces in the 5 upper horizons develop a coating of salt crystals upon drying.

HORIZON	DESCRIPTION
A21 RSL 69789	0 to 5 cm (0 to 2 inches), light gray (10YR 7/2) loam, dark grayish brown (10YR 4/2) moist; weak thick platy structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium roots; common fine, medium and coarse vesicular and tubular pores; slightly effervescent; strongly alkaline (pH 8.8); abrupt smooth boundary.
A22 RSL 69790	5 to 13 cm (2 to 5 inches), light gray (10YR 7/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; many fine and medium roots; common very fine, fine and medium vesicular and few tubular pores; slightly effervescent; strongly alkaline (pH 8.8); abrupt smooth boundary.
B21t RSL 69791	13 to 28 cm (5 to 11 inches), brown (10YR 5/3) clay, dark brown (10YR 3/3) moist; moderate medium prismatic breaking to strong medium and coarse angular and subangular blocky structure; hard, friable, sticky, plastic; many fine and medium and few coarse roots; common moderately thick clay films on ped faces; a few fine white (10YR 8/2) irregularly shaped soft masses of $CaCO_3$, light brownish gray moist; slightly effervescent; very strongly alkaline (pH 9.6); clear wavy boundary.
B22tsa RSL 69792	28 to 48 cm (11 to 19 inches), light brown (7.5YR 6/4) clay loam or clay, dark brown (7.5YR 4/4) moist; light brownish gray (10YR 6/2) moist; moderate medium prismatic breaking to moderate fine and medium subangular and angular blocky structure; hard, friable, sticky, plastic; many fine and medium and few coarse roots; few fine tubular pores; common thin clay films on ped faces; a few fine white (10YR 8/2) irregularly shaped soft masses of $CaCO_3$, light brownish gray moist; strongly effervescent; very strongly alkaline (pH 9.6); clear wavy boundary.
B23tsa RSL 69793	48 to 79 cm (19 to 31 inches), pinkish gray (7.5YR 7/2) clay, brown (7.5YR 5/4) moist; light brownish gray (10YR 6/2) moist; moderate fine subangular blocky structure; very hard, friable, sticky, very plastic; common fine and medium and few coarse roots; few very fine tubular pores; common thin clay films on ped faces; a few fine white (10YR 8/2) irregularly shaped soft masses of $CaCO_3$, light brownish gray moist; strongly effervescent; very strongly alkaline (pH 9.6); clear wavy boundary.
B3casa RSL 69794	79 to 89 cm (31 to 35 inches), pinkish gray (7.5YR 7/2) clay, brown (7.5YR 5/4) moist; moderate fine and medium subangular blocky structure; very hard, friable, sticky, plastic; few medium roots; common very fine tubular pores; few thin clay films on ped faces; many medium and large white (10YR 8/2) irregularly shaped soft masses of $CaCO_3$, pale brown when moist; violently effervescent; very strongly alkaline (pH 9.6); abrupt smooth boundary.
Ccasim RSL 69795	89 to 100 cm (35 to 39½ inches), very pale brown (10YR 7/3) and light yellowish brown (10YR 6/4) silica-lime cemented pan (duripan), yellowish brown (10YR 5/4) and brown (7.5YR 5/4) moist; massive; extremely hard; few fine and coarse roots in fractures; few very fine vesicular pores; violently effervescent; very strongly alkaline (pH 9.6); clear smooth boundary.
B21tcab RSL 69796	100 to 115 cm (39½ to 45½ inches), mottled reddish brown (5YR 5/4) and pinkish white (7.5YR 8/2) gravelly clay loam, reddish brown (5YR 4/4) and light brown (7.5YR 6/4) moist; moderate medium subangular blocky structure; very hard, friable, sticky, plastic; few fine tubular pores; common thin clay films on ped faces; approximately 10 to 12 percent by volume of rounded silica-lime cemented nodules (durinodes) 1/4 to 1-1/2 inches in diameter, many medium and large irregularly shaped soft masses of $CaCO_3$; strongly effervescent; very strongly alkaline (pH 9.6); clear wavy boundary.

CONSECUTIVE PEDON NUMBER C 71 4 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES HARQUA TAXADJUNCT SOIL NO. S71 ARIZ. 10- 4 SAMPLE NO. 1 18-1 25 ORGAN PIPE MON AREA

SOIL FAMILY: TYPIC NATRARGID,CLAYEY-SKELETAL,ILLTC,HYPRTHRMC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.		DEPTH CM.		HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS-- CSI .05- .02	FSI .02- .002	CLAYS---- CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	INT. COARSE FRAGMENTS- II .2- .02 WHOLE 20	PCT. OF	I 75- 20	II 20-5	III 5-2
					PERCENT OF LESS THAN 2MM													SOIL	PCT. OF	LT 75		
1	18	0-	4	A2	45.0	40.2	14.8	4.8	4.6	3.5	12.5	19.6	16.3	23.9	12.9	1.9		44.5	30A	14	12	4
1	19	4-	8	A3	49.8	28.6	21.6	8.5	7.6	4.2	11.1	18.4	12.2	16.4	18.2	3.4		38.2	30A	9	15	7
1	20	8-	15	B21TSA	37.9	21.5	40.6	7.9	5.4	2.6	7.4	14.6	10.0	11.5	31.8	8.8		29.7	44A	20	17	8
1	21	15-	28	B22TSA	33.4	18.2	48.4	9.8	5.7	2.2	5.0	10.7	9.4	8.8	30.5	17.9		23.4	60A	27	24	9
1	22	28-	43	B3TCASA	53.4	21.0	25.6	23.4	10.5	3.9	5.7	9.9	9.6	11.4	14.0	11.6	2	22.8	73A	34	28	11
1	23	43-	55	C 1CA	65.8	18.0	16.2	31.3	16.2	5.0	5.5	7.8	8.3	9.7			1	18.9	66A	32	16	18
1	24	55-	74	C 2CA	70.1	15.4	14.5	34.5	15.2	6.1	7.4	6.9	6.2	9.2			TR	17.1	66A	20	26	20
1	25	74-	107	C 3CA															62A	8	26	28

SAMPLE NO.		DEPTH CM.		ORG. CAR- BON 6A1A -PERCENT--	MATTER NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2 19-2 6E1B -PERCENT-	EXT. IRON FE 6C2B PCT.	ATTERBERG L I M I T LL 4F1 PCT.	PL 4F2 NO.40	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F GRAMS	DRY 4A1H PER CC	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C ----PERCENT---	15 BAR 4B2	EXTENSBLTY LEF 4D1 -PERCENT--	LE 4D1	-----PH------- H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
1	18	0-	4	0.13	0.017	2		0.6				1.46	1.50	0.81	19.8	17.2	7.6	0.9	0.7	8.0	8.8	8.0
1	19	4-	8	0.13	0.021	4		0.6			1.46			0.81			8.1			7.8	8.2	7.8
1	20	8-	15	0.18		1		0.7				1.31	1.40	0.72	24.0	18.9	11.8	2.2	1.6	7.7	8.0	7.8
1	21	15-	28	0.24		2		0.7			1.31			0.57			16.7			7.7	7.9	7.7
1	22	28-	43	0.05		16		0.3				0.75	0.80	0.57	73.1	68.3	11.4	2.2	1.2	7.6	8.2	7.7
1	23	43-	55	0.07		15		0.3				0.89	0.93	0.61	41.3	37.7	9.2	1.5	0.9	7.8	8.3	7.6
1	24	55-	74	0.12		8		0.3				1.14	1.18	0.55	30.0	25.2	7.8	1.2	0.6	7.8	8.4	7.7
1	25	74-	107			5					1.14			0.59			6.8			8.0	8.4	7.8

SAMPLE NO.		DEPTH CM.		----EXTRACTABLE BASES--- CA 5B4A 6N2E	MG 5B4A 6D2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT. PCT.	--C E C-- NA- OAC 5A2A -MEQ/100G	NH4- OAC 5A6A	------WATER EXTRACT FROM SATURATED PASTE 8A1 ----- EC 8A1A MMHO	CA 6N1A	MG 6O1A	NA 6P1A -----MEQ/1000	K 6Q1A	CO3 6I1A ML	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A PPM	PH SAT. PASTE 8C1B
1	18	0-	4	12.6	3.7	15.3	1.7	33.3	100+			16.8	39.5	100.5	28.1	318.0	2.7		3.8	437.0	9.7	1.1	7.5
1	19	4-	8	19.8	7.5	29.1	2.4	58.8	100+			15.1	74.3	301.7	111.9	515.0	2.0		6.2	908.0	17.6	1.7	7.3
1	20	8-	15	31.7	12.4	33.7	2.5	80.3	100+			19.2	63.3	338.7	144.9	485.0	1.3		4.3	863.0	25.0	2.9	7.4
1	21	15-	28	61.4	17.2	38.4	1.1	118.1	100+			18.5	71.3	352.2	162.0	433.0	1.0		6.6	842.0	36.0	2.2	7.4
1	22	28-	43	39.9	12.0	30.9	0.5	83.3	100+			9.4	46.4	201.4	86.4	298.0	0.6		4.3	522.0	34.0	1.4	7.4
1	23	43-	55	28.6	5.8	21.3	0.3	56.0	100+			7.2	36.1	134.9	57.1	220.0	0.5		4.3	372.0	26.7	2.6	7.5
1	24	55-	74	22.3	3.8	18.2	0.2	44.5	100+			5.8	31.0	100.9	39.4	196.0	0.5		3.3	303.0	27.7	3.3	7.4
1	25	74-	107	17.1	2.6	9.9	0.2	29.8	100+			6.5	28.4	82.8	34.2	218.0	0.4		6.2	286.0	23.1	4.7	7.6

SAMPLE NO.		DEPTH CM.		WATER EXCHANGBLE AT SAT. 8A PCT.	NA 5B4B MEQ.	502 NA PCT.	5E	SAR	-GYPSUM- AMT. 6F1B PCT.	REQ. 6P3A MEQ.	--LESS THAN 0.002 MM--- -L.T. .0002 MM- ------X RAY--------- DTA 7A2E I	7A2E II	7A2E III	7A2E IV	7A3 PCT.	-----X RAY----- 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
				CLAY MINERALOGY																
1	18	0-	4	32.2	5.1	30	40				MI 3	KK 1				MI 3			MI MICA	1 TRACE
1	19	4-	8	32.9	12.2	81	36									MI 4			KK KAOLINIT	2 SMALL
1	20	8-	15	46.0	11.4	59	31	2.7			MI 4	KK 2				MI 5				3 MODERATE
1	21	15-	28	67.4	9.2	50	27	2.9								MI 4				4 ABUNDANT
1	22	28-	43	66.0	11.2	100+	25	0.4								MI 3				5 DOMINANT
1	23	43-	55	59.9	6.1	100+	22	0.8			MI 5	KK 1								6 INDETER.
1	24	55-	74	56.1	7.2	100+	23	0.5												
1	25	74-	107	42.9	0.6	9	29	0.5												

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

HARQUA VERY GRAVELLY LOAM (taxadjunct) 1/
S71 Ariz-10-4-(1-8*)

Location: Pima County, Arizona. North of salt well. Go west on Puerto Blanco Road past International boundary and stake #22, 3/4 mile north and 1/10 mile west of boundary marker #170., Organ Pipe Cactus National Monument. Date of Sampling: April 6, 1971.
Description by: Y.H.Havens, E.Chamberlin. Collectors: K. Flach, E. Chamberlin, K. Vogt.
Classification: Typic Natrargid, clayey-skeletal, illitic, hyperthermic.
Vegetation: Scattered creosotebush and turkshead. Use: Desert rangeland. Climate: Mean annual precipitation 7 to 9 inches. Mean annual air temperature 69° F. Parent Material: Mixed alluvium from schist, rhyolite, diorite, welded tuff and gneiss. Topography: Nearly level, less than 1 percent slope. Elevation: 1250 feet. Drainage: Well drained, slow permeability. Soil Moisture: Dry.
Remarks: 80 percent of surface covered with varnished gravel--desert pavement.

HORIZON	DESCRIPTION
A2 RSL 7118	0 to 4 cm (0 to 1½ inches), light brown (7.5YR 6/4) very gravelly loam, dark brown (7.5YR 4/4) moist; weak thick platy structure; slightly hard, very friable, nonsticky, slightly plastic; many fine and very fine vesicular pores; 50 percent gravel by volume; slightly effervescent; strongly alkaline (pH 8.6 thymol blue); abrupt wavy boundary.
A3	4 to 8 cm (1½ to 3 inches), reddish brown (5YR 5/4) gravelly loam, yellowish red (5YR

[redacted]

7119	common very fine interstitial pores; 40 percent gravel by volume; strongly effervescent; strongly alkaline (pH 8.5); clear wavy boundary.
B21tsa RSL 7120	8 to 15 cm (3 to 6 inches), yellowish red (5YR 5/6) gravelly light clay loam, yellowish red (5YR 4/6) moist, weak medium prismatic parting to weak fine subangular blocky structure; hard, friable, slightly sticky, plastic; few fine roots; few fine tubular and interstitial pores; few thin clay films on faces of peds and in pores; 35 percent gravel by volume; strongly effervescent; strongly alkaline (pH 8.6); clear wavy boundary.
B22tsa RSL 7121	15 to 28 cm (6 to 11 inches), yellowish red (5YR 5/6) gravelly clay loam, yellowish red (5YR 4/6) moist; weak medium prismatic parting to weak fine subangular blocky structure; hard, friable, sticky, plastic; few fine roots; few fine tubular and interstitial pores; common thin clay films on faces of peds and in pores; 35 percent gravel; strongly effervescent; few fine pinkish white (7.5YR 8/2) lime filaments; moderately alkaline (pH 8.3); gradual wavy boundary.
B3tcasa RSL 7122	28 to 43 cm (11 to 17 inches), pinkish white (5YR 8/2) and yellowish red (5YR 5/6) gravelly loam, pink (5YR 7/3) and reddish brown (5YR 5/4) moist; weak medium subangular blocky structure; hard, friable, sticky, plastic; common fine interstitial and few fine tubular pores; few thin clay films on faces of peds; 50 percent gravel; violently effervescent; many pinkish white (7.5YR 8/2) slightly hard lime masses and coatings on gravel; moderately alkaline (pH 8.3); clear wavy boundary.
C1ca RSL 7123	43 to 55 cm (17 to 22 inches), pinkish white (7.5YR 8/2) and light brown (7.5YR 6/4) very gravelly sandy loam, light brown (7.5YR 6/4) and brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky, slightly plastic; many very fine and fine interstitial pores; 60 percent gravel; violently effervescent; many pinkish white (7.5YR 8/2) slightly hard lime masses and gravel is completely coated with lime; moderately alkaline (pH 8.3); clear wavy boundary.
C2ca RSL	55 to 74 cm (22 to 29 inches), pinkish white (7.5YR 8/2) and light brown (7.5YR 6/4)

CONSECUTIVE PEDON NUMBER C 71 16 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CASA GRANDE TAXADJUNCT SOIL NO. S71 ARIZ. 7- 3 SAMPLE NO. 1 94-1 94 CENT. MARICOPA AREA

SOIL FAMILY: TYPIC NATRARGID,COARSE-LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION			SANDS				SILTS		CLAYS			1A2A INT.	COARSE FRAGMENTS		
			SAND 2- .05	SILT .05- .002	CLAY LT .002	VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	II .2- .02	PCT. OF WHOLE SOIL	I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75			
1	94	20- 67	B2tca	69.5	15.4	15.1	2.1	15.9	22.6	20.2	8.7	8.8	6.6			25.1	A			

SAMPLE NO.	DEPTH CM.	ORG. CAR- BON 6A1A	MATTER NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG LL 4F1	PL 4F2	BULK DENSITY EST 1/3 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSIBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		PERCENT		PERCENT		PCT.	PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT				
1	94	20- 67		7					1.52			1.00	7.2					9.0	10.0	8.6

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1A	MG 6O1A	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000				ML				PPM	
1	94	20- 67	12.4	1.4	9.8	0.3	23.9	100+		6.6	9.0	1.0	0.7	88.9	0.2		2.9	55.1	26.6		8.7

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT SAT. 8A PCT.	NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY DTA 7A2E I	7A2E II	7A2E III	7A2E IV	7A3 PCT.	-L.T. .0002 MM- X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE
1	94	20- 67 74.8	3.1	48	96		5.6									

RELATIVE AMOUNT

1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

CASA GRANDE SANDY LOAM (taxadjunct) 1/
S71Ariz-7-3(1)

Location: Maricopa County, Arizona. The site is located 600 feet west and 40 feet north of the SE corner of the NW 1/4 of Sec. 2, T1S, R6W, about 15 miles west of Buckeye. Date of Sampling: April 12, 1971.
Description by: W. Nettleton, J. Jay, G. Hartman, R. Schurig, F. Cook. Collectors: W. Nettleton, J. Jay, G. Hartman, R. Schurig, F. Cook.
Classification: Typic Natrargid, coarse-loamy, mixed, hyperthermic.
Vegetation: Four-wing saltbush, cholla cactus, mesquite. Use: Desert range. Climate: Semi-arid. 7 inches precipitation. Mean annual air temperature 70° F. Parent Material: Alluvium from granite, rhyolite, andesite and quartzite. Topography: Nearly level valley plain. Slopes less than one percent. Elevation: 1100 feet. Drainage: Well drained, slow to very slow permeability. Slow runoff.
Remarks: Sample site is 140 feet W NW from S71Ariz-7-1(1-13). 20-67 cm was sampled for ESP. Soil Moisture: Dry when sampled.

HORIZON	DESCRIPTION
A11	0 to 6 cm (0 to 2-1/2 inches), light yellowish brown (10YR 6/4) sandy loam, dark brown (10YR 4/3) moist; weak thin platy structure; slightly hard, very friable, nonsticky, slightly plastic; common very fine roots; common fine tubular pores; weakly effervescent; moderately alkaline (pH 8.3 TB); clear smooth boundary.
A12	6 to 20 cm (2-1/2 to 8 inches), light yellowish brown (10YR 6/4) sandy loam, dark brown (10YR 4/3) when moist; massive, slightly hard, very friable, nonsticky, slightly plastic; common fine roots; common fine tubular pores; nonefferves-cent; moderately alkaline (pH 8.3); abrupt smooth boundary.
B2tca RSL 71094 (20-67 cm)	20 to 39 cm (8 to 15-1/2 inches), yellowish red (5YR 5/6) heavy sandy loam, dark brown (7.5YR 4/4) moist; massive; hard, very friable, slightly sticky, slightly plastic; few fine roots; many fine interstitial pores; weakly to strongly effervescent; a 1 1/2 inch stratum of fine, medium and coarse gravel at the bottom of horizon; common fine white irregularly shaped soft lime masses and lime filaments; strongly alkaline (pH 9.0); abrupt smooth boundary.
IIB2tca RSL No. 71094	39 to 67 cm (15-1/2 to 26-1/2 inches) reddish brown (5YR 5/4) and yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) and reddish brown (5YR 4/4) moist; strong fine prismatic; very hard, firm, sticky and plastic; few fine roots; common fine interstitial and few fine tubular pores; slightly effervescent; many fine and medium white irregularly shaped soft lime masses; very strongly alkaline (pH 9.4).

1/ The Casa Grande series is in a fine-loamy, mixed, hyperthermic family of Typic Natrargids. This pedon has a control section with less than 18 percent clay.

CONSECUTIVE PEDON NUMBER C 71 13 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CASA GRANDE SOIL NO. S71 ARIZ. 7- 1 SAMPLE NO. 1 73-1 85 CENT. MARICOPA AREA

SOIL FAMILY: TYPIC NATRARGID,FINE-LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.		DEPTH CM.		HORZ.	TOTAL FRACTION 2- .05	SANDS .05- .002	SILTS LT .002	CLAYS	VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	CLAYS FINE LT .2U	CARBO NATE 3A1A.02	INT. II PCT. OF WHOLE SOIL	COARSE FRAGMENTS I 75-20	II 20-5	III 5-2
					PERCENT OF LESS THAN 2MM															PCT. OF LT 75		
1	73	0-	5	A11	65.6	29.8	4.6		2.2	11.4	15.3	18.2	18.5	20.1	9.7			46.4	A			
1	74	5-	13	A12	72.9	21.7	5.4		2.1	14.9	19.7	21.3	14.9	15.4	6.3			39.0	A			
1	75	13-	20	B21T	61.2	21.0	17.8		1.8	11.7	15.7	18.4	13.6	11.6	9.4			32.7	A			
1	76	20-	38	B22TCA	55.8	24.3	19.9		3.3	12.4	14.1	14.8	11.2	9.6	14.7		1	27.1	8A	--	4	3
1	77	38-	54	B23TCA	47.0	34.6	18.4		2.3	12.3	13.5	12.8	6.1	5.6	29.0		3	17.2	17A	--	12	5
1	78	54-	74	B24TCA	46.5	31.7	21.8		4.9	12.6	10.2	11.0	7.8	8.7	23.0		1	21.7	2A	--	--	2
1	79	74-	97	B25TCA	38.9	43.0	18.1		0.5	4.2	4.6	11.1	18.5	22.2	20.8			48.0	A			
1	80	97-	122	C 1	62.1	23.2	14.7		0.5	2.8	5.1	31.9	21.8	11.8	11.4			55.5	A			
1	81	122-	129	2C 2	45.3	35.0	19.7		--	0.5	1.2	15.6	28.0	18.2	16.8			58.3	A			
1	82	129-	142	3C 3	66.4	19.8	13.8		0.1	0.7	2.3	36.5	26.8	10.2	9.6		--	63.3	A			
1	83	142-	147	3C 4															TRA	--	--	TR
1	84	147-	165	4C 5															A			
1	85	165-	190	5C 6															G			

SAMPLE NO.		DEPTH CM.		ORG.MATTER CARBON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	CARBONATE AS CACO3 2-19 6E1B	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	ATTERBERG P L 4F2	BULK DENSITY EST 1/3 BAR 4A1F	BULK DENSITY 1/3 BAR 4A1F	BULK DENSITY DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	WATER CONTENT 1/3 BAR 4B1C	WATER CONTENT 15 BAR 4B2	EXTENSBLTY LEF 4D1	EXTENSBLTY LE 4D1	PH H2O 1/1 8C1A	PH H2O 1/10 8C1A	PH CACL2 8C1E
				-PERCENT--		-PERCENT-		PCT.	PCT.	NO.40	GRAMS PER CC				----PERCENT---			-PERCENT--				
1	73	0-	5	0.29	0.037	TR					1.66		1.00				3.1			8.4		7.6
1	74	5-	13	0.06	0.012	TR						1.66	1.67	1.00	10.1	5.5	2.3	0.2	0.2	8.8	9.2	7.6
1	75	13-	20			2						1.60	1.69	1.00	17.6	14.7	6.2	1.8	1.8	9.2	9.9	8.5
1	76	20-	38			13						1.52	1.61	0.95	19.7	17.2	7.2	1.9	1.8	9.0	9.9	8.6
1	77	38-	54			28						1.60	1.69	0.89	18.0	15.5	7.9	1.8	1.6	9.0	9.8	8.5
1	78	54-	74			15						1.43	1.72	0.99	30.2	25.2	11.8	6.3	6.3	8.8	9.8	8.6
1	79	74-	97			4						1.31	1.56	1.00	38.1	31.1	11.7	6.0	6.0	8.5	9.5	8.3
1	80	97-	122			1						1.34	1.56	1.00	34.1	26.0	9.8	5.2	5.2	8.9	9.8	8.6
1	81	122-	129			1					1.34		1.00				16.4			8.5	9.5	8.5
1	82	129-	142			1					1.34		1.00				11.1			8.6	9.7	8.5
1	83	142-	147			1					1.34		1.00				20.8			8.5		8.4
1	84	147-	165			TR					1.34		1.00				14.2			8.4		8.3
1	85	165-	190			51					1.34		1.00				16.3			8.5		8.7

SAMPLE NO.		DEPTH CM.		EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA+ OAC 5A2A	C E C NH4- OAC 5A6A	WATER EXTRACT EC 8A1A	WATER EXTRACT CA 6N1A	WATER EXTRACT MG 6O1A	WATER EXTRACT NA 6P1A	WATER EXTRACT K 6Q1A	SATURATED PASTE CO3 6I1A	SATURATED PASTE HCO3 6J1A	SATURATED PASTE CL 6K1A	SATURATED PASTE SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
				---------MEQ/100G---------				PCT.		-MEQ/100G		MMHO	---------------MEQ/1000 ML---------------								PPM	
1	73	0-	5	7.7	1.9	0.3	0.8	10.7	100+		7.2											
1	74	5-	13	4.8	1.5	1.4	0.6	8.3	100+		5.6	2.46	1.6	1.3	17.6	0.2		1.0	18.6			8.1
1	75	13-	20	8.9	1.5	8.2	0.8	19.4	100+		9.9	6.8	1.0	0.5	65.9	0.2		4.4	55.6			8.3
1	76	20-	38	14.0	1.4	13.0	0.5	28.9	100+		9.6	14.4	2.2	1.5	143.0	0.2		4.6	107.0	31.2		8.2
1	77	38-	54	13.9	1.6	14.9	0.2	30.6	100+		10.2	12.7	2.9	2.7	131.0	0.1		3.2	92.3	32.6		8.5
1	78	54-	74	14.6	2.0	21.6	0.3	38.5	100+		14.9	10.4	1.6	0.8	103.0	0.1		2.3	68.4	29.0		8.6
1	79	74-	97	28.3	2.2	29.4	0.4	60.3	100+		21.4	16.9	19.9	3.2	168.0	TR		3.2	85.8	110.4		8.1
1	80	97-	122	11.9	2.0	25.5	0.3	39.7	100+		19.0	9.7	2.3	1.1	96.6	0.5		1.4	56.8	36.2		8.5
1	81	122-	129	17.8	2.9	38.9	0.5	60.1	100+		31.4	14.2	11.5	2.2	145.0	0.1		2.7	74.4	88.8		8.2
1	82	129-	142	9.5	2.1	27.2	0.4	39.2	100+		21.5	12.3	4.1	1.4	118.0	0.1		3.6	72.9	54.6		8.3
1	83	142-	147																			

SAMPLE NO.		DEPTH CM.		WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	EXCHANGBLE NA 5D2 PCT.	EXCHANGBLE SAR 5E	GYPSUM AMT. 6F1B PCT.	GYPSUM REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	DTA IV 7A2E	DTA 7A3 PCT.	CLAY MINERALOGY -L.T. .0002 MM- X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E
1	73	0-	5		0.3	4				MI 3	MT 1						
1	74	5-	13	22.0	1.0	18	15		0.8	MT 3	MI 3	KK 1					
1	75	13-	20	36.4	5.8	59	76		5.2	MT 4	MI 3	KK 1					
1	76	20-	38	41.4	7.1	74	100+		5.9								
1	77	38-	54	65.9	6.3	61	78		5.3								
1	78	54-	74	106.4	10.6	71	94		9.2	MT 5	MI 1						
1	80	97-	122	107.5	15.1	80	74		9.8	MT 5	MI 1						
1	81	122-	129	121.7	21.3	68	55		14.1								
1	82	129-	142	85.0	17.2	80	71		10.9	MT 5	MI 1						
1	83	142-	147														
1	84	147-	165														
1	85	165-	190														

MINERAL CODE / RELATIVE AMOUNT

MI MICA — 1 TRACE
MT MONTMORT — 2 SMALL
3 MODERATE
KK KAOLINIT — 4 ABUNDANT
5 DOMINANT
6 INDETER.

MT MONTMORT MI KK
VR VERMICLT

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
G=GROUND WHOLE. HORIZON INDURATED OR GRAVEL TOO SOFT TO BE SEPARATED. ALL DATA FOR WHOLE SOIL.

CASA GRANDE SANDY LOAM
S71Ariz-7-1(1-13)

Location: Maricopa County, Arizona. 500 feet west of the NE corner of the SE¼ of the NW¼ of Section 2, T1S, R6W, about 15 miles west of Buckeye. Date of Sampling: April 12, 1971.
Description by: W. D. Nettleton, J. Jay, G. Hartman, R. Schurig, F. Cook. Collectors: W. D. Nettleton, J. Jay, G. Hartman, R. Schurig, F. Cook.
Classification: Typic Natrargid, fine-loamy, mixed, hyperthermic.
Vegetation: Four-wing saltbush, cholla cactus, mesquite trees. Use: Desert rangeland. Climate: [illegible]

granite, quartzite, rhyolite, andesite, tuff, schist and limestone. Topography: Nearly level valley floors. Elevation: 1100 feet. Drainage: Well drained. Slow to very slow permeability. Slow runoff. Soil Moisture: Dry when sampled.

HORIZON	DESCRIPTION
A11 RSL 71073	0 to 5 cm (0 to 2 inches), light yellowish brown (10YR 6/4) sandy loam, dark brown (7.5YR 4/4) moist; weak coarse platy structure; soft, very friable, nonsticky and slightly plastic; many fine roots; many fine and medium tubular pores; slightly effervescent; moderately alkaline (pH 8.2 TB); abrupt smooth boundary.
A12 RSL 71074	5 to 13 cm (2 to 5 inches), light yellowish brown (10YR 6/4) sandy loam, dark brown (7.5YR 4/4) when moist; massive; soft, very friable, slightly sticky and slightly plastic; many fine roots; many fine and medium tubular pores; slightly effervescent; moderately alkaline (pH 8.3); abrupt smooth boundary.
B21t	13 to 20 cm (5 to 8 inches), yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6) [illegible]

CONSECUTIVE PEDON NUMBER C 71 14 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CASA GRANDE SOIL NO. S71 ARIZ. 7- 2 SAMPLE NO. 1 86-1 86 CENT. MARICOPA AREA

SOIL FAMILY: TYPIC NATRARGID,FINE-LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05 SAND	2- .05- .002 SILT	LT .002 CLAY	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBONATE 3A1A.02	1A2A INT. II .2- .02	COARSE FRAGMENTS PCT. OF WHOLE SOIL I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75		
1	86 14- 70	B2tca	57.0	21.1	21.9	2.0	12.8	14.4	16.5	11.3	10.2	10.9			1	29.2	1A --	--	1

SAMPLE NO.	DEPTH CM.	ORG. CAR- BON 6A1A	MATTER NITRO GEN 681A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L I M I T EST LL 4F1	PL 4F2	BULK DENSITY 1/3 BAR 4A1F	ORY 4A1H	CM 3B2	WATER CONTENT EXTENSBLTY 1/10 BAR 481C	1/3 BAR 481C	15 BAR 482	LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT--		-PERCENT-		PCT.	PCT.	NO.40	GRAMS PER CC			----PERCENT---			-PERCENT--				
1	86 14- 70			10					1.52		0.99			8.2			8.9	9.7	8.5

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 584A 6N2E	MG 584A 602D	NA 584A 6P2A	K 584A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1A	MG 6O1A	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	8A1 SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	-MEQ/100G		MMHO	MEQ/1000 ML								PPM	
1	86 14- 70	14.4	2.0	11.5	0.8	28.7	100+		10.3	11.5	2.5	1.2	109.0	0.4		3.6	85.6	12.5		8.1

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT SAT. 8A PCT.	NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 PCT.	L.T. .0002 MM X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE
1	86 14- 70	45.9	6.5	63	80		5.8									

RELATIVE AMOUNT

1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

CASA GRANDE FINE SANDY LOAM
S-71Ariz-7-2(1)

Location: Maricopa County, Arizona. 400 feet west and 30 feet south of the NE corner of the SE¼ of the NW¼, Section 2, T1S, R6W, about 15 miles west of Buckeye. Date of Sampling: April 12, 1971.
Described by: J. E. Jay, W. D. Nettleton, G. Hartman, R. Schurig, F. Cook.
Collectors: J. Jay, W. D. Nettleton, G. Hartman, R. Schurig, F. Cook.
Classification: Typic Natrargid, fine-loamy, mixed, hyperthermic.
Vegetation: Saltbush, cholla cactus. Use: Range. Climate: Semiarid. 7 inches precipitation. Mean annual air temperature is 70° F. Parent Material: Old alluvium from granite, schist, rhyolite, andesite, quartzite, basalt. Topography: Nearly level valley plain. Elevation: 1100 feet. Less than 1 percent slope. Drainage: Well drained, moderately slow permeability. Slow runoff. Soil Moisture: Dry when sampled.

HORIZON	DESCRIPTION
A11	0 to 3 cm (0 to 1 inch), light yellowish brown (10YR 6/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist, weak thin platy structure; slightly hard, very friable, nonsticky and slightly plastic; common fine roots; many fine, medium and coarse vesicular pores; 1/8 inch black algae crust on the surface; noneffervescent to slightly effervescent; moderately alkaline (pH 8.2 TB); abrupt smooth boundary.
A12	3 to 14 cm (1 to 5½ inches), light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable, nonsticky and slightly plastic; common fine roots; few fine tubular pores; slightly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.
B21tca* RSL No. 71086 (14 to 70 cm)	14 to 25 cm (5½ to 10 inches), light reddish brown (5YR 6/4) and reddish brown (5YR 5/4) clay loam, yellowish red (5YR 4/6) and reddish brown (5YR 4/4) moist; moderate, medium and coarse columnar structure; hard, friable, slightly sticky and plastic; common fine roots; common fine tubular pores; strongly effervescent, many fine and medium white irregular-shaped nodules, effervescent soft lime masses; very strongly alkaline (pH 9.2); clear smooth boundary.
B22tca * RSL No.	25 to 58 cm (10 to 23 inches), reddish brown (5YR 5/4) and yellowish red (5YR 5/6) heavy sandy clay loam; yellowish red (5YR 4/6) and

CONSECUTIVE PEDON NUMBER C 71 15 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CASA GRANDE SOIL NO. S71 ARIZ. 7- 9 SAMPLE NO. 1 87-1 93 CENT. MARICOPA AREA

SOIL FAMILY: TYPIC NATRARGID,FINE-LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE	DEPTH	HORZ.	TOTAL FRACTION			SANDS					SILTS		CLAYS			INT.	COARSE FRAGMENTS		
NO.	CM.		SAND 2- .05	SILT .05- .002	CLAY LT .002	VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	II .2- .02	PCT. OF WHOLE	I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM																

[redacted]

1	88	7- 16	B21TCA	49.6	35.3	15.1	4.0	7.1	7.1	14.4	17.0	15.6	19.7	13.5	1.6		39.9	2A	--	--	2
1	89	16- 36	B22TCA	48.5	29.8	21.7	3.3	7.1	8.0	14.4	15.7	13.5	16.3			TR	36.0	2A	--	--	2
1	90	36- 65	B31TCA	49.1	27.2	23.7	3.1	9.8	10.1	13.0	13.1	15.1	12.1	15.9	7.8	1	34.0	2A	--	--	2
1	91	65- 92	B32TCA	46.4	36.3	17.3	1.1	5.4	7.7	13.9	18.3	20.4	15.9			1	45.1	A			
1	92	92-130	C 1CA	47.0	38.1	14.9	1.9	6.0	7.6	13.2	18.3	21.7	16.4			4	46.1	3A	--	--	3
1	93	130-165	C 2	67.8	24.1	8.1	0.7	4.8	12.4	33.0	16.9	18.0	6.1	4.6	3.5		50.4	1A	--	--	1

SAMPLE		DEPTH	ORG. MATTER CAR- BON	NITRO GEN	CARBONATE AS CACO3 LT 2	19-2	EXT. IRON FE	ATTERBERG L T M I T LL	PL	BULK DENSITY EST 1/3 BAR	DRY	CM	WATER CONTENT 1/10 BAR	1/3 BAR	15 BAR	EXTENSBLTY LEF	LE	PH H2O 1/1	H2O 1/10	CACL2
NO.		CM.	6A1A	6B1A	6E1B	6E1B	6C2B	4F1	4F2	4A1F	4A1F	4A1H	3B2	4B1C	4B1C	4B2	4D1	4D1	8C1A	8C1A	8C1E
			-PERCENT--		-PERCENT-		PCT.	PCT.	NO.40	GRAMS PER CC			----PERCENT---			-PERCENT--				
1	87	0- 7	0.17	0.022	TR						1.69	1.70	0.99	14.6	8.8	3.1	0.2	0.2	8.8		7.8
1	88	7- 16	0.11	0.019	6						1.55	1.63	0.99	20.2	17.7	7.3	1.7	1.7	9.4	10.0	8.5
1	89	16- 36	0.12		8						1.63	1.76	0.99	19.0	15.9	9.0	2.6	2.5	9.2	10.2	8.9
1	90	36- 65			7						1.44	1.62	0.99	23.3	19.2	8.8	4.0	4.0	8.5	9.5	8.5
1	91	65- 92			10					1.44			1.00			7.6			9.1	9.9	8.6
1	92	92-130			17						1.59	1.69	0.98	21.5	16.2	6.5	2.1	2.0	9.1	10.1	8.7
1	93	130-165			5						1.69	1.77	0.99	12.2	8.6	3.9	1.6	1.5	9.5	10.1	8.6

SAMPLE		DEPTH	EXTRACTABLE BASES CA	MG	NA	K	SUM	BASE	C E C NA+	NH4+	EC	WATER EXTRACT FROM SATURATED PASTE 8A1 CA	MG	NA	K	CO3	HCO3	CL	SO4	B	PH SAT
NO.		CM.																			

[redacted]

1	87	0- 7	9.7	1.9	0.6	1.0	13.2	100+		7.2											
1	88	7- 16	16.9	2.7	9.3	1.6	30.5	100+		18.3	2.25	0.4	0.3	19.3	0.2		6.8	12.9			8.3
1	89	16- 36	13.9	1.9	16.5	0.8	33.1	100+		18.0	6.2	0.6	0.5	57.8	0.2		6.7	35.0			8.4
1	90	36- 65	18.8	1.7	17.0	0.5	38.6	100+		14.0	16.9	17.7	2.8	198.0	0.1		3.4	63.0	158.5		8.1
1	91	65- 92	13.8	1.3	15.6	0.4	31.1	100+		10.6	16.8	7.1	1.7	183.0	0.1		6.0	66.5	128.5		8.3
1	92	92-130	13.2	1.3	15.6	0.4	30.5	100+		10.2	16.8	7.1	1.7	183.0	0.1		6.0	66.5	128.5		8.3
1	93	130-165	6.1	0.8	3.5	0.3	10.7	100+		4.6	3.5	1.5	0.4	34.5	0.1		1.5	12.5	24.0		8.6

SAMPLE		DEPTH	SAT.	OAC 5A2A	OAC 5A6A	8A1A	6N1A	6O1A	6P1A	6Q1A	6I1A	6J1A	6K1A	6L1B	6T1A	PASTE 8C1B
NO.		CM.	PCT.	-MEQ/100G		MMHO	----------	----------	MEQ/1000	----------	ML	----------	----------	----------	PPM	
1	87	0- 7	100+		7.2											
1	88	7- 16	100+		18.3	2.25	0.4	0.3	19.3	0.2		6.8	12.9			8.3
1	89	16- 36	100+		18.0	6.2	0.6	0.5	57.8	0.2		6.7	35.0			8.4
1	90	36- 65	100+		14.0	16.9	17.7	2.8	198.0	0.1		3.4	63.0	158.5		8.1
1	91	65- 92	100+		10.6	16.8	7.1	1.7	183.0	0.1		6.0	66.5	128.5		8.3
1	92	92-130	100+		10.2	16.8	7.1	1.7	183.0	0.1		6.0	66.5	128.5		8.3
1	93	130-165	100+		4.6	3.5	1.5	0.4	34.5	0.1		1.5	12.5	24.0		8.6

CASA GRANDE FINE SANDY LOAM
S71Ariz-7-9(1-7)

Location: Maricopa County, Arizona. 1130 feet east and 980 feet south of NW corner Sec. 18, T1N, R8W, about 31 miles west of Buckeye. Date of Sampling: April 14, 1971.
Description by: J. Jay, W. Nettleton, G. Hartman, R. Schurig, F. Cook.
Collectors: J. Jay, W. Nettleton, G. Hartman, R. Schurig, F. Cook.
Classification: Typic Natrargid, fine-loamy, mixed, hyperthermic.
Vegetation: Saltbush and creosotebush. Use: Range. Climate: Semi-arid. Mean annual air temperature 70° F. 7 inches precipitation. Parent Material: Old alluvium from granite, rhyolite, andesite, quartzite, limestone, and basalt. Topography: Nearly level valley plain. Slopes less than 1 percent. Elevation: 1170 feet. Drainage: Moderate drainage. Moderately slow permeability. Slow runoff. Soil Moisture: Dry when sampled.

HORIZON	DESCRIPTION
A1 RSL 71087	0 to 7 cm (0 to 2¾ inches), brown (10YR 5/3) fine sandy loam, yellowish brown (10YR 5/4) moist; weak coarse platy structure; slightly hard, very friable, nonsticky and slightly plastic; common very fine and fine roots; common fine vesicular and tubular pores; noneffervescent to slightly effervescent; moderately alkaline (pH 8.2 TB); abrupt smooth boundary.
B21tca RSL 71088	7 to 16 cm (2¾ to 6⅓ inches), reddish brown (5YR 5/3) clay loam, reddish brown (5YR 4/4) moist; moderate medium and coarse prismatic structure; hard, friable, slightly sticky and plastic; common very fine and fine roots; many fine tubular pores; common fine and medium white irregularly shaped soft lime masses; violently effervescent; very strongly alkaline (pH 9.6); clear smooth boundary.
B22tca RSL 71089	16 to 36 cm (6⅓ to 14 inches), reddish brown (5YR 5/3) clay loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky structure; hard, friable, sticky and plastic; few fine and medium roots; common fine tubular pores; many fine and medium white irregularly shaped soft lime masses; violently effervescent; very strongly alkaline (pH 9.6); clear smooth boundary.
B31tca RSL 71090	36 to 65 cm (14 to 25½ inches), reddish brown (5YR 5/3) clay loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, sticky and plastic; very few fine roots; few very fine tubular and common very fine interstitial pores; common fine and medium white irregularly shaped soft lime masses; violently effervescent; very strongly alkaline (pH 9.2); clear smooth boundary.
B32tca RSL 71091	65 to 92 cm (25½ to 36⅓ inches), pinkish gray (7.5YR 6/2) light clay loam, brown (7.5YR 4/4) moist; massive; hard, friable, sticky and plastic; common fine tubular and few medium tubular pores; common fine and medium white irregularly shaped soft lime masses; violently effervescent; very strongly alkaline (pH 9.2); gradual smooth boundary.
C1ca RSL 71092	92 to 130 cm (36½ to 51 inches), pinkish gray (7.5YR 6/2) fine sandy loam, brown (7.5YR 5/4) moist; massive; hard, very friable, slightly sticky and slightly plastic; common fine tubular pores; many fine and medium white filaments, mottles and soft lime masses; violently effer-

CONSECUTIVE PEDON NUMBER C 71 20 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES HARQUA TAXADJUNCT SOIL NO. S71 ARIZ. 7- 6 SAMPLE NO. 1 116-1 125 CENT. MARICOPA AREA

SOIL FAMILY: TYPIC NATRAGID,FINE-LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE	DEPTH	HORZ.	TOTAL FRACTION SAND	SILT	CLAY	SANDS VCS	CS	MS	FS	VFS	SILTS CSI	FSI	CLAYS CO.	FINE	CARBO	INT. II	COARSE FRAGMENTS PCT. I	II	III
1 116	0- 5	A11	57.6	35.7	6.7	10.1	7.2	4.2	10.9	25.2	25.3	10.4							
1 117	5- 15	A12	59.4	32.0	8.6	6.2	7.9	6.1	13.5	25.7	23.3	8.7							
1 118	15- 19	B21TCA	56.1	28.4	15.5	16.3	9.3	5.3	9.9	15.3	16.2	12.2				TR			
1 119	19- 36	B22TCA	32.2	43.7	24.1	8.0	6.8	4.0	6.0	7.4	11.4	32.3				5			
1 120	36- 56	B23TCA	38.5	39.7	21.8	7.2	8.3	6.4	8.4	8.2	11.4	28.3				1			
1 121	56- 76	B31TCA	58.2	22.7	19.1	28.4	12.4	5.7	6.6	5.1	7.3	15.4				1			
1 122	76- 88	B32TCA	39.1	44.2	16.7	14.2	8.2	3.6	6.5	6.6	10.2	34.0				TR			
1 124	111-127	2C	1CA	20.4	66.3	13.3	1.2	1.1	0.7	3.3	14.1	16.9	49.4				1			
1 125	127-178	2C	2CA	38.0	48.0	14.0	0.3	0.5	1.1	9.0	27.1	26.4	21.6				TR			

SAMPLE	DEPTH	ORG.MATTER CARBON 6A1A -PERCENT--	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2	2-0.02 6E1B -PERCENT-	EXT. IRON FE 6E1B PCT.	ATTERBERG L L 6C2B PCT.	P I 4F1 PCT.	M T 4F2 NO.40	BULK DENSITY EST 1/3 BAR 4A1F GRAMS	1/3 BAR 4A1F	DRY 4A1H PER CC	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2 -PERCENT---	EXTENSBLTY LEF 4D1 -PERCENT--	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
1 116	0- 5	0.09	0.021	4						1.50			0.85			5.0			8.1		7.0
1 117	5- 15	0.12	0.018	4							1.50	1.53	0.90	22.7	13.1	5.5	0.7	0.6	9.0		7.2
1 118	15- 19	0.36		9						1.49			0.70			7.5			8.8	9.9	7.2
1 119	19- 36	0.30		38							1.48	1.60	0.80	22.4	19.0	11.6	2.6	2.1	8.7	9.9	7.4
1 120	36- 56	0.12		29						1.48			0.78			12.0			7.7	9.3	7.3
1 121	56- 76	0.05		15							1.17	1.31	0.78	37.0	32.1	14.0	3.8	3.0	8.3	9.3	7.6
1 122	76- 88	0.04		31						1.17			0.84			11.5			8.3	9.8	7.8
1 123	88-111			8						1.17			0.74			14.3			8.1	9.5	8.0
1 124	111-127			44						1.55			0.97			11.2			8.4	9.8	7.9
1 125	127-178			9							1.55	1.74	1.00	25.2	20.8	12.8	3.9	3.9	8.4	9.7	7.9

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT. PCT.	C E C NA- DAC 5A2A	NH4- OAC 5A6A	EC 8A1A MMHO	WATER EXTRACT FROM SATURATED PASTE CA 6N1A	MG 6O1A	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A PPM	PH SAT. PASTE 8C1B
		MEQ/100G						-MEQ/100G		MMHO	MEQ/1000 ML									
1 116	0- 5	17.8	1.7	0.4	1.0	20.9	100+		11.0											
1 117	5- 15	17.4	1.7	1.9	0.7	21.7	100+		11.9											
1 118	15- 19	13.6	1.7	6.3	0.4	22.0	100+		14.4	3.88	0.4	0.5	32.3	0.2		4.6	27.4			8.1
1 119	19- 36	15.6	2.3	13.4	0.3	31.6	100+		16.5	9.2	4.7	1.5	86.8	0.1		3.4	46.4	38.5		8.1
1 120	36- 56	25.3	2.9	17.6	0.3	46.1	100+		16.7	14.8	22.8	6.1	140.0	0.1		4.0	48.6	112.0		8.2
1 121	56- 76	46.3	3.6	22.2	0.4	72.5	100+		22.1	18.1	21.7	8.2	177.0	0.1		3.8	55.6	150.0		8.2
1 122	76- 88	19.4	3.2	19.6	0.4	42.6	100+		17.6	14.4	11.4	5.4	143.0	0.2		4.2	45.1	117.2		8.3
1 123	88-111	20.7	3.7	22.3	0.5	47.2	100+		21.8	16.3	15.4	6.2	161.0	0.2		4.2	49.6	134.8		8.2
1 124	111-127	13.6	2.9	14.4	0.4	31.3	100+		12.1	9.4	2.8	1.5	88.3	0.1		3.2	32.7	57.0		8.6
1 125	127-178	14.8	3.4	18.3	0.5	37.0	100+		17.1	13.0	6.9	3.7	126.0	0.1		3.4	45.6	96.8		8.4

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT SAT. 8A PCT.	NA 5B4B MEQ.	NA 5O2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM-- X RAY 7A2E I	7A2E II	7A2E III	DTA 7A2E IV	7A3 PCT.	-L.T. .0002 MM- X RAY 7A2E I	7A2E II	7A2E III
1 116	0- 5		0.4	4				MM 3 KK 1							
1 117	5- 15		1.9	16				MM 3							
1 118	15- 19	37.0	5.1	35	48		2.0								
1 119	19- 36	59.2	8.3	50	49		3.8	MT 3 MI 2							
1 120	36- 56	65.7	8.4	50	37	2.9	3.8								
1 121	56- 76	59.7	11.6	53	46	2.9	6.0	MT 3							
1 122	76- 88	59.9	11.0	63	49		6.1								
1 123	88-111	60.8	12.5	57	49	0.6	9.0	MT 5 MI 3 KK 1							
1 124	111-127	79.1	7.4	61	60		5.6								

MINERAL CODE: MM MT/MICA, KK KAOLINIT, MT MONTMORT, MI MICA

RELATIVE AMOUNT: 1 TRACE, 2 SMALL, 3 MODERATE, 4 ABUNDANT, 5 DOMINANT, 6 INDETER.

HARQUA GRAVELLY FINE SANDY LOAM (taxadjunct) 1/

S71Ariz-7-6(1-10)

Location: Maricopa County, Arizona. 1650 feet north and 400 feet west of the SE corner of Sec. 18, T1S, R6W, about 20 miles west of Buckeye. Date of Sampling: April 13, 1971.
Description by: W. D. Nettleton, J. E. Jay, G. Hartman, R. G. Schurig, F. Cook. Collectors: J.E.Jay, W. D. Nettleton, G. Hartman, R. Schurig, F. Cook.
Classification: Typic Natrargid, fine-loamy, mixed, hyperthermic.
Vegetation: Creosotebush, four-wing saltbush, mesquite, cholla cactus. Use: Rangeland. Climate: Semiarid. 7 inches precipitation. Mean annual air temperature 70° F. Parent Material: Old alluvium from granite, rhyolite, schist, andesite and tuff. Topography: Gently sloping dissected low fans. Slopes 1 to 2 percent. Elevation: 1100 feet. Drainage: Well drained. Permeability is slow. Runoff medium. Soil Moisture: Dry when sampled.

HORIZON	DESCRIPTION
A11 RSL 71116	0 to 5 cm (0 to 2 inches), light yellowish brown (10YR 6/4) gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse platy structure; slightly hard, very friable, nonsticky, slightly plastic; few very fine and fine roots; few fine tubular and interstitial pores; 25 percent fine and medium subangular gravel; strongly effervescent; moderately alkaline (pH 8.2 TB); abrupt smooth boundary.
A12 RSL 71117	5 to 15 cm (2 to 6 inches), light yellowish brown (10YR 6/4) gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive, slightly hard, very friable, nonsticky, slightly plastic; common very fine and fine and few medium fine roots; common fine interstitial and few fine tubular pores; 35 percent subangular gravel; strongly effervescent; moderately alkaline (pH 8.3); abrupt wavy boundary.
B21tca RSL 71118	15 to 19 cm (6 to 7½ inches), yellowish red (5YR 5/6 and 5YR 4/6) gravelly clay loam, yellowish red (5YR 5/6 and 5YR 4/6) moist; weak medium prismatic parting to moderate medium subangular blocky structure; hard, friable, slightly sticky, plastic; few fine medium and very fine roots; common fine interstitial and few fine tubular pores; 35 percent subangular gravel; strongly to violently effervescent; common fine and medium pinkish white (7.5YR 8/2) and pink (7.5YR 8/4) irregularly shaped soft lime masses; strongly alkaline (pH 8.6); clear smooth boundary.
B22tca RSL 71119	19 to 36 cm (7½ to 14 inches), light brown (7.5YR 6/4) and light reddish brown (5YR 6/4) gravelly clay loam, brown (7.5YR 5/4 and 4/4) when moist; weak medium prismatic parting to weak medium subangular blocky structure; hard, friable, slightly sticky, plastic; few very fine, fine and medium roots; common fine interstitial and few fine tubular pores; 25 percent subangular gravel; violently effervescent; many fine and medium pinkish white and pink irregularly shaped soft lime masses; strongly alkaline (pH 8.7) clear smooth boundary.
B23tca RSL 71120	36 to 56 cm (14 to 22 inches), light brown (7.5YR 6/4) and yellowish red (5YR 5/6) gravelly clay loam, reddish brown (5YR 4/4) and yellowish red (5YR 4/6) moist; weak fine subangular blocky structure; hard, friable, slightly sticky, plastic, very few fine roots; common fine interstitial and few fine tubular pores; common small clusters of gypsum crystals; 40 percent subangular gravel; violently effervescent; many fine and medium pinkish white and pink irregularly shaped soft lime masses; strongly alkaline (pH 9.0); gradual smooth boundary.
B31tca RSL 71121	56 to 76 cm (22 to 30 inches), yellowish red (5YR 4/6 and 4/8) gravelly sandy clay loam, yellowish red (5YR 4/6 and 4/8) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common fine interstitial and few fine tubular pores; common small clusters of gypsum crystals; 30 percent subangular gravel; violently effervescent; common fine and medium pinkish white and pink irregularly shaped soft lime masses; strongly alkaline (pH 8.6) clear wavy boundary.
B32tca RSL 71122	76 to 88 cm (30 to 35 inches), light brown (7.5YR 6/4) very gravelly clay loam, reddish brown (5YR 4/4) moist; massive; hard, very friable, slightly sticky, slightly plastic; common fine interstitial pores; 50 percent subangular gravel; violently effervescent; many coarse and medium seams of lime and strata of volcanic ash; strongly alkaline (pH 8.5); clear wavy boundary.
B33tca RSL 71123	88 to 111cm (35 to 44 inches), yellowish red (5YR 5/6) gravelly sandy clay loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common fine interstitial pores; 40 percent subangular gravel; violently effervescent; common fine and medium pinkish white irregularly shaped soft lime masses and concretions; strongly alkaline (pH 8.7); clear wavy boundary.
IIC1ca RSL 71124	111 to 127 cm (44 to 50 inches), light brown (7.5YR 6/4) gravelly clay loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common fine interstitial pores; 30 percent subangular gravel; violently effervescent; many fine and medium pinkish white seams of lime and strata of volcanic ash; strongly alkaline (pH 8.9); abrupt wavy boundary.
IIC2ca RSL 71125	127 to 178 cm (50 to 70 inches), light brown (7.5YR 6/4) clay loam, brown (7.5YR 4/4) moist; moderate medium angular blocky structure; extremely hard, very firm, slightly sticky, plastic; few fine tubular pores; common fine black manganese stains on ped faces; common fine yellow (5YR 8/6) masses on ped faces; slightly effervescent; violently effervescent on few fine pinkish white irregularly shaped extremely hard lime concretions; strongly alkaline (pH 9.0).

1/ The Harqua series is in a fine-loamy, mixed, hyperthermic family of Typic Haplargids. This pedon has a natric horizon.

CONSECUTIVE PEDON NUMBER C 71 6 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES HARQUA TAXADJUNCT SOIL NO. S71 ARIZ. 10- 6 SAMPLE NO. 1 33-1 40 ORGAN PIPE MON AREA

SOIL FAMILY: TYPIC NATRARGID, FINE-LOAMY, MIXED, HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.		DEPTH CM.		HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	CO. CLAY 2- .2U	FINE CLAY LT .2U	CARBONATE 3A1A	INT. COARSE FRAGMENTS II PCT. OF WHOLE SOIL .2-.02	I 75-20 PCT. OF LT 75	II 20-5	III 5-2
					PERCENT OF LESS THAN 2MM																
1	33	0-	5	A2	48.7	39.3	12.0	8.2	6.8	4.9	11.8	17.0	16.2	23.1	11.0	1.0		40.6	24A	4	14	6
1	34	5-	12	A3	54.6	34.6	10.8	13.9	7.3	4.6	11.3	17.5	15.5	19.1	8.9	1.9		40.1	44A	21	13	9
1	35	12-	33	B21tcasa	39.1	30.4	30.5	11.2	5.0	3.5	8.0	11.4	9.0	21.4	22.8	7.7	2	25.3	51*	8V	27	15
1	36	33-	53	B22tcasa	41.3	28.6	30.1	13.1	7.6	4.5	6.9	9.2	7.4	21.2	18.6	11.5	3	20.4	50A	14	23	13
1	37	53-	74	B23tcasa	50.2	26.3	23.5	11.8	9.8	7.2	10.3	11.1	6.9	19.4			1	22.8	42A	1	25	16
1	38	74-	97	2Clcasa	33.6	50.9	15.5	1.4	1.9	1.8	5.1	23.4	15.8	35.1	8.3	7.2	1	42.3	8A	2	3	4
1	39	97-	112	2C2casa	45.9	42.8	11.3	0.2	0.6	0.9	7.8	36.4	13.9	28.9			TR	56.3	1A	--	--	1
1	40	112-	132	2C3casa	65.4	24.1	10.5	1.0	1.3	1.6	15.8	45.7	15.7	8.4				73.0	2A	--	--	2

SAMPLE NO.		DEPTH CM.		ORG. MATTER CAR- BON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6F1B	19-2 6F1B	EXT. IRON FE 6C2B	ATTERBERG L I M I T LL 4F1	PL 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
				PERCENT		PERCENT		PCT.	PCT.NO.40		GRAMS PER CC				PERCENT			PERCENT				
1	33	0-	5	0.05	0.013	3		0.8			1.56	1.58	0.84	19.1	16.6	7.3	0.4	0.4	9.0	9.8	8.3
1	34	5-	12	0.07	0.013	2		0.7		1.56			0.69			8.4			8.5	9.4	8.4
1	35	12-	33	0.17		12		0.5		1.17			0.68			13.8			8.2	8.6	8.2
1	36	33-	53	0.14		20		0.6		1.17			0.69			14.6			8.3	8.7	8.3
1	37	53-	74	0.09		19		0.4			1.17	1.28	0.75	25.4	23.1	10.9	3.0	2.3	8.5	8.8	8.4
1	38	74-	97			32		0.3			1.43	1.55	0.95	28.8	23.4	9.6	2.7	2.6	8.6	9.4	8.5
1	39	97-	112			26				1.35			1.00			8.1			8.7	9.6	8.4
1	40	112-	132			2					1.28	1.44	0.99	34.2	23.7	7.4	4.0	4.0	8.8	9.5	8.5

SAMPLE NO.		DEPTH CM.		EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6D2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1A	MG 6O1A	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
				MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML							PPM	
1	33	0-	5	20.0	2.5	6.9	1.6	31.0	100+		18.2	3.90	1.3	0.9	34.2	0.2		5.3	24.7		1.1	8.2
1	34	5-	12	12.2	1.2	20.6	1.1	35.1	100+		17.0	32.0	23.6	2.9	330.0	0.6		4.3	295.0	28.0	7.2	7.9
1	35	12-	33	38.4	2.3	43.9	0.6	85.2	100+		18.8	56.8	43.8	11.5	515.0	0.4		5.7	513.0	92.5	12.5	7.9
1	36	33-	53	57.4	2.2	45.0	0.4	105.0	100+		17.6	45.0	34.2	7.2	538.0	0.2		2.4	407.0	106.5	10.0	8.1
1	37	53-	74	42.9	1.5	30.6	0.3	75.3	100+		14.7	33.7	14.7	4.6	369.0	0.2		2.9	238.0	129.0	11.0	8.3
1	38	74-	97	19.1	1.6	24.1	0.2	45.0	100+		11.7	23.5	15.5	4.0	228.0	0.2		2.1	149.0	96.5	13.7	8.4
1	39	97-	112	13.1	1.4	18.9	0.2	33.6	100+		9.8	19.6	10.4	2.4	198.0	0.2		2.3	118.0	106.0	10.2	8.3
1	40	112-	132	9.5	1.4	18.0	0.3	29.2	100+		11.7	16.6	4.0	1.3	163.0	0.2		3.2	101.0	64.8	9.3	8.5

SAMPLE NO.		DEPTH CM.		WATER EXCHANGBLE AT SAT. 8A PCT.	NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY <0.002 MM LESS THAN 2MM X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	DTA IV 7A2E	DTA PCT. 7A3	CLAY <.002 MM X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	MINERAL CODE	RELATIVE AMOUNT
1	33	0-	5	28.1	5.9	33	33		4.8	MI 3					MI 2			MI MICA	1 TRACE
1	34	5-	12	33.7	9.5	56	91	0.1	8.3						MI 4				2 SMALL
1	35	12-	33	50.9	17.7	94	98	2.9	4.2	MI 5 KK 1					MI 5			KK KAOLINIT	3 MODERATE
1	36	33-	53	59.9	12.8	72	100+	5.5	4.9						MI 4 MT 2			MT MONTMORT	4 ABUNDANT
1	37	53-	74	56.7	9.7	66	100+		4.4										5 DOMINANT
1	38	74-	97	66.4	9.0	77	73		4.8	MT 4 MI 3 KK 1					MT 4 MI 3				6 INDETER.
1	39	97-	112	58.5	7.3	75	78		2.8										
1	40	112-	132	58.3	8.5	73	100+		6.4										

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
*=THE 75-250MM FRACTION IS INCLUDED.
V=NOT WEIGHED. VALUE CALCULATED FROM A VOLUME ESTIMATE.

HARQUA VERY GRAVELLY SANDY LOAM (taxadjunct) 1/

S71 Ariz-10-6-(1-8*)

Location: Pima County, Arizona. 1/4 mile north and 1/8 mile west of the southeast corner of Section 13, T18S, R5W, Organ Pipe Cactus National Monument. Date of Sampling: April 7, 1971.
Description by: Y. H. Havens, E. Chamberlin. Collectors: K. Flach, E. Chamberlin, K. Vogt.
Classification: Typic Natrargid, fine-loamy, mixed, hyperthermic.
Vegetation: Saltbush, creosotebush, bursage and mesquite. Use: Desert rangeland. Climate: Mean annual precipitation 8 to 10 inches. Mean annual air temperature 69° F. Parent Material: Mixed--dominantly basalt with influence from rhyolite and andesite. Topography: Gently sloping--convex, with 1½ to 2 percent slope. Elevation: 1600 feet. Drainage: Well drained with moderately slow to slow permeability. Soil Moisture: Dry.
Remarks: 70 percent of surface covered with gravel.

HORIZON	DESCRIPTION
A2	0 to 5 cm (0 to 2 inches), light brown (7.5YR 6/4) very gravelly sandy loam, dark
RSL	brown (7.5YR 4/4) moist; moderate medium and coarse platy structure; slightly hard,
???	very friable—nonsticky—slightly plastic; many very fine and fine vesicular pores;

blue); abrupt wavy boundary.

A3sa	5 to 12 cm (2 to 5 inches), strong brown (7.5YR 5/6) gravelly loam, yellowish red

CONSECUTIVE PEDON NUMBER C 71 7 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES HARQUA TAXADJUNCT SOIL NO. S71 ARIZ. 10- 7 SAMPLE NO. 1 41-1 47 ORGAN PIPE MON AREA

SOIL FAMILY: TYPIC NATRARGID,FINE-LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBONATE 3A1A	INT. II .2- .02	COARSE FRAGMENTS I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM													SOIL	PCT. OF LT 75		
1 41	0- 7	A2	55.2	35.1	9.7	9.0	7.3	5.6	11.6	21.7	18.9	16.2	7.6	2.1	47.5	46A	5	34	7
1 42	7- 15	B1ca	34.8	41.8	23.4	3.7	4.6	3.7	8.2	14.6	16.3	25.5			36.0	26A	9V	10	6
1 43	15- 30	B21tcasa	31.1	28.1	40.8	7.4	4.5	2.9	5.7	10.6	9.9	18.2	29.0	11.8	1 23.8	42A	10V	20	13
1 44	30- 46	B22tcasa	36.6			11.9	6.4	3.6	5.3	9.4						45A	9V	21	14
1 45	46- 69	B3tcasa	39.1	30.0	30.9	10.7	8.1	4.5	6.0	9.8	10.1	19.9	19.4	11.5	6 23.3	44A	8V	21	15
1 46	69- 84	2C1casa	32.0	41.8	26.2	2.0	2.6	1.9	4.2	21.3	21.3	20.5			2 45.3	A			
1 47	84-104	2C2casa	35.1	40.9	24.0	0.4	1.0	0.7	3.9	29.1	24.9	16.0	13.9	10.1	1 56.8	TRA	--	--	TR

SAMPLE NO.	DEPTH CM.	ORG. CARBON 6A1A	MATTER NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	I M PL 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		PERCENT		PERCENT		PCT.	PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT				
1 41	0- 7	0.16	0.021	1		0.7			1.22			0.72			5.8			8.5	9.1	7.8
1 42	7- 15	0.14	0.024	3		0.8				1.22	1.32	0.86	32.9	26.0	11.9	2.7	2.3	8.4	9.5	8.0
1 43	15- 30	0.24		10		0.7				1.02	1.16	0.78	44.1	38.7	17.3	4.4	3.3	8.4	9.6	8.3
1 44	30- 46	0.11		13		0.5				1.05	1.19	0.76	40.2	34.8	18.2	4.3	3.1	8.1	8.6	8.1
1 45	46- 69			26		0.6				1.30	1.38	0.74	35.0	30.8	12.9	4.4	3.6	8.5	8.2	8.4
1 46	69- 84			24		0.6				1.34	1.53	1.00	32.2	25.7	12.7	4.5	4.5	8.5	9.4	8.5
1 47	84-104			10		0.4														

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA+ OAC 5A2A	NH4+ OAC 5A6A	WATER EXTRACT FROM SATURATED PASTE EC 8A1A	CA 6N1A	MG 6O1A	NA 6P1A	K 6Q1A	CO3 6J1A	HCO3 6K1A	CL 6L1B	8A1 SO4 6T1A	B 8C1B	PH SAT. PASTE 8C1B

HARQUA VERY GRAVELLY LOAM (taxadjunct) 1/

S71 Ariz 10-7-(1-7*)

Location: Pima County, Arizona. Northwest of Blankenship well, north on highest ridge, 1/4 mile south and 200 feet west of northeast corner Section 14, T18S, R5W, Organ Pipe Cactus National Monument. Date of Sampling: April 7, 1971.
Description by: Y. H. Havens, E. Chamberlin. Collectors: K. Flach, E. Chamberlin, K. Vogt.
Classification: Typic Natrargid, fine-loamy, mixed, hyperthermic.
Vegetation: Saltbush, creosotebush and mesquite. Use: Desert rangeland. Climate: Mean annual precipitation 7 to 9 inches. Mean annual air temperature 69° F. Parent Material: Mixed--dominantly basalt, rhyolite and andesite. Topography: Gently sloping-convex with 2 to 3 percent slope. Elevation: 1450 feet. Drainage: Well drained with moderately slow to slow permeability. Soil Moisture: Dry to IICca—moist IICca.
Remarks: 80 percent of surface covered with gravel and cobble--dominantly basalt and rhyolite.

HORIZON	DESCRIPTION
A2 RSL 7141	0 to 7 cm (0 to 3 inches), light brown (7.5YR 6/4) very gravelly loam, dark brown (7.5YR 4/4) moist; weak medium and coarse platy structure; slightly hard, very friable, nonsticky, slightly plastic; few very fine roots; many very fine tubular and vesicular pores; 50 percent gravel by volume; slightly effervescent; strongly alkaline (pH 8.6 thymol blue); abrupt wavy boundary.
B1sa RSL 7142	7 to 15 cm (3 to 6 inches), yellowish red (5YR 5/6) loam, yellowish red (5YR 4/8) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky, slightly plastic; common very fine and fine roots; common very fine interstitial pores; few fine gravel; slightly effervescent; few fine pinkish white (7.5YR 8/2) soft lime masses and salt crystals; strongly alkaline (pH 8.5); clear wavy boundary.
B21tcasa RSL 7143	15 to 30 cm (6 to 12 inches), yellowish red (5YR 5/6) gravelly clay loam, yellowish red (5YR 4/6) moist; weak medium prismatic parting to moderate fine and medium subangular blocky structure; hard, friable, sticky, plastic; few very fine roots; few fine and medium tubular pores; few thin clay films on faces of peds and in pores; 35 percent gravel and cobble; strongly effervescent; common fine pinkish white (7.5YR 8/2) slightly hard lime masses, pink (7.5YR 7/4) moist; strongly alkaline (pH 8.7); abrupt wavy boundary.
B22tcasa RSL 7144	30 to 46 cm (12 to 18 inches), reddish brown (5YR 5/4) gravelly sandy clay loam, yellowish red (5YR 4/6) moist; weak medium prismatic parting to moderate fine and medium subangular blocky structure; hard, friable, sticky, plastic; few very fine roots; few fine tubular pores; few thin clay films on faces of peds and in pores; 35 percent gravel; violently effervescent; many fine pinkish white (7.5YR 8/2) slightly hard lime masses and lime coatings on gravel, pink (7.5YR 7/4) moist; common medium and coarse salt crystals; strongly alkaline (pH 8.7); clear wavy boundary.
B3tcasa RSL 7145	46 to 69 cm (18 to 27 inches), light brown (7.5YR 6/4) gravelly clay loam, brown (7.5YR 5/4) moist; weak fine and medium subangular blocky structure; hard, friable sticky, plastic; few very fine roots; few fine tubular pores; few thin clay films on faces of peds and in pores; 25 percent gravel; violently effervescent; many fine pinkish white (7.5YR 8/2) slightly hard lime masses and lime coatings on gravel, pink (7.5YR 7/4) moist; common medium and coarse salt crystals; very strongly alkaline (pH 9.0); clear wavy boundary.
IIC1casa RSL 7146	69 to 84 cm (27 to 33 inches), light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4) moist; massive; hard, friable, sticky, plastic; few fine tubular pores; few fine gravel; violently effervescent; common fine and medium pinkish white (7.5YR 8/2) slightly hard lime masses, pink (7.5YR 7/4) moist; very strongly alkaline (pH 9.0); clear wavy boundary.
IIC2casa RSL 7147	84 to 104 cm (33 to 41 inches), light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky, plastic; few fine tubular pores; few fine gravel; very strongly alkaline (pH 9.0).

1/ The Harqua series is in a fine-loamy, mixed, hyperthermic family of Typic Haplargids. This pedon has a natric horizon.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Natrargid, fine-loamy, mixed, thermic

SOIL Gothard clay loam SOIL Nos. S64Ariz-2-20 LOCATION Cochise County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 64605 - 64611

Depth (In.)	Horizon	1B1b Size class and particle diameter (mm) 3A1													Coarse fragments 1A2a		
		Total			Sand					Silt		Int. II (0.2–0.02)	(2–0.1)	Non carbonate 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)				>2	2 – 19	19 –76
																Pct. of	

GOTHARD CLAY LOAM, SALINE-ALKALI
S64Ariz-2-20

Location: Cochise County, Arizona. 16-1/2 miles south and 2-3/4 miles east of Willcox, Arizona reached by Kansas Settlement Road. 1/4 mile west and 100 feet north of east 1/4 corner of Sec. 27, T. 16 S., R. 25 E. Date of Sampling: October 20, 1964.
Description by: James Jay and M. L. Richardson. Collectors: K. W. Flach, B. Brasher, James Jay, M. L. Richardson, and R. K. Preece.
Classification: Typic Natrargid, fine-loamy, mixed, thermic.
Vegetation: Grassland. Mainly alkali sacaton with minor amounts of tobosa grass, mesquite bushes and annual grasses. Climate: Precipitation 12 inches annual. Mean annual temperature 58° F. (Willcox) Mean January temperature 41° F., mean July temperature 77° F. Soil temperature at time of sampling: 24 inches 70° F., 84 inches 70° F. Parent Material: Mixed alluvium from rhyolite, rhyolite-tuff, and andesite. Topography: Nearly level plains adjacent to the Willcox Playa. Slopes are 0.2 percent or less and very slightly concave. Elevation: 4210 feet. Drainage: Moderately well drained. Surface runoff very slow. Very slowly permeable. Soil Moisture: Slightly moist - 25 to 50 percent field capacity. Ground water 50 to 100 feet. Remarks: Paired with sample S64Ariz-2-21. Field determination of pH by thymol blue in 1:5 dilution.

HORIZON	DESCRIPTION
A21 RSL No. 64605	0-2 inches (0-5 cm), light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; weak medium and fine platy structure; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; common fine and medium roots; common fine discontinuous and a few fine and medium continuous tubular pores; slightly effervescent with HCl; pH 8.6; abrupt smooth boundary.
A22 RSL No. 64606	2-5 inches (5-13 cm), light gray to gray (10YR 6/1) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; hard when dry, friable when moist, nonsticky and nonplastic when wet; common fine and medium roots; many fine discontinuous and a few fine continuous tubular pores; strongly effervescent - lime disseminated; pH 8.6; abrupt smooth boundary.
B2t RAL No. 64607	5-11 inches (13-28 cm), grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) when moist; moderate fine and medium prismatic breaking to moderate fine and medium angular and subangular blocky structure; hard when dry, firm when moist, sticky and plastic when wet; common fine and medium roots; many exped interstitial and common thin clay films on ped faces and in pores; slightly effervescent; pH 9.0; clear smooth boundary.
[illegible]	[illegible]

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Natrargid, fine-loamy, mixed, thermic

SOIL Gothard clay loam SOIL Nos. S64Ariz-2-21 LOCATION Cochise County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 64612 - 64618

Depth (In.)	Horizon	1B1b Total Sand (2-0 05)	Silt (0 05-0 002)	Clay (< 0.002)	Sand: 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: 0 05-0.02	Int. III (0.02-0.002)	Int II (0.2-0.02)	(2-0.1)	Non carbonate clay		Coarse fragments 1A2a: >2	2 - 19	19 - 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0-2	A2	47.6	38.1	14.3	1.1	3.6	5.9	21.9	15.1	14.0	24.1	43.1	32.5	14		1	1	
2-7	B2t	34.4	20.9	44.7	0.8	2.7	4.9	15.4	10.6	8.1	12.8	28.3	23.8	37		1	1	
7-20	Cca	52.8	21.0	26.2	1.2	3.5	7.2	23.8	17.1	10.4	10.6	42.5	35.7	19		6	6	
20-40	IIB2tcab	48.0	25.2	26.8	1.9	5.8	7.6	18.8	13.9	9.7	15.5	34.9	34.1	19		8	8	
40-51	IIC1ca	46.7	32.1	21.2	2.4	7.1	8.9	16.0	12.3	14.9	17.2	35.5	34.4	21		8	8	
51-58	IIIC2	70.5	16.7	12.8	8.7	20.7	15.4	16.8	8.9	8.5	8.2	25.6	61.6	13		30	30	
58-69	IVC3	64.0	22.1	13.9	7.7	15.0	11.0	19.3	11.0	11.5	10.6	32.8	53.0	14		7	7	

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct	C/N	6E1b Carbonate as $CaCO_3$ 1/ Pct.	6E1b Carbonate as $CaCO_3$ Pct.	3A1a Carbonate in <0.002 mm. Pct.	Atterberg limits: Plastic limit	Liquid limit	Plastic index (Pct. of <0.4 mm)	Water content: Pct.	Pct	4B2 15 bar Pct.	pH: 8C1a 1:1 H_2O	8C1a 1:10 H_2O
0-2	0.35	0.042	8	4	4							6.2	9.2	9.7
2-7	0.36	0.044	8	15	15	8	17	46	29			17.6	8.9	9.9
7-20	0.19			14	15	7	12	36	24			11.8	9.3	10.0
20-40	0.06			23	25	8	12	28	16			12.4	9.3	10.0
40-51	0.03			tr.	tr.							16.1	9.1	10.0
51-58	0.02			3	4		21	38	17			7.6	9.2	9.8
58-69	0.02			tr.	tr.							9.1	9.0	9.6

Depth (In.)	Extractable bases 5B1a: 6N2b Ca	6O2c Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum	Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	6I1a CO_3	6J1a HCO_3	6K1a Cl	6L1a SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter								mmho/cm
0-2	18.7	1.4	5.6	0.4	26.1		13.5		1.5	0.5	21.6	0.2	-	5.8	6.0		2.50
2-7	14.5	2.4	26.3	1.3	44.5		25.9		1.7	0.5	101	0.2	-	6.0	10.8	95.7	10.0
7-20	13.3	1.1	18.4	0.6	33.4		14.6		1.0	0.5	205	0.5	-	8.5	7.5	205	17.2
20-40	14.1	1.3	23.1	0.6	34.3		12.8		0.8	0.5	104	0.2	-	5.8	5.8	101	10.2
40-51	7.8	1.0	14.6	0.6	24.0		16.1		0.4	0.2	32.6	0.1	-	5.6	3.8	23.9	3.48
51-58	6.6	0.6	8.9	0.3	16.4		10.4		0.3	0.1	27.1	0.1	-	5.6	4.6		2.98
58-69	3.3	0.6	9.1	0.3	13.8		11.5		0.4	0.3	15.3	0.1	-	5.6	2.8		1.74

Depth (In.)	8A Water at Saturation Pct	5D2 Exchangeable Na Pct.	5B1b Exch. Na me / 100 g	Gypsum Pct	SAR
0-2	27.6	37	5.0		22
2-7	63.6	77	19.9		105
7-20	54.5	49	7.2		236
20-40	72.1	122	15.6		107
40-51	89.1	73	11.7		59
51-58	57.0	71	7.4		60
58-69	65.6	67	7.7		26

1/ In percent of whole soil including >2 mm.

GOTHARD CLAY LOAM, SALINE-ALKALI
S64Ariz-2-21

Location: Cochise County, Arizona. 16 miles south and 1-1/4 miles east of Willcox, Arizona via Kansas Settlement road. 1050 feet east and 350 feet north of the S 1/4 corner Sec. 21, T. 16 S., R. 25 E. Date of Sampling: October 20, 1964.
Description by: James Jay and M. L. Richardson. Collectors: K. W. Flach, B. Brasher, James Jay, M. L. Richardson, R. K. Preece.
Classification: Typic Natrargid, fine-loamy, mixed, thermic.
Vegetation: Grassland - principally alkali sacaton, few shadscale and annual grasses. Climate: Precipitation 12 inches annual. Mean annual temperature (Willcox) 58° F. Mean January temperature 41° F., mean July temperature 77° F. Soil temperature at time of sampling: 2 inches 69° F., 4 inches 71° F., 6 inches 71° F. Parent Material: Mixed alluvium mainly from rhyolite, ignimbrite, and andesite. Topography: Nearly level plain adjacent to Willcox Playa. Slopes are very slightly concave and about 0.2 percent. Elevation: 4190 feet. Drainage: Moderate internal. Slow external. Very slowly permeable. Soil Moisture: Slightly moist - 25 to 50 percent field capacity. Water table 50-100 feet. Remarks: Paired sample S64Ariz-2-20. Field determinations of pH by thymol blue in 1:5 dilution.

HORIZON	DESCRIPTION
A2 RSL No. 64612	0-2 inches (0-5 cm), grayish brown and light gray (10YR 6/2 & 7/1) fine sandy loam, brown (10YR 5/3) when moist; moderate medium and coarse platy structure; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; common fine and medium roots; common discontinuous fine tubular pores; strongly effervescent with HCl; pH 8.6; abrupt smooth boundary.
B2t RSL No. 64613	2-7 inches (5-18 cm), light brown (7.5YR 6/4) clay, brown (7.5YR 5/4) when moist; moderate fine and medium prismatic breaking to moderate fine and medium angular blocky structure; hard when dry, friable when moist, sticky and plastic when wet; many fine, medium and coarse roots; many fine exped and a few fine and very fine tubular pores; few thin clay skins on peds and in pores; strongly effervescent-lime disseminated and a few fine faint mottles; pH 9.4; gradual smooth boundary.
Cca(sa?) RSL No. 64614	7-20 inches (18-51 cm), light gray (10YR 7/1) and many fine faint mottles of white (10YR 8/1) light clay, light grayish brown (10YR 6/2) and light gray (10YR 7/2) when moist; massive, breaking to moderate medium angular and subangular blocky structure; slightly hard when dry, friable when moist, sticky and plastic when wet; common fine and medium roots; few fine and very fine tubular and common fine interstitial exped pores; few thin clay bridges; strongly effervescent; pH 9.4; gradual wavy boundary.
IIB2tcab RSL No. 64615	20-40 inches (51-102 cm), matrix pinkish gray (7.5YR 6/2); brown (7.5YR 5/4) patchy clay films and many medium to large distinct mottles of white (N8), clay, brown (7.5YR 5/2), brown to dark brown (7.5YR 4/4), and light gray (10YR 7/2) when moist; massive, breaking to moderate medium angular and subangular blocky structure; very hard when dry, firm when moist, sticky and plastic when wet; few fine exped roots; many fine and very fine and a few medium tubular pores; common thin clay films on ped faces and lining pores; strongly effervescent in matrix and violently effervescent in mottles; pH 9.4; gradual wavy boundary.
IIC1ca RSL NO. 64616	40-51 inches (102-130 cm), pinkish gray (7.5YR 6/2) matrix with patchy coatings of light brown (7.5YR 6/4(and a few fine faint mottles of pale olive (5Y 6/3) clay loam, brown (7.5YR 4/4) and olive (5Y 5/3) when moist; massive and weakly cemented; extremely hard when dry, firm when moist, sticky and plastic when wet; few fine roots; many fine and very fine tubular pores; slightly and strongly effervescent pH 9.4; gradual smooth boundary.
IIIC2 RSL No. 64617	51-58 inches (130-147 cm), light gray (10YR 7/1) with common fine to medium mottles of light yellowish brown (10YR 6/4) and a few fine mottles of white (8/N), light sandy loam or loamy sand, gray (10YR 6/1), yellowish brown (10YR 5/4) and light gray (10YR 7/2) when moist; massive and weakly cemented by silica (?); extremely hard and brittle when dry; firm when moist, nonsticky and slightly plastic when wet; no roots; common fine tubular pores; slight and strong effervescence; pH 9.4; clear smooth boundary.
IVC3 RSL No. 64618	58-69 inches (147-175 cm), matrix color is light gray (5Y 7/1) with varicolored mottles of yellowish red (5YR 5/6), dark reddish brown (5YR 3/2), olive brown (2.5YR 4/4), and light brown (7.5YR 6/4), loamy sand stratified with thin sandy clay loam lenses, gray (5Y 6/1) with mottles brown (7.5YR 4/4 & 5/4) light reddish brown (5YR 6/4) and olive (5Y 3/4) when moist; massive and weakly cemented by silica(?); extremely hard when dry, firm when moist, nonsticky and slightly plastic when wet; no roots; common fine tubular and a very few very coarse tubular pores; slight effervescence in spots; pH 9.0; abrupt wavy boundary.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Natrargid, fine, mixed, thermic
SOIL Gothard finely gravelly loam (taxadjunct) SOIL Nos. S64Ariz-2-29 LOCATION Cochise County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 64662 - 64671

Depth (In.)	Horizon	1B1b Total: Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0.02–0 002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 4A2a: ≥ 2 Pct.	2 – 19 Pct. of < 76 mm	19 – 76 Pct. of < 76 mm
		Size class and particle diameter (mm) 3A1																
		Pct. of < 2 mm																
0–2	A11	64.4	26.6	9.0	8.0	12.5	10.8	19.9	13.2	17.2	9.4	41.7	51.2			18	17	1
2–5	A12	58.7	31.1	10.2	9.3	12.5	9.3	16.8	10.8	16.0	15.1	36.2	47.9			27	25	2
5–9	B2t	51.1	32.5	16.4	9.5	11.0	7.2	13.2	10.2	17.5	15.0	35.1	40.9			29	29	tr.
9–11	A2	49.6	35.1	15.3	14.3	9.7	5.8	10.8	9.0	17.3	17.8	32.2	40.6			54	51	3
11–19	B21t	25.2	18.2	56.6	3.8	5.5	3.8	7.0	5.1	9.0	9.2	17.9	20.1			14	14	tr.
19–25	B22tca	35.1	17.3	47.6	5.9	8.0	5.4	9.6	6.2	8.7	8.6	20.0	28.9			13	13	tr.
25–29	B3ca	48.7	22.4	28.9	6.8	9.8	7.0	15.1	10.0	12.4	10.0	30.5	38.7			22	22	tr.
29–39	C1ca	51.4	28.4	20.2	7.5	10.5	7.6	15.6	10.2	12.5	15.9	30.9	41.2			27	27	tr.
39–57	C2ca	62.5	23.2	14.3	7.7	10.7	9.1	21.2	13.8	13.6	9.6	39.2	48.7			29	26	3
57–72+	IIC3	82.1	10.9	7.0	19.1	26.5	15.8	15.1	5.6	5.1	5.8	17.3	76.5			40	24	16
		6A1a	6B1a		6E1b	6E1b	3A1a	Atterberg limits		6C2a	Water content						pH	

GOTHARD FINELY GRAVELLY LOAM (taxadjunct) 1/

S64Ariz-2-29

Location: Cochise County, Arizona. 8-1/2 miles north and 1 mile west of Willcox, Arizona and 400 feet east of the ranch road. 800 feet south and 50 feet west of the northeast corner of Sec. 24, T. 12 S., R. 24 E. Date of Sampling: October 23, 1964.

Description: James Jay and M. L. Richardson. Collectors: K. W. Flach, B. Brasher, James Jay, M. L. Richardson, and R. K. Preece.

Classification: Typic Natrargid, fine, mixed, thermic.

Vegetation: Grassland: poor to fair cover of Rothrock grama, black grama, blue grama, tall three-awn, annual grama, sand dropseed, burrograss and burroweed. Climate: Precipitation 11-12 inches annual. Mean annual temperature 58° F. (Willcox). Soil temperature at time of sampling: 24 inches 70° F., 48 inches 71° F., 72 inches 72° F. Parent Material: Old alluvium from andesite, rhyolite, rhyolite-tuff, quartzite, and granite. Topography: Nearly level valley slopes near the low end of a long alluvial fan. Slope is 1.5 percent very slightly convex, and with a southern aspect. Elevation: 4390 feet. Drainage: Well drained. Moderate surface runoff. Slowly permeable. Soil Moisture: Slightly moist - about 25 percent of feed capacity. Water table at 100-150 feet. Remarks: This is one of the most extensive soils in Southeastern Arizona. Most of it is rangeland but some areas are cultivated. Paired sample is S64Ariz-2-28. Field determinations of pH by Hellige-Truog indicator.

HORIZON	DESCRIPTION
A11 RSL No. 64662	0-2 inches (0-5 cm), light brown (7.5YR 6/4) fine gravelly fine sandy loam, dark brown (7.5YR 4/4) when moist; weak medium platy structure; slightly hard when dry, very friable when moist, nonsticky and nonplastic when wet; common fine and medium roots; many fine interstitial pores; 15 percent fine gravel; pH 6.0; abrupt smooth boundary.
A12 RSL No. 64663	2-5 inches (5-13 cm), same colors; fine gravelly loam, weak fine and medium subangular blocky structure; slightly hard when dry, very friable when moist, slightly sticky and slightly plastic when wet; fine and medium roots; many fine interstitial and a few medium and coarse tubular pores; 20 percent fine gravel; pH 6.5; clear smooth boundary.
B2t RSL No. 64664	5-9 inches (13-23 cm), brown (7.5YR 5/4) fine gravelly clay loam, reddish brown (5YR 4/3) when moist; weak fine and medium subangular blocky structure; hard when dry, firm when moist, sticky and plastic when wet; many fine roots; common fine and a few medium tubular pores, and many fine exped pores; common thin discontinuous clay films on ped faces and pores; 20 percent fine and medium gravels; noneffervescent, pH 8.0; abrupt wavy boundary.
A2 RSL No. 64665	9-11 inches (23-28 cm), pinkish gray (7.5YR 7/2) fine gravelly heavy loam, brown to dark brown (7.5YR 4/4) when moist; massive; hard when dry, friable when moist, slightly sticky and plastic when wet; many fine roots; few fine tubular and common fine interstitial pores; 20 percent fine and medium gravel; pH 7.5; abrupt wavy boundary.
B21t RSL No. 64666	11-19 inches (28-48 cm), reddish brown (5YR 4/3) dry and moist, (5YR 4/4) when crushed, clay; moderate to fine and medium prismatic breaking to strong fine and medium angular blocky structure; very hard when dry, firm when moist, sticky and very plastic when wet; common fine flattened exped roots; few fine tubular and common exped pores; continuous moderately thick clay films on ped faces and in pores; 10 percent fine gravel; noneffervescent; pH 8.0; clear wavy boundary.
B22tca RSL No. 64667	19-25 inches (48-63 cm), reddish brown (5YR 5/4) and common fine distinct lime mottles of pinkish white (5YR 8/2) clay, reddish brown (5YR 4/4) and pink (5YR 7/3) when moist; moderate fine and medium prismatic breaking to moderate fine and medium angular blocky structure; very hard when dry, friable when moist, sticky and plastic when wet; few fine exped roots; common fine tubular and exped pores; thin continuous clay films on ped faces and in pores; 10 percent fine gravel; slightly effervescent in matrix and strong in mottles; pH 8.2; clear wavy boundary.
B3ca RSL No. 64668	25-29 inches (63-74 cm), similar colors to above; gravelly sandy clay loam; massive breaking to weak medium and coarse angular blocky structure; very hard when dry, firm when moist, slightly sticky and plastic when wet; few roots; common fine and very fine tubular and fine interstitial pores; few thin clay films on peds and as bridges between sand grains; few to common fine black flecks on ped faces; 30 percent fine and medium gravel; slightly effervescent in matrix and strong to violent in mottles and lime veins; pH 8.2; clear smooth boundary.
C1ca TSL No.	29-39 inches (74-99 cm), pink (5YR 8/3 & 7/3) and common fine to medium faint mottles of light reddish brown (5YR 6/3) gravelly sandy loam, pink (5YR 7/3), light reddish brown (5YR 6/4), and reddish brown (5YR

CONSECUTIVE PEDON NUMBER C 67 51 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES HARQUA TAXADJUNCT SOIL NO. S67 ARIZ. 7- 4 SAMPLE NO. 7 618-7 628 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC PALEARGID,FINE-LOAMY,MIXED,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CO. CLAYS 2- .2U	FINE LT .2U	CARBONATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75		
7 618	0- 0																		
7 619	0- 3	A2	36.1	50.5	13.4	3.4	4.2	2.8	7.7	18.0	26.6	23.9				49.5	9	TR	9Z N
7 620	3- 8	A+B	39.5	43.1	17.4	6.7	6.1	3.2	7.1	16.4	22.8	20.3				43.6	30	TR	30Z N
7 621	8- 23	B2 T	36.9	26.1	37.0	7.9	7.9	3.3	5.4	12.4	13.7	12.4				29.2	32	TR	32Z N
7 622	23- 38	B31TCA	SA55.5	19.3	25.2	18.7	10.2	3.8	6.7	16.1	12.3	7.0				32.4	35	TR	35Z N
7 623	38- 48	B32TCA	SA62.7	20.5	16.8	15.6	11.2	5.0	9.8	21.1	15.3	5.2				42.3	43	TR	43Z N
7 624	48- 76	B33TCA	41.0	37.5	21.5	6.0	6.5	3.0	5.1	20.4	19.7	17.8			3	43.3	7	TR	7Z N
7 625	76- 99	C 1CA	48.0	31.6	20.4	7.7	7.7	4.0	6.5	22.1	18.1	13.5			4	44.0	12	TR	12Z N
7 626	99-122	C 2CA	62.1	23.8	14.1	12.3	12.1	5.7	7.3	24.7	15.2	8.6				44.0	18	TR	18Z N
7 627	122-152	2C 3CA	77.8	9.2	13.0	34.0	28.6	7.3	4.1	3.9	5.2	4.0				10.8	59	16	43Z N
7 628	152-178	3C 4															47	TR	47Z N

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6G2B	ATTERBERG L I M I T LL 4F1	PL 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT--		-PERCENT-		PCT.	PCT.	NO.40	GRAMS PER CC				----PERCENT---			-PERCENT--				
7 618	0- 0																			
7 619	0- 3	0.07	0.016	7		0.7			1.51	1.57	0.95		17.7	9.0		1.3	1.2		9.9	
7 620	3- 8		0.016	4		0.8			1.47	1.53	0.81		16.1	10.7		1.3	1.1		9.9	
7 621	8- 23			4		0.7			1.25	1.37	0.82		21.7	12.9		3.1	2.5		8.6	
7 622	23- 38			4		0.5			1.53	1.58	0.76		15.2	9.3		1.1	0.8		8.4	
7 623	38- 48			2		0.4			1.56	1.60	0.69		12.4	6.6		0.8	0.6		8.6	
7 624	48- 76			12		0.4			1.38	1.51	0.96		21.7	8.4		3.0	2.9		8.6	
7 625	76- 99			14		0.4			1.43	1.60	0.93		18.2	7.6		3.8	3.5		8.6	
7 626	99-122			10		0.4			1.55	1.63	0.89		14.2	5.6		1.7	1.5		8.8	
7 627	122-152			10					1.57	1.62	0.54		12.3	5.5		1.1	0.6			
7 628	152-178			5		0.4			1.53	1.56	0.66		14.6	5.7		0.6	0.4			

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4C	MG 5B3A 6O4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA+ OAC 5A2A	NH4+ OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		--------MEQ/100G--------					PCT.	-MEQ/100G		MMHO	---------------MEQ/1000 ML---------------								PPM	
7 618	0- 0																			
7 619	0- 3		TR	4.6	1.7	6.4		20.5	1.26	0.6	0.2	10.9	0.2			5.0	4.5			8.4
7 620	3- 8			6.8	1.7	8.5		21.8	3.95	1.6	0.5	29.4	0.3			2.8	25.8			8.5
7 621	8- 23			14.8	1.2	16.0		17.8	36.9	14.0	37.6	260.0	1.4			3.1	378.0			7.7
7 622	23- 38			12.8	0.7	13.5		12.1	33.5	166.0	37.0	270.0	0.5			6.0	384.0			7.5
7 623	38- 48			9.5	0.4	9.9		8.7	35.7	132.8	30.8	204.0	0.5			3.7	319.0			7.7
7 624	48- 76			11.1	0.4	11.5		10.1	36.4	119.2	59.6	224.0	0.8			3.5	328.0			7.6
7 625	76- 99			9.8	0.4	10.2		8.5	31.6	92.0	49.2	194.0	0.4			2.3	296.0			7.7
7 626	99-122			7.2	0.2	7.4		6.1	19.8	54.8	28.8	129.6	0.2			2.5	165.0			8.0
7 627	122-152																			
7 628	152-178			8.5	0.3	8.8		8.2	19.0	29.8	4.5	144.0	0.8			1.6	11.5			8.0

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT 8A PCT.	NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM-- X RAY I 7A2E	II 7A2E	III 7A2E	IV 7A2E	DTA 7A3 PCT.	-L.T. .0002 MM- X RAY I 7A2E	II 7A2E	III 7A2E	MINERAL CODE
7 618	0- 0															
7 619	0- 3	24.1	4.3	21	17			MI 2								MI MICA
7 620	3- 8	35.6	5.8	26	29											MT MONTMORT
7 621	8- 23	42.7	3.7	21	51			MI 4	MT 2	KK 2						KK KAOLINIT
7 622	23- 38	41.3	1.6	14	27											
7 623	38- 48	33.4	2.7	31	23											
7 624	48- 76	45.9	0.8	8	24			MI 4	MT 3	KK 3						
7 625	76- 99	46.2	1.0	12	23											
7 626	99-122	51.5	0.5	9	20											
7 627	122-152															
7 628	152-178	40.5	2.7	33	35			MT 4	MI 3	KK 3						

RELATIVE AMOUNT
1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.

HARQUA GRAVELLY LOAM (taxadjunct) 1/
S67Ariz-7-4

Location: Maricopa County, Arizona. 40 feet north and 400 feet west of the southeast corner of Sec. 7, T. 1 S., R. 8 W., 16 miles west-southwest of Tonopah. Date of Sampling: October 10, 1967.
Description by: G. Hartman, S. Torrance, J. Jay. Collectors: K. Flach, D. Nettleton, A. DeWall.
Classification: Typic Paleargid, fine-loamy, mixed, hyperthermic.
Vegetation: Barren. Use: Seasonal rangeland. Climate: Mean annual precipitation (est.) 6 inches. Mean annual air temperature 70° F.; January 51° F., July 92° F. Parent Material: Medium and moderately fine textured alluvium over gravelly alluvium from andesite tuff, granite and schist. Topography: Smooth nearly level lower fan slope. Less than 1 percent slope. Elevation: 1270 feet. Drainage: Well drained. Runoff is slow. Permeability is moderate. Soil Moisture: Dry. Remarks: Soil temperature at 20 inches 83° F., at 60 inches 81° F. Sampled from backhoe pit.

HORIZON	DESCRIPTION
A2 RSL 67619	0-3 cm (0-1 inch), light yellowish brown (10YR 6/4) silt loam, dark brown (10YR 4/3) when moist; weak coarse platy structure; slightly hard when dry, friable when moist, sticky and plastic when wet; many very fine and fine, horizontal inped vesicular pores; about 8 percent gravel in soil. Varnished desert pavement of gravel covers 85 percent of the surface. Strongly effervescent; moderately alkaline (pH 8.3 thymol blue); abrupt smooth boundary.
A & B RSL 67620	3-8 cm (1-3 inches), 50 percent pinkish white (5YR 8/2) and 50 percent reddish brown (5YR 5/4) gravelly clay loam, reddish brown (5YR 5/4 and 5YR 4/4) when moist; weak coarse platy structure; hard when dry, friable when moist, sticky and plastic when wet; common fine and very fine inped vesicular pores; few thin clay films in pores; about 30 percent very fine gravel; strongly effervescent; strongly alkaline (pH 9.5); abrupt smooth boundary.
B2tsa RSL 67621	8-23 cm (3-9 inches), reddish brown (5YR 5/4) gravelly clay loam, reddish brown (5YR 4/4) when moist; weak very fine subangular blocky structure; slightly hard when dry, friable when moist, sticky and plastic when wet; many very fine interstitial pores; about 30 percent very fine gravel; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
B31tcasa RSL 67622	23-38 cm (9-15 inches), reddish brown (5YR 5/4) gravelly clay loam, reddish brown (5YR 4/4); weak medium and coarse subangular blocky structure; very hard when dry, friable when moist, sticky and plastic when wet; many fine interstitial and tubular pores; few thin clay films in pores and on mineral grains; common fine pinkish white lime veins and medium rounded lime concretions, about 30-35 percent very fine gravel and concretions; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
B32tcasa RSL 67623	38-48 cm (15-19 inches), reddish brown (5YR 4/4) gravelly clay loam, reddish brown (5YR 4/4) when moist; weak medium and coarse subangular blocky structure; very hard when dry, friable when moist, sticky and plastic when wet; many fine tubular and interstitial pores; few thin clay films in pores and on mineral grains; approximately 35 percent very fine gravel; common pinkish white medium lime veins, strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
B33tca RSL 67624	48-76 cm (19-30 inches), light reddish brown (5YR 6/4) clay loam rounded concretions, reddish brown (5YR 4/4) when moist; massive; very hard when dry, friable when moist, sticky and plastic when wet; few fine tubular pores and common fine interstitial pores; few thin clay films in pores and on mineral grains; common reddish yellow medium lime veins and fine to medium, some fine gravel; strongly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
C1ca RSL 67625	76-99 cm (30-39 inches), light brown (7.5YR 6/4) loam, brown (7.5YR 5/4); massive; very hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many fine and very fine tubular pores and common fine interstitial pores; few thin clay films in pores and on mineral grains; common medium pinkish white lime veins and rounded concretions, about 10 percent very fine gravel and nodules; violently effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
C2ca RSL 67626	99-122 cm (39-48 inches), pinkish white (7.5YR 7/2) gravelly sandy clay loam, brown (7.5YR 5/4) when moist; massive; very hard when dry; friable when moist, slightly sticky and slightly plastic when wet; many fine and very fine discontinuous vertical and horizontal closed tubular pores; very few clay films bridging sand grains; few fine pinkish white soft lime masses; about 15 percent very fine gravel and medium lime concretions, violently effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
IIC3ca RSL 67627	122-152 cm (48 to 60 inches), light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 5/4) when moist; massive; very hard when dry, friable when moist, sticky and nonplastic when wet; many fine interstitial pores; very few clay films bridging sand grains; about 35 percent fine gravel; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
IIIC4 RSL 67628	152-178 cm (60-70 inches), light brown (7.5YR 6/4) very gravelly loamy sand, brown (7.5YR 5/4) when moist; massive; very hard when dry, very friable when moist, slightly sticky and slightly plastic when wet; many fine and very fine interstitial pores; very few clay films in pores and bridging sand grains; about 40 percent fine gravel; slightly effervescent; moderately alkaline (pH 8.1).

1/ The Harqua series is in a fine-loamy, mixed, hyperthermic family of Typic Haplargids. This pedon has an abrupt boundary between the A2 and B2t horizons and more than a 20 percent increase in clay.

CONSECUTIVE PEDON NUMBER C 69159 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES TUBAC TAXADJUNCT SOIL NO. S69 ARIZ. 2-13 SAMPLE NO. 9 831-9 838 WILLCOX AREA

SOIL FAMILY: TYPIC PALEARGID,FINE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	SILTS CO. 2-.2U	CLAYS FINE LT .2U	CARBONATE 3A1A.02	INT. II .2-	COARSE FRAGMENTS- PCT. OF WHOLE SOIL I 75-	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75		
9 831	0- 5	A11	69.9	20.9	9.2	21.2	19.5	7.1	13.6	8.5	12.7	8.2	6.4	2.8		29.0	--G	--	--
9 832	5- 31	A12	66.2	22.1	11.7	13.3	19.5	11.4	14.5	7.5	12.8	9.3				27.8	--G	--	--
9 833	31- 41	A2	63.8	25.4	10.8	20.6	17.2	7.8	11.1	7.1	14.0	11.4	6.8	4.0		27.2	--G	--	--
9 834	41- 61	B21T	51.5	11.5	37.0	25.4	12.3	4.2	6.0	3.6	6.1	5.4				13.0	--G	--	--
9 835	61- 74	B22T	52.6	11.7	35.7	20.0	14.9	6.0	7.8	3.9	7.3	4.4	15.4	20.3		15.3	--G	--	--
9 836	74-100	B23T	66.6	13.5	19.9	25.8	18.1	7.8	9.7	5.2	7.8	5.7				18.1	--G	--	--
9 837	100-120	B3	81.4	7.3	11.3	32.0	29.3	10.1	7.5	2.5	5.6	1.7				11.3	--G	--	--
9 838	120-150	C	80.2	8.9	10.9	36.0	20.9	7.8	10.9	4.6	6.2	2.7				16.5	--G	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON	NITROGEN	CARBONATE AS CACO3	EXT. IRON	ATTERBERG L	I	M	T	BULK DENSITY EST	1/3	DRY	CM WATER CONTENT 1/10	1/3	15	EXTENSBLTY LEF	LE	PH H2O	H2O CACL2
		6A1A	6B1A	6E1B	6E1B	6C2B	4F1	4F2		4A1F	4A1F	4A1H	3B2	4B1C	4B1C	4B2	4D1	4D1	8C1A	8C1A	8C1E
		-PERCENT--		-PERCENT-		PCT.	PCT.	NO.40		GRAMS PER CC				-----PERCENT---			-PERCENT--				
9 831	0- 5	0.30	0.030			0.6	NP	NP		1.79	1.80	1.00		5.0	3.0	0.2	0.2	5.0			4.3
9 832	5- 31	0.25	0.032			0.7				1.74	1.76	1.00		6.9	3.9	0.4	0.4	5.6			5.2
9 833	31- 41	0.17				0.9	16	14		1.80	1.84	1.00		4.0	3.6	0.7	0.7	6.4			5.9
9 835	61- 74	0.19				1.1	55	20		1.70	1.91	1.00		18.0	15.1	4.0	4.0	7.6	8.8		7.4
9 836	74-100			TR		0.7	34	17		1.76	1.87	1.00		10.5	9.3	2.0	2.0	7.2	8.4		7.1
9 837	100-120					0.5				1.77	1.86	1.00		9.2	6.3	1.7	1.7	7.4	8.7		7.3
9 838	120-150					0.4	27	20		1.83	1.90	1.00		5.8	5.3	1.3	1.3	7.6	9.1		7.3

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6G2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- 0AC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1B	MG 6G1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	8A1 SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G				PCT.	-MEQ/100G		MMHO	MEQ/1000 ML								PPM		
9 831	0- 5			0.1	0.3	0.4			4.3											
9 832	5- 31			0.1	0.3	0.4			5.4											
9 833	31- 41			0.1	0.2	0.3			4.3											
9 834	41- 61			1.5	1.4	2.9			20.1											
9 835	61- 74			1.9	1.4	3.3			21.5	1.27	1.9	1.3	8.9	0.4		2.6	3.1	7.1		7.7
9 836	74-100			1.6	1.1	2.7			12.7	3.36	10.2	7.7	19.5	0.9		2.4	23.8			7.3
9 837	100-120			1.2	0.4	1.6			8.2	2.89	6.9	4.7	19.3	0.6		2.2	19.6			7.6
9 838	120-150			1.1	0.4	1.5			7.3	2.17	3.7	2.3	17.4	0.3		2.4	12.9			7.6

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT SAT. 8A	NA 5B4B	NA 5D2	SAR 5E	GYPSUM AMT. 6F1B	REQ. 6P3A	CLAY MINERALOGY --LESS THAN 0.002 MM-- X RAY I	II	III	DTA IV	PCT.	-L.T. .0002 MM- X RAY I	II	III	MINERAL CODE		RELATIVE AMOUNT
		PCT.	MEQ.	PCT.		PCT.	MEQ.	7A2E	7A2E	7A2E	7A2E	7A3	7A2E	7A2E	7A2E			
9 831	0- 5		0.1	2				MI 3	KK 2				KK 3	MI 2		MI	MICA	1 TRACE
9 832	5- 31		0.1	2				MI 3	KK 2							KK	KAOLINIT	2 SMALL
9 833	31- 41		0.1	2				MI 3	KK 2				MI 3	KK 3				3 MODERATE
9 834	41- 61		1.5	7												MT	MONTMORT	4 ABUNDANT

TUBAC SANDY LOAM (taxadjunct) 1/
S69Ariz-2-13

Location: Cochise County, Arizona. 1850 feet north and 1650 feet west of the SE corner, Section 23, T17S, R24E. Date of Sampling: October 16, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Typic Paleargid, fine-loamy, mixed, thermic.
Vegetation: Blue grama, three-awn, Lehmans lovegrass, spike dropseed, scattered burroweed, yucca, and mesquite. Use: Formerly livestock range, now subdivided for homesites. Climate: Precipitation about 11 to 12 inches. Mean annual air temperature 60°F., January 42°F., July 78°F. Parent Material: Alluvium, dominantly from granite with some andesite, rhyolite, quartzite, and a limited amount of limestone. Topography: Nearly level to gently sloping convex fans and valley slopes. Slope, 0.3 percent, northeast facing. Elevation: 4380 feet. Drainage: Well drained. Runoff is medium. Permeability is moderately slow to slow. Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by Hellige-Truog indicator solution. This sample was not paired.

HORIZON	DESCRIPTION
A11 RSL 69831	0 to 5 cm (0 to 2 inches), yellowish red (5YR 5/6) sandy loam, reddish brown (5YR 4/4) moist; weak thin platy and weak fine granular structure; slightly hard, very friable, nonsticky, nonplastic; many fine and medium roots; common fine vesicular and tubular pores; few fine gravel; noneffervescent; medium acid (pH 6.0); abrupt smooth boundary
A12 RSL	5 to 31 cm (2 to 12 inches), yellowish red (5YR 5/6) sandy loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, nonsticky, nonplastic;

pores; noneffervescent; slightly acid (pH 6.5); clear wavy boundary.

A2 RAL 69833	31 to 41 cm (12 to 16 inches), light brown (7.5YR 6/4) gravelly sandy loam, dark brown (7.5YR 4/4) moist; massive; hard, very friable, nonsticky, nonplastic; few very fine and fine roots; many fine vesicular and few fine tubular pores; 15 to 20 percent by volume of 2 to 5 mm angular granitic gravel; noneffervescent; neutral (pH 7.0); abrupt wavy boundary.
B21t RSL 69834	41 to 61 cm (16 to 24 inches), red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; strong medium prismatic structure; very hard, friable, sticky, very plastic; common very fine and fine roots; few thin clay films on ped faces; common pressure faces; common black staining on faces of peds; noneffervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
B22t RSL	61 to 74 cm (24 to 29 inches), red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; strong medium prismatic structure; very hard, friable, sticky,

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Paleargid, fine, mixed, thermic
SOIL Tubac gravelly loam SOIL Nos. S64Ariz-2-28 LOCATION Cochise County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 64655 - 64661

Depth (In.)	Horizon	1B1b Total Sand (2–0.05) Pct. of <2 mm	1B1b Total Silt (0.05–0.002) Pct. of <2 mm	1B1b Total Clay (<0.002) Pct. of <2 mm	Size class and particle diameter (mm) Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	3A1 Int. II (0.2–0.02)	(2–0.1)	Non carbonate clay		Coarse fragments 1A2a: ≥2 Pct. of whole soil	2–19 Pct. of <76 mm	19–76 Pct. of <76 mm
0–2	A11	65.9	28.7	5.4	6.1	12.6	11.1	23.0	13.1	19.1	9.6	44.6	52.8			19	17	2
2–6	A12	62.3	28.5	9.2	7.0	11.7	9.9	20.7	13.0	17.3	11.2	41.7	49.3			34	29	5
6–11	B1	56.1	27.2	16.7	12.7	12.7	7.6	13.7	9.4	16.3	10.9	33.2	46.7			44	38	6
11–21	B21t	26.3	15.0	58.7	7.5	7.1	2.8	5.2	3.7	6.5	8.5	13.1	22.6			31	24	7
21–35	B22tca	41.5	10.4	48.1	14.1	12.7	5.6	6.0	3.1	4.6	5.8	10.7	38.4			65	36	29
35–44	B3tca	61.1	15.2	23.7	17.0	19.1	9.6	10.4	5.0	7.1	8.1	17.3	56.1			56	34	16
44–70+	C	83.0	6.1	10.9	28.1	32.0	13.2	8.0	1.7	2.4	3.7	7.2	81.3			54	49	5

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N	6E1b Carbonate as $CaCO_3$ 2/ Pct.	6E1b Carbonate as $CaCO_3$ 1/ Pct.	Bulk density 4A1f 1/3 bar g/cc	4A1h Oven dry g/cc	Atterberg limits: Plastic limit (Pct. of <0.4 mm)	Liquid limit	Plastic index	Water content 4B1c 1/3 bar Pct.	4B2 15 bar Pct.	4D1 Extensibility COLE in./in.	4D1 Extensibility COLE in./in.	3B2 Cm	pH 8C1a 1:1 H_2O	8C1a 1:10 H_2O
0–2	0.25	0.029	9			1.59	1.60				11.1	3.9	0.002	0.002	0.88	5.7	6.5
2–6	0.33	0.035	9			1.48	1.50				13.2	4.7	0.003	0.003	0.78	6.3	6.7
6–11	0.43	0.044	10			1.43	1.48				18.0	7.0	0.011	0.008	0.70	7.0	7.3
11–21	0.34	0.050				1.20	1.53	22	76	54	40.1	21.6	0.083	0.067	0.83	7.5	8.2
21–35	0.20			3	1	1.27	1.39				31.0	19.0	0.032	0.017	0.53	7.9	8.6
35–44	0.04			tr.	tr.	1.40	1.50				21.3	10.8	0.022	0.014	0.60	7.7	8.6
44–70+	0.02			tr.	tr.	1.38	1.40	16	29	13	17.6	6.7	0.006	0.003	0.62	7.6	7.8

Depth (In.)	Extractable bases 6N2b Ca	6O2c Mg	6P2a Na	5B1a 6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity 5A1a NH_4OAc	5A3a Sum	Water extract from saturated paste 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	8A1 6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity mmho/cm
	meq/100 g								meq/liter								
0–2	2.5	1.2	1.0	0.8	5.5	1.6	5.2				1.0	0.6					0.35
2–6	3.9	1.5	1.0	0.7	7.1	1.3	6.7				1.4	0.5					0.55
6–11	7.1	2.6	1.0	0.9	11.6		10.2		7.2	3.5	2.7	0.8	-	1.6	1.8		1.34
11–21	26.0	9.5	2.9	2.4	40.8		32.6		9.8	4.6	7.4	0.8	-	1.5	7.6		2.18
21–35	28.3	8.3	4.2	2.6	43.4		29.6		9.8	4.9	12.2	0.9	-	1.7	14.0		2.76
35–44	15.3	4.5	4.4	2.0	26.2		19.1		9.8	4.6	18.4	0.7	-	2.0	18.7		3.45
44–70+	7.8	2.1	4.0	1.8	15.7		14.0		6.4	2.3	16.0	0.5	-	1.6	13.9		2.71

Depth (In.)	8A Water at Saturation Pct	5D2 Exchangeable Na 2/ Pct.	5B1b Exch. Na me./100 g.	5E Sodium adsorption ratio	Clay mineralogy (<0.002 mm) 3A1: Mont.	Verm.	Mica 7A2 X-ray	Kaolin.
0–2	23.8	19	1.0					
2–6	26.6	15	1.0		xx	-	xx	xx
6–11	32.8	9	0.9	1	xx	-	xx	
11–21	72.2	7	2.4	3				
21–35	58.4	12	3.5	4	xx	-	xxx	tr.
35–44	37.2	19	3.7	7				
44–70+	28.7	26	3.6	8	xxxx	-	xx	tr.

1/ In percent of the whole soil including >2 mm.

2/ In percent of the <2 mm fraction; calculated assuming no carbonates in >2 mm fraction.

TUBAC FINELY GRAVELLY LOAM
S64Ariz-2-28

Location: Cochise County, Arizona. 9 miles north and 3/4 mile east of Willcox, Arizona. 820 feet west and 375 feet north of the east 1/4 corner of Sec. 18, T. 12 S., R. 25 E. Date of Sampling: October 23, 1964.
Description by: James Jay and M. L. Richardson. Collectors: K. W. Flach, B. Brasher, M. L. Richardson, James Jay and R. K. Preece.
Classification: Typic Paleargid, fine, mixed, thermic.
Vegetation: Grassland. Fair cover of blue and black grama, Rothrock grama and annual gramas. Climate: Precipitation 11-12 inches annual. Mean annual temperature 58° F. (Willcox). Soil temperature at time of sampling: 24 inches 70° F., 48 inches - 73° F., 72 inches 73° F. Parent Material: Old alluvium from andesite, rhyolite, rhyolite-tuff, quartzite, and granite. Topography: Nearly level valley slopes near the low end of a long alluvial fan. Slope is 1.6 percent, very slightly convex, and with a southern aspect. Elevation: 4470 feet. Drainage: Well drained. Moderate surface runoff. Slowly permeable. Soil Moisture: Slightly moist - about 25 percent of field capacity. Water table at 100-150 feet. Remarks: This is one of the most extensive soils in Southeastern Arizona. Most of it is rangeland but some areas are cultivated. Paired sample is S64Ariz-2-29. Field determination of pH by Hellige-Truog indicator.

HORIZON	DESCRIPTION
A11 RSL NO. 64655	0-2 inches (0-5 cm), light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 4/4) when moist; weak medium and coarse platy structure; slightly hard when dry, very friable when moist, slightly sticky and slightly plastic when wet; common fine and medium roots; few fine tubular and many fine interstitial pores; 10 percent fine gravels; pH 5.5; abrupt smooth boundary.
A12 RSL No. 64656	2-6 inches (5-15 cm), reddish brown (5YR 5/3) finely gravelly heavy sandy loam, reddish brown (5YR 4/3) when moist; weak fine and medium subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many fine and very fine roots; few fine tubular and common fine interstitial pores; 30 percent fine gravel; pH 5.5; clear smooth boundary.
A3 RSL No. 64657	6-11 inches (15-28 cm), reddish brown (5YR 5/3) finely gravelly clay loam, reddish brown (5YR 4/3) when moist; weak fine and medium subangular blocky structure; hard when dry, friable when moist, sticky and plastic when wet; common fine and medium roots; common fine tubular and many fine interstitial pores; few thin clay films on ped faces and in pores; 30 percent fine gravel; pH 7.5; abrupt wavy boundary.*
B21t RSL No. 64658	11-21 inches (28-53 cm), reddish brown (5YR 4/3) (5YR 4/4 when crushed) gravelly clay, same color moist; moderate medium prismatic breaking to moderate fine and medium angular blocky structure; very hard when dry, friable when moist, sticky and very plastic when wet; common exped flattened fine roots; few fine tubular and many exped pores; thin continuous clay films on ped faces and lining pores; 20 percent fine and medium gravel; noneffervescent; pH 8.0; clear wavy boundary.
B22tca RSL No. 64659	21-35 inches (53-89 cm), reddish brown (5YR 5/4), with pink (5YR 7/3) common fine faint mottles (weathered gravels), lime flecks and thin patchy lime coating on gravel and common very fine mottles of black; gravelly clay, reddish brown (5YR 4/4), light reddish brown (5YR 6/3) and black, when moist; massive, breaking to moderate fine and medium subangular blocky structure; very hard when dry, friable when moist, sticky and plastic when wet; few fine roots; common fine tubular and many fine interstitial pores; many thin clay films on ped faces, gravels, and pore linings; 30 percent fine to coarse gravel; slight effervescence with HCl in matrix and strong effervescence in mottles and coatings; pH 8.2; gradual wavy boundary.
B3tca RSL No. 64660	35-44 inches (89-112 cm), reddish brown (5YR 5/3 & 5/4) gravelly sandy clay loam, reddish brown (5YR 4/4) when moist; massive; very hard when dry, friable when moist, sticky and plastic when wet; few fine roots; common fine tubular and interstitial pores; few thin clay films on ped faces in pores and bridges; 35 percent fine to coarse gravel and 5 percent cobble; slight effervescence in spots with a few gravel coatings strong; pH 8.2; gradual wavy boundary.
C RSL No. 64661	44-70 inches + (112-178 cm), light reddish brown (5YR 6/3) very gravelly loamy sand, reddish brown (5YR 4/3) when moist; massive; very hard when dry, friable when moist, nonsticky and nonplastic when wet; no roots; many fine interstitial pores; noneffervescent; pH 8.2.

*A very thin intermittent pinkish gray (5YR 6/2) layer, dark reddish gray (5YR 4/2) when moist is present between B1t and B21t horizons.

CONSECUTIVE PEDON NUMBER C 69204 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES TUBAC SOIL NO. S69 ARIZ. 10- 3 SAMPLE NO. 91085-91092 - WALNUT G.-TUCSON AREA

SOIL FAMILY: TYPIC PALEARGID,FINE,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	INT. II .2- .02	COARSE FRAGMENTS- PCT. OF WHOLE SOIL	I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM															PCT. OF LT 75		
91085	0- 1	A11	49.7	40.9	9.4	12.0	4.9	3.4	12.2	17.2	23.7	17.2				49.0	78A	12	59	7
91086	1- 5	A12	31.9	50.1	18.0	3.8	3.3	2.3	8.7	13.8	21.7	28.4				41.3	10A	--	4	6
91087	5- 13	A3	41.8	35.2	23.0	8.7	7.1	4.9	11.4	9.7	13.0	22.2				29.2	23A	3	4	16
91088	13- 36	B21T	21.4	20.2	58.4	2.6	3.8	2.9	5.9	6.2	7.9	12.3				17.5	11A	--	4	7
91089	36- 51	B22T	27.2	17.6	55.2	7.3	5.0	3.3	5.9	5.7	9.2	8.4				18.3	10A	--	4	6
91090	51- 69	B3 T	40.3	22.9	36.8	17.6	7.5	3.0	5.1	7.1	9.7	13.2			1	19.6	45A	10	26	9
91091	69- 94	C 1CA	55.6	24.7	19.7	25.2	11.9	5.4	7.3	5.8	10.6	14.1			2	20.1	20A	--	9	11
91092	94-122	C 2CA	61.9	20.6	17.5	22.2	18.1	8.1	7.8	5.7	8.6	12.0			2	18.0	55A	7	15	33

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-0.2 6E1B	EXT. IRON FE 6C2B	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		PERCENT		PERCENT		PCT.	PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT				
91085	0- 1	0.13	0.012			1.0			1.20			0.39			4.6			6.8		6.7
91086	1- 5	0.11	0.014			1.1				1.59	1.67	0.94		13.5	7.4	1.6	1.5	7.2		6.9
91087	5- 13					1.0			1.50			0.85			8.3			7.6	8.7	7.4
91088	13- 36					1.1			1.50			0.94			14.3			7.4	7.3	7.5
91089	36- 51			1		1.1			1.50			0.94			13.2			7.3	7.9	7.5
91090	51- 69			10		0.7			1.45			0.69			11.5			7.3	8.3	7.7
91091	69- 94			17		0.6			1.45			0.88			8.3			7.4	8.5	7.9
91092	94-122			12		0.7			1.45			0.60			8.1			7.7	8.8	7.8

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 584A 6N2E	MG 584A 6Q2D	NA 584A 6P2A	K 584A 6Q2A	SUM	BASE SAT.	C E C NA+ OAC 5A2A	NH4+ OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	8A1 B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
91085	0- 1			0.3	0.8	1.1			10.0											
91086	1- 5			0.5	1.6	2.1			16.3											
91087	5- 13			1.4	2.2	3.6			20.4	3.51	15.7	2.6	14.5	1.4		2.4	17.5	3.1		7.7
91088	13- 36			4.3	2.5	6.8			28.1	15.9	114.2	27.7	45.1	1.6		3.0	77.8	27.6		7.4
91089	36- 51			4.6	2.0	6.6			26.1	25.4	160.9	39.9	63.9	2.3		6.6	130.0	17.2		7.9
91090	51- 69			3.7	1.3	5.0			17.1	19.6	146.3	46.2	53.6	1.3		1.2	106.0	16.0		7.4
91091	69- 94			2.2	0.7	2.9			8.7	13.0	81.4	29.1	41.5	1.1		1.2	68.5	8.1		7.5
91092	94-122			2.2	0.6	2.8			9.0	7.2	28.8	13.2	42.5	0.8		0.8	36.7	6.4		7.5

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT 8A SAT. PCT.	NA 584B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY DTA 7A2E I	7A2E II	7A2E III	7A2E IV	7A3 PCT.	-L.T. .0002 MM- X RAY 7A2E I	7A2E II	7A2E III
91085	0- 1		0.3	3				MI	3	MT	1	KK	1		
91086	1- 5		0.5	3				MI	3	MT	1	KK	1		
91087	5- 13	31.5	0.9	5	5			MI	2	MT	1	KK	1		
91088	13- 36	51.1	2.0	7	5										
91089	36- 51	45.3	1.7	7	6	0.2									
91090	51- 69	44.0	1.3	8	5			MI	3	KK	1				
91091	69- 94	39.2	0.6	7	6										
91092	94-122	42.2	0.4	5	9			MI	4	MT	3	KK	2		

MINERAL CODE / RELATIVE AMOUNT

MI MICA 1 TRACE
MT MONTMORT 2 SMALL
KK KAOLINIT 3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

TUBAC VERY GRAVELLY LOAM
S69Ariz-10-3

Location: Pima County, Arizona. Approximately 100 feet east and 100 feet north of southwest corner of Sec. 7, T. 12 S., R. 10 E. About 14 miles west of Rillito on Silver Bell Road.
Description by: Y. H. Havens and D. M. Hendricks. Sampled by: Y. H. Havens and D. M. Hendricks.
Classification: Typic Paleargid, fine, mixed, thermic.
Vegetation: Bare - desert pavement. Climate: Mean annual temperature is approximately 68° F. Approximately 10 inches annual precipitation. Parent material: Mixed alluvium from andesite, basalt, granite and rhyolite. Topography: Gently sloping old fan. Elevation: 2,050 feet. Drainage: Well drained. Soil moisture: Dry.
Remarks: 80 to 95 percent of the surface covered with gravel--desert pavement.

HORIZON	DESCRIPTION
A11 RSL No. 691085	0-1 cm (0-1/2 inch), light brown (7.5YR 6/4) very gravelly loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium vesicular pores; noneffervescent; neutral (pH 7.0); abrupt smooth boundary.
A12 RSL No. 691086	1-5 cm (1/2-2 inches), light brown (7.5YR 6/4) heavy loam, dark brown (7.5YR 4/4) moist; weak thick platy structure; slightly hard, friable, slightly sticky, slightly plastic; few very fine roots; many fine and medium vesicular pores; 10 percent gravel; noneffervescent; neutral (pH 6.9); abrupt smooth boundary.
A3 RSL No. 691087	5-13 cm (2-5 inches), reddish brown (2.5YR 5/4) clay loam, dark red (2.5YR 3/6) moist; moderate fine, medium and coarse subangular and angular blocky structure; hard, friable, sticky, plastic; few very fine and fine roots; common fine tubular and vesicular pores; common thin clay films on ped faces and in pores; 10 percent gravel; slightly effervescent in spots; moderately alkaline (pH 7.9); abrupt smooth boundary.
B21t RSL No. 691088	13-36 cm (5-14 inches), red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; moderate fine and medium prismatic structure; hard, friable, sticky, plastic; few very fine and fine roots; common fine tubular pores; common thin clay films on ped faces and in pores; 5 percent gravel; noneffervescent; mildly alkaline (pH 7.6); clear wavy boundary.
B22t RSL No. 691089	36-51 cm (14-20 inches), red (2.5YR 5/6) gravelly clay, dark red (2.5YR 3/6) moist; moderate medium and coarse subangular blocky structure; hard, friable, sticky, plastic; common fine tubular pores; common thin clay films on ped faces and in pores; 30 percent gravel; slightly effervescent in spots; neutral (pH 7.3); clear wavy boundary.
B3 RSL No. 691090	51-69 cm (20-27 inches), reddish brown (2.5YR 5/4) gravelly clay loam, dark reddish brown (2.5YR 3/4) moist; weak medium and coarse subangular blocky structure; very hard, friable, slightly sticky, plastic; common fine tubular pores; few thin clay films on ped faces and in pores; 30 to 35 percent gravel; common fine and medium distinct pinkish white (7.5YR 8/2) lime filaments and segregations, pinkish gray (7.5YR 7/2) moist; strongly effervescent; moderately alkaline (pH 7.9); clear wavy boundary.
C1ca RSL No. 691091	69-94 cm (27-37 inches), mottled light brown (7.5YR 6/4) and pinkish white (8/2) very gravelly sandy clay loam, strong brown (7.5YR 5/6) and light brown (7.5YR 6/4) moist, mottles are many medium and large and distinct; massive--weakly cemented; very hard, friable, slightly sticky, slightly plastic; many fine and very fine tubular pores; 50 to 60 percent gravel; strongly effervescent; moderately alkaline (pH 8.3); clear wavy boundary.
C2ca RSL No. 691092	94-122 cm (37-48 inches), mottled brown (7.5YR 5/4) and pinkish gray (7/2) very gravelly light sandy clay loam, yellowish red (5YR 4/6) and light reddish brown (5YR 6/3) moist; massive; weakly cemented in places; hard, friable, slightly sticky, slightly plastic; many medium and large pinkish gray (7.5YR 7/2) lime segregations and coatings; strongly effervescent; moderately alkaline (pH 8.3).

CONSECUTIVE PEDON NUMBER C 71 12 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES AJO TAXADJUNCT SOIL NO. S71 ARIZ. 10-11 SAMPLE NO. 1 68-1 72 ORGAN PIPE MON AREA

SOIL FAMILY: PETROCALCIC PALEARGID,CLAYY-SKLTL,MXD,HYPRTHRMC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.		DEPTH CM.		HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	SILTS CO. 2- .2U	CLAYS FINE LT .2U	CARBONATE 3A1A	1A2A INT. COARSE FRAGMENTS II .2-	PCT. OF WHOLE SOIL	I 75- 20	II 20-5	III 5-2
					PERCENT OF LESS THAN 2MM															PCT. OF LT 75		
1	68	0-	5	A1	53.4	28.2	18.4	5.0	5.9	4.4	12.7	25.4	21.5	6.7				55.8	36A	14	17	6
1	69	5-	15	B21T	44.0	30.3	25.7	11.7	5.6	3.1	7.7	15.9	11.8	18.5				32.7	68*	34	25	6
1	70	15-	33	B22T	39.9	18.3	41.8	13.9	4.2	2.5	6.1	13.2	10.0	8.3				27.1	82*	35	38	8
1	71	33-	61	B3 CA	43.4	16.7	39.9	19.8	7.5	3.4	4.4	8.3	7.5	9.2				18.1	68*	34	24	8
1	72	61-	91	CCAM	77.4	17.3	5.3	35.4	17.1	7.6	9.6	7.7	8.0	9.3			1	21.3	G			

SAMPLE NO.		DEPTH CM.		ORG.MATTER CARBON 6A1A	NITRO GEN 6N1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	P L 4F2	BULK DENSITY EST 1/3 BAR 4A1F	4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
				PERCENT		PERCENT		PCT.	PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT				
1	68	0-	5	0.27	0.039	TR		1.0			1.10			0.81			6.6			7.5		7.2
1	69	5-	15	0.38	0.050	TR		1.2				1.15	1.26	0.52	22.6	22.0	10.2	3.1	1.5	7.4		7.3
1	70	15-	33	0.30		2		0.9			1.15			0.34			13.8			7.8		7.5
1	71	33-	61			4		0.7			1.30			0.49			16.5			7.9	8.7	7.8
1	72	61-	91			21		0.2			1.75			1.00			4.4			8.7		8.0

SAMPLE NO.		DEPTH CM.		EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6D2D	NA 5B4A 6P2A	K 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1A	MG 6O1A	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
				MEQ/100G				PCT.	MEQ/100G			MMHO	MEQ/1000 ML							PPM	
1	68	0-	5	10.5	4.1	0.1	2.0	16.7	95		17.5											
1	69	5-	15	17.4	6.7	0.2	2.6	26.9	99		27.2											
1	70	15-	33	22.1	7.3	1.0	1.7	32.1	100+		31.7											
1	71	33-	61	28.3	9.3	6.9	2.1	46.6	100+		34.7	7.6	24.8	12.3	41.7	0.7		4.0	68.4			7.5
1	72	61-	91	17.7	2.8	1.4	0.9	22.8	100+		13.0	0.77										

SAMPLE NO.		DEPTH CM.		WATER EXCHANGBLE AT SAT. 8A	NA 5B4B	NA 5D2	SAR 5E	GYPSUM AMT. 6F1B	REQ. 6P3A	CLAY MINERALOGY LESS THAN 0.002 MM X RAY I 7A2E	II 7A2E	III 7A2E	IV 7A2E	DTA 7A3	L.T. .0002 MM X RAY I 7A2E	II 7A2E	III 7A2E
				PCT.	MEQ.	PCT.		PCT.	MEQ.					PCT.			
1	68	0-	5		0.1	1				MT	4	MI	3	KK	2		
1	69	5-	15		0.2	1				MT	4	MI	3	KK	2		
1	70	15-	33		1.0	3											
1	71	33-	61	64.5	4.2	12	10		11.2	MT	4	MI	3	KK	1		
1	72	61-	91		1.4	11				MT	3	MI	1				

MINERAL CODE / RELATIVE AMOUNT

MT MONTMORT 1 TRACE
MI MICA 2 SMALL
KK KAOLINIT 3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
*=THE 75-250MM FRACTION IS INCLUDED.
G=GROUND WHOLE. HORIZON INDURATED OR GRAVEL TOO SOFT TO BE SEPARATED. ALL DATA FOR WHOLE SOIL.

AJO VERY GRAVELLY LOAM (taxadjunct) 1/
S71 Ariz-10-11-(1-5*)

Location: Pima County, Arizona. NW¼ of SE¼ of Section 35, T15S, R5W (projected) on Alamo Canyon Road, Organ Pipe Cactus National Monument. Date of Sampling: April 8, 1971.
Description by: Y. H. Havens, E. Chamberlin. Collectors: K. Flach, K. Vogt, E. Chamberlin.
Classification: Petrocalcic Paleargid, clayey-skeletal, mixed, hyperthermic.
Vegetation: Creosotebush, ocotillo, saguaro, triangle bursage, cholla cacti, paloverde, six-weeks grama and fluffgrass. Use: Desert rangeland. Climate: Mean annual precipitation 8 to 10 inches. Mean annual temperature 69° F.
Parent Material: Mixed alluvium from rhyolite, welded tuff, basalt, andesite and schist. Topography: Gently sloping--convex with slope of 2 percent. Elevation: 2200 feet. Drainage: Well drained, with moderately slow permeability. Soil Moisture: Dry.
Remarks: 65 percent of surface covered by gravel and cobble.

HORIZON	DESCRIPTION
A1 RSL 7168	0 to 5 cm (0 to 2 inches), brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 4/4) moist; weak medium platy structure; slightly hard, friable, slightly sticky, plastic; common very fine roots; common very fine vesicular and few fine tubular pores; 55 percent gravel by volume; noneffervescent; moderately alkaline (pH 8.0 thymol blue); abrupt wavy boundary.
B21t RSL 7169	5 to 15 cm (2 to 6 inches), reddish brown (5YR 4/4) very gravelly clay loam, dark reddish brown (5YR 3/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, sticky, plastic; common very fine and fine and few medium roots; common very fine interstitial pores; few thin clay films on faces of peds and in pores; 60 percent gravel; noneffervescent; moderately alkaline (pH 8.0); clear wavy boundary.
B22t RSL 7170	15 to 33 cm (6 to 13 inches), yellowish red (5YR 4/6) very gravelly clay loam, yellowish red (5YR 4/6) moist; weak fine and medium subangular blocky structure; hard, friable, sticky, plastic; many very fine and medium roots; common very fine interstitial and few very fine tubular pores; few thin clay films on faces of peds and in pores; 65 percent gravel; noneffervescent; moderately alkaline (pH 8.2); clear wavy boundary.
B3ca RSL 7171	33 to 61 cm (13 to 24 inches), yellowish red (5YR 5/6) very gravelly clay loam, yellowish red (5YR 4/6) moist; massive; hard, friable, sticky, plastic; common very fine and fine roots; common very fine interstitial and few very fine tubular pores; few thin clay films in pores; 70 percent gravel; strongly effervescent; pinkish white (7.5YR 8/2) lime coatings on all gravel and few fine lime filaments; moderately alkaline (pH 8.2); clear wavy boundary.
Ccam RSL 7172	61 to 91 cm (24 to 36 inches), white (N/8) and pink (7.5YR 7/4) petrocalcic horizon, pinkish gray (7.5YR 7/2) and light brown (7.5YR 6/4) moist; massive; violently effervescent; moderately alkaline (pH 8.3).

1/ The Ajo series is in a loamy-skeletal, mixed, hyperthermic family of Petrocalcic Paleargids. This pedon has an argillic horizon with more than 35 percent clay.

CONSECUTIVE PEDON NUMBER C 71 22 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES LA PALMA TAXADJUNCT SOIL NO. S71 ARIZ. 7-10 SAMPLE NO. 1 135-1 141 CENT. MARICOPA AREA

SOIL FAMILY: PETROCALCIC PALEARGID,CRSE-SLTY,MXD,HYPRTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBONATE 3A1A	INT. II .2- .02	1A2A COARSE FRAGMENTS PCT. OF WHOLE SOIL I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75		
1 135	0- 4	A11	39.8	53.6	6.6	0.3	0.9	1.1	9.6	27.8	38.1	15.5	4.1	2.5		73.6	A		
1 136	4- 12	A12	40.9	53.0	6.1	0.2	0.6	1.0	9.3	29.8	37.4	15.6				74.1	A		
1 138	19- 29	B2TCA	31.3	48.4	20.3	0.5	0.9	1.0	7.8	21.1	32.2	16.2	14.5	5.8	8	58.9	A		
1 139	29- 46	B3TCA	25.0	43.6	31.4	0.7	0.9	1.4	6.0	16.0	24.3	19.3			14	44.5	A		
1 140	46- 68	C1CA	45.5	33.1	21.4	18.2	7.8	3.4	6.5	9.6	15.3	17.8			12	28.6	G		
1 141	68- 73	C2CA SM															G		

SAMPLE NO.	DEPTH CM.	ORG. MATTER CARBON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY 1/3 BAR 4A1F	DRY 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
1 135	0- 4	0.65	0.078	4					1.28	1.32	1.00	21.4	13.6	5.3	1.0	1.0	7.9		7.3	
1 136	4- 12	0.24	0.033	5					1.42	1.45	1.00	21.8	12.1	4.7	0.7	0.7	8.5		7.5	
1 137	12- 19	0.20		5					1.56	1.59	1.00	25.5	16.1	5.0	0.6	0.6	9.2	9.9	8.0	
1 138	19- 29	0.23		16					1.49	1.59	1.00	23.3	17.8	8.8	2.2	2.2	9.2	10.2	8.6	
1 139	29- 46			27					1.43	1.66	1.00	28.9	24.2	11.5	5.1	5.1	9.7	10.1	9.2	
1 140	46- 68			54					1.60	1.79	1.00	24.6	19.0	9.1	3.8	3.8	9.8	10.2	8.9	
1 141	68- 73			79					2.06	2.06	1.00	5.4	5.3	3.1			9.9	10.2	8.1	

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6D2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1A	MG 6O1A	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
1 135	0- 4	14.2	3.3	0.4	1.3	19.2	100+	9.9												
1 136	4- 12	12.6	3.6	0.6	1.6	18.4	100+	9.5												
1 137	12- 19	10.3	3.6	3.5	2.8	20.2	100+	9.9	2.37	0.6	0.4	18.7	1.2		4.3	13.8				8.6
1 138	19- 29	10.3	3.3	10.5	3.4	27.5	100+	13.2	6.2	0.4	0.4	57.7	2.4		9.9	38.9				8.6
1 139	29- 46	10.9	2.4	19.0	3.5	35.8	100+	17.6	10.0	0.4	0.4	98.6	3.1	6.3	14.2	49.1	14.0			9.3
1 140	46- 68	8.8	2.4	13.0	2.3	26.5	100+	10.9	10.7	0.2	0.4	110.0	3.0	12.0	17.2	53.6	18.6			9.4
1 141	68- 73	10.3	2.5	5.7	1.1	18.6	100+	4.6	6.6	0.2	0.3	67.6	1.5	12.2	17.9	23.1	8.7			9.4

LA PALMA VERY FINE SANDY LOAM (taxadjunct) 1/
S71Ariz-7-10(1-7)

Location: Maricopa County, Arizona. 1600 feet east and 1100 feet south of the NW corner of Sec. 2, T2N, R1W, about 9 miles west of Glendale. Date of Sampling: April 14, 1971.
Description by: W. Nettleton, J. Jay, G. Hartman, R. Schurig, F. Cook. Collectors: W. Nettleton, J. Jay, G. Hartman, R. Schurig, F. Cook.
Classification: Petrocalcic Paleargid, coarse-silty, mixed, hyperthermic.
Vegetation: Saltbush. Use: Desert range. Climate: Semiarid. 7 inches precipitation. Mean annual air temperature 70° F. Parent Material: Alluvium from acid, basic and neutral rocks. Topography: Nearly level valley plains. Slopes are 1 percent or less. Elevation: 1200 feet. Drainage: Well drained. Slow permeability to pan which is impermeable. Slow runoff. Soil Moisture: Dry when sampled.

HORIZON	DESCRIPTION
A11 RSL 71135	0 to 4 cm (0 to 1-1/2 inches), light brown (7.5YR 6/4) very fine sandy loam, brown (7.5YR 5/4) moist; weak, thin platy structure; slightly hard, very friable, nonsticky and slightly plastic; common very fine and fine roots; common fine tubular pores; strongly effervescent; moderately alkaline (pH 8.2 TB); abrupt smooth boundary.
A12 RSL 71136	4 to 12 cm (1-1/2 to 5 inches), light yellowish brown (10YR 6/4) very fine sandy loam, brown (7.5YR 4/4) moist; weak thin platy structure; slightly hard, very friable, nonsticky and slightly plastic; common very fine and fine roots; common fine tubular pores; strongly effervescent; moderately alkaline (pH 8.3); clear smooth boundary.
B1t RSL 71137	12 to 19 cm (5 to 7½ inches), light brown (7.5YR 6/4) heavy very fine sandy loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular pores; strongly to violently effervescent; common fine and medium pinkish white irregularly shaped soft lime masses; very strongly alkaline (pH 9.6); abrupt smooth boundary.
B2tca RSL 71138	19 to 29 cm (7½ to 11½ inches), yellowish red (5YR 5/6) and brown (7.5YR 5/4) light clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and plastic; common very fine and fine roots; common fine tubular pores; strongly effervescent to violently effervescent; common fine and medium pinkish white irregularly shaped soft lime masses, 2 percent fine pinkish white durinodes; very strongly alkaline (pH 9.4); clear smooth boundary.
B3tca RSL 71139	29 to 46 cm (11½ to 18 inches), light brown (7.5YR 6/4) heavy loam, brown (7.5YR 5/4) moist; pink (7.5YR 7/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine common fine tubular pores; strongly effervescent; common fine, medium and coarse pinkish white irregularly shaped soft lime masses; 1 percent fine gravel; gradual smooth boundary.
C1ca RSL 71140	46 to 68 cm (18 to 27 inches), light brown (7.5YR 6/4) heavy loam, brown (7.5YR 5/4) moist, pink (7.5YR 7/4) moist; massive, slightly hard, friable, slightly sticky and slightly plastic; few fine roots; common fine tubular pores; many pinkish white strongly cemented to indurated fragments, violently effervescent; very strongly alkaline (pH 9.6); abrupt wavy boundary.
C2ca sim RSL 71141	68 to 73 cm (27 to 29 inches), pinkish white (7.5YR 8/2) silica indurated pan, pinkish gray moist; thin laminar layer on top, no fractures; extremely hard, violently effervescent; very strongly alkaline (pH 9.6).

1/ The La Palma series is in a coarse-loamy, mixed, hyperthermic family of Petrocalcic Paleargids. This pedon has less coarse sand and more silt

CONSECUTIVE PEDON NUMBER C 71 21 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES LA PALMA SOIL NO. S71 AR12. 7- 8 SAMPLE NO. 1 126-1 134 CENT. MARICOPA AREA

SOIL FAMILY: PETROCALCIC PALEARGID,CRSE-LOAMY,MXD,HYPRTHERMC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS-- CSI .05- .02	FSI .02- .002	CLAYS---- CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	INT. II .2- .02	1A2A COARSE FRAGMENTS- PCT. OF WHOLE SOIL I 75- PCT.	II 20-5 PCT. OF	III 5-2 LT 75
			PERCENT OF LESS THAN 2MM																
1 126	0- 4	A11	62.2	33.0	4.8	5.6	14.4	11.4	14.0	16.8	22.9	10.1				46.2	5A	1	2	2
1 127	4- 12	A12	65.5	28.3	6.2	4.6	14.4	12.4	15.1	19.0	19.3	9.0				45.4	3A	--	2	1
1 128	12- 18	B1tcasa	63.0	25.0	12.0	3.1	12.7	13.1	16.7	17.4	14.7	10.3				40.3	20A	17V	2	1
1 129	18- 31	B2tcasa	61.9	17.5	20.6	4.4	16.6	15.2	16.4	9.3	9.1	8.4			6	25.8	4A	--	2	2
1 130	31- 42	B31tca	58.4	22.6	19.0	2.3	13.0	13.8	18.2	11.1	12.6	10.0			3	32.5	4A	--	3	1
1 131	42- 51	B32tca	57.0	26.5	16.5	1.8	9.2	12.7	19.8	13.5	15.3	11.2			1	38.9	2A	--	1	TR
1 132	51- 64	C1casim															G			
1 133	64- 82	C 2CA															G			
1 134	82-146	C 3	57.9	26.0	16.1	1.5	7.2	12.0	23.3	13.9	15.3	10.7				41.6	A			

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON 6A1A -PERCENT--	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6F1B -PERCENT-	19-2 6E1B	EXT. IRON FE 6C2B PCT.	ATTERBERG L I M I T LL 4F1 PCT.	PL 4F2 NO.40	BULK DENSITY EST 1/3 4A1F	1/3 BAR 4A1P GRAMS PER CC	ORY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C ----PERCENT---	15 BAR 4B2	EXTENSBLTY LEF 4D1 -PERCENT--	LE 4D1	-----PH-------- H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
1 126	0- 4	0.37	0.044	1					1.69		0.97				3.3			8.2		7.1
1 127	4- 12	0.04	0.011	1						1.69 1.70	0.98		16.8	12.1	3.6	0.2	0.2	9.1		7.4
1 128	12- 18	0.26		4					1.44		0.88				5.7			9.0	10.0	8.0
1 129	18- 31	0.12		14						1.44 1.80	0.98		31.2	26.8	10.3	7.7	7.5	9.0	10.0	8.5
1 130	31- 42	0.08		10						1.39 1.75	0.98		33.8	28.3	14.6	8.0	7.8	8.8	9.9	8.2
1 131	42- 51	0.08		8						1.35 1.63	0.99		35.8	29.7	11.9	6.5	6.4	8.1	9.5	7.9
1 132	51- 64			61						2.19 2.23	1.00		8.0	7.4	5.1	0.6	0.6	9.0	10.0	8.0
1 133	64- 82			42					2.19		1.00				9.5			8.6	9.8	8.2
1 134	82-146			1						1.56 1.72	1.00		25.3	21.6	11.8	3.3	3.3	8.5	9.6	7.9

SAMPLE NO.	DEPTH CM.	----EXTRACTABLE BASES--- CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT. PCT.	--C E C-- NA- OAC 5A2A	NH4- OAC 5A6A	------WATER EXTRACT FROM SATURATED PASTE 8A1 ----- EC 8A1A	CA 6N1A	MG 6O1A	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G PCT.						-MEQ/100G		MMHO	MEQ/1000 ML								PPM	
1 126	0- 4	8.8	1.6	1.1	0.5	12.0	100+		7.5											
1 127	4- 12	11.5	1.1	2.6	1.0	16.2	100+		7.5											
1 128	12- 18	11.4	1.2	7.0	0.2	19.8	100+		8.6	7.5	1.4	0.5	63.7	0.3		4.8	63.7			8.3
1 129	18- 31	11.8	1.7	15.4	0.6	29.5	100+		11.0	8.8	0.7	0.3	88.9	0.2		6.3	68.9	11.7		8.8
1 130	31- 42	10.6	2.5	27.6	0.6	41.3	100+		17.3	15.4	2.0	1.1	147.0	0.3		5.3	110.0	31.2		8.7
1 131	42- 51	29.2	2.5	29.7	0.6	62.0	100+		18.0	23.7	25.7	4.4	214.0	0.4		5.7	164.0	50.0		8.5
1 132	51- 64	11.7	1.6	13.1	0.3	26.7	100+		8.4	20.8	4.0	1.2	212.0	0.3		4.4	164.0	25.2		8.6
1 133	64- 82	12.1	2.1	26.9	0.5	41.6	100+		14.9	21.0	7.6	2.0	208.0	0.3		3.8	155.0	57.2		8.5
1 134	82-146	5.6	1.9	30.5	0.5	38.5	100+		18.6	15.1	1.4	1.0	147.0	0.2		4.0	120.0	24.3		8.6

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT SAT. 8A PCT.	NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	-GYPSUM- AMT. 6F1B PCT.	REQ. 6P3A MEQ.	--LESS THAN 0.002 MM--- -X RAY-- I 7A2E	II 7A2E	III 7A2F	IV 7A2E	DTA 7A3 PCT.	-L.T. .0002 MM- -X RAY- I 7A2E	II 7A2E	III 7A2E	MINERAL CODE	RELATIVE AMOUNT
1 126	0- 4		1.1	15				MM 4	KK 2							MM MT/MICA	1 TRACE
1 127	4- 12		2.6	35				MI 3	KK 2							KK KAOLINIT	2 SMALL
1 128	12- 18	30.4	5.1	59	65		3.7										3 MODERATE
1 129	18- 31	68.8	9.3	84	100+		7.1	MT 5	MI 2							MI MICA	4 ABUNDANT
1 130	31- 42	82.6	15.5	89	100+		9.9									MT MONTMORT	5 DOMINANT
1 131	42- 51	70.7	14.6	81	55	1.6	8.5										6 INDETER.
1 132	51- 64	32.2	6.3	75	100+		4.2										
1 133	64- 82	68.1	12.7	86	95		8.3										
1 134	82-146	89.8	17.3	93	100+		11.6										

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
V=NOT WEIGHED. VALUE CALCULATED FROM A VOLUME ESTIMATE.
G=GROUND WHOLE. HORIZON INDURATED OR GRAVEL TOO SOFT TO BE SEPARATED. ALL DATA FOR WHOLE SOIL.

LA PALMA SANDY LOAM
S71Ariz-7-8(1-9)

Location: Maricopa County, Arizona. 770 feet east and 2050 feet north of SW corner of Sec. 12, T1N, R6W.
Date of Sampling: April 13, 1971.
Decription by: W. D. Nettleton, J. E. Jay, G. W. Hartman, R. G. Schurig, F. Cook. Collectors: W. D. Nettleton, J. E. Jay, G. W. Hartman, R. G. Schurig, F. Cook.
Classification: Petrocalcic Paleargid, coarse-loamy, mixed, hyperthermic.
Vegetation: Four-wing saltbush, cholla cactus, mesquite. Use: Desert range. Climate: Semi-arid. 7 inches precipitation. Mean annual air temperature, 70°F. Parent Material: Old alluvium from acid, basic and neutral igneous rocks. Elevation: 1200 feet. Topography: Nearly level valley plains. Slopes are less than 1 percent. Drainage: Well drained, slow permeability. Medium runoff. Soil Moisture: Dry when sampled.

HORIZON	DESCRIPTION
A11	0 to 4 cm (0 to 1½ inches), pale brown (10YR 6/3) sandy loam, dark brown (10YR 4/3)
RSL	moist; weak coarse platy structure; slightly hard, very friable, nonsticky, non-
71126	plastic; common very fine roots; common fine vesicular pores; noneffervescent; moderately alkaline (pH 8.2TB); abrupt smooth boundary.
A12	4 to 12 cm (1½ to 5 inches), brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3)
71127	fine roots; common fine tubular pores; weakly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.
B1tcasa	12 to 18 cm (5 to 7 inches), light reddish brown (5YR 6/3) gravelly sandy loam;
RSL	reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; very hard,
71128	very friable, nonsticky, slightly plastic; few fine, very fine and medium roots;

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Ustollic Paleargid, fine, mixed, thermic
SOIL White House gravelly loam (taxadjunct) SOIL Nos. S64Ariz-2-25 LOCATION Cochise County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 64648 - 64654

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (<0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 1A2a: >2 Pct.	2 – 19 Pct. of <76 mm	19 – 76 Pct. of <76 mm
		Pct. of <2 mm																
0–2	A1	61.7	25.2	13.1	6.0	8.5	8.3	21.7	17.2	16.6	8.6	47.3	44.5			34	24	10
2–8	B1t	47.0	22.5	30.5	4.9	6.8	5.7	15.8	13.8	14.1	8.4	38.1	33.2			64	19	45
8–17	B21t	21.7	15.7	62.6	3.2	3.6	2.4	6.3	6.2	9.0	6.7	19.2	15.5			16	12	4
17–22	B22t	14.1	11.8	74.1	2.1	2.8	1.8	3.8	3.6	6.3	5.5	12.1	10.5			29	17	12
22–31	B23tca	18.4	15.2	66.4	4.3	3.7	2.4	4.3	3.7	6.4	8.8	12.5	14.7			51	25	26
31–38	B3tca	25.4	17.2	57.4	8.5	5.5	3.1	4.8	3.5	6.6	10.6	12.6	21.9			66	46	20
38–53+	Cca	46.9	30.3	22.8	10.8	14.3	7.4	9.5	4.9	8.5	21.8	17.9	42.0			77	40	37
					/													

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ 1/ Pct.	3A1a Carbonate in <0.002 mm. Pct.	Bulk density 4A1f 1/3 bar g/cc	Bulk density 4A1h Oven dry g/cc	Atterberg limits: Plastic limit	Liquid limit	Plastic index (Pct. of <0.4 mm)	Water content 4B1c 1/3 bar Pct	Water content 4B2 15 bar Pct.	4D1 Extensibility COLEF in./in.	4D1 Extensibility COLE in./in.	3B2 Cm	pH 8C1a 1:1 H_2O	pH 8C1a 1:10 H_2O
0–2	0.57	0.055	10	1.4			1.49	1.53				15.2	5.7	0.010	0.008	0.78	5.9	6.2
2–8	0.95	0.092	10	1.8			1.34	1.40				17.7	9.9	0.016	0.008	0.53	6.7	6.9
8–17	0.91	0.097	9	1.0			1.28	1.54	24	75	51	33.8	20.5	0.062	0.056	0.92	7.4	7.6
17–22	0.57	0.071	8	2.7			1.25	1.50				37.4	24.7	0.063	0.052	0.84	7.6	8.2
22–31	0.46	0.047	10	2.3	6				28	84	56		21.3				7.9	8.6
31–38	0.29			2.1	28		1.35	1.47				27.7	21.4	0.027	0.013	0.50	7.9	8.8
38–53+	0.11			0.7	46	4	1.32	1.34	15	39	24	25.2	9.4	0.006	0.002	0.37	8.4	9.1

Depth (In.)	Extractable bases 5B1a: 6N2b Ca	602c Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum	Water extract from saturated paste 8A1: 6N1a Ca	601a Mg	6P1a Na	6Q1a K		6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter									mmho/cm
0–2	4.7	1.8	0.5	0.5	7.5	2.9	8.3				1.2	0.2						0.52
2–8	10.6	3.3	0.7	0.8	15.4	2.4	15.0				1.4	0.2						0.64
8–17	18.2	6.2	1.0	1.8	27.2		26.1				2.0	0.3						0.64
17–22	22.4	8.5	2.2	2.1	35.2		31.3				3.5	0.4						0.87
22–31	28.0	9.2	3.5	2.1	42.8		29.7		4.2	2.0	7.2	0.4		-	1.7	4.9		1.45
31–38	28.5	8.0	3.8	1.6	41.9		25.9		2.6	2.0	9.1	0.3		-	1.9	6.9		1.54
38–53+	20.2	3.3	2.7	0.5	26.7		11.0		2.6	1.3	21.1	0.2		-	2.1	7.8		1.54

Depth (In.)	8A Water at Saturation Pct.	5D2 Exchangeable Na Pct.	5B1b Exch. Na me / 100 g	SAR	Clay mineralogy (<0.002 mm.) X-ray 7A: Montmorillonite	Vermiculite	Illite	Kaolinite
0–2	31.3	6	0.5		tr.	-	xx	xx
2–8	44.2	4	0.6					
8–17	64.0	3	0.9					
17–22	71.2	6	2.0		x	-	xx	xx
22–31	69.5	10	3.0	4	x	-	xx	xx
31–38	68.4	12	3.2	6				
38–53+	40.9	16	1.8	15	x	-	xxx	x

1/ In percent of whole soil including >2 mm.

x – detected
xx – moderate
xxx – abundant
xxxx – dominant

WHITE HOUSE GRAVELLY LOAM (taxadjunct) 1/
S64Ariz-2-25

Location: Cochise County, Arizona. 15 miles south and 22-1/2 miles east of Willcox, Arizona via State Highway 186. 1180 feet north and 130 feet west of the south 1/4 corner of Sec. 13, T. 16 S., R. 28 E. Date of Sampling: October 22, 1964.
Description by: James Jay and M. L. Richardson. Collectors: K. W. Flach, B. Brasher, M. L. Richardson, James Jay, and R. K. Preece.
Classification: Ustollic Paleargid, fine, mixed, thermic.
Vegetation: Grassland. Fair cover of black, blue, and hairy gramas. Climate: Precipitation 14 -15 inches annual. Mean annual temperature 57° F. (Chiricahua National Monument) Soil temperature at time of sampling: 24 inches 70° F., 48 inches 72° F. Parent Material: Old alluvium from ignimbrite, andesite and quartzite. Topography: Nearly level old valley terrace remnant, or old fan, from the Chiricahua Mountains. Slope is slightly convex with a 2 percent gradient to west southwest. Elevation: 4950 feet. Drainage: Well drained. Moderate surface runoff. Slowly permeable. Soil Moisture: Slightly moist - about 25 percent of field capacity. Water table 150-300 feet. Remarks: Colors of the B horizons are somewhat redder than normal. Compare with samples S64Ariz-2-28 and 29. Field determinations of pH by Hellige-Truog indicator.

HORIZON	DESCRIPTION
A1 RSL No. 64648	0-2 inches (0-5 cm), reddish brown (5YR 5/4) gravelly light loam, dark reddish brown (5YR 3/4) when moist; moderate medium platy breaking to moderate fine granular structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; many fine and very fine roots; few fine tubular and many fine interstitial pores; 20-30 percent gravel; pH 6.0; abrupt smooth boundary.
B1t RSL No. 64649	2-8 inches (5-20 cm), red (2.5YR 4/6) very gravelly heavy clay loam, dark reddish brown (2.5YR 3/4) when moist; moderate medium angular and subangular blocky structure; hard when dry, firm when moist, sticky and plastic when wet; fine and very fine roots; few fine tubular and many fine interstitial pores; few thin clay films on ped faces; 50-60 percent fine to coarse gravel; pH 6.5; clear smooth boundary.
B21t RSL No. 64650	8-17 inches (20-43 cm), red (2.5YR 4/6) clay, dark red (2.5YR 3/6) when moist; moderate medium prismatic breaking to moderate medium and fine angular blocky structure; very hard when dry, friable when moist, sticky and very plastic when wet; many exped pores; thin continuous clay films on ped faces and in pores, that are dark red (10YR 3/6) dry and moist; 5-10 percent gravel and a few cobble; pH 7.0 to 7.5; gradual smooth boundary.
B22t RSL No. 64651	17-22 inches (43-56 cm), red (10R 4/6) gravelly clay. with clay films dark red (10R 3/6) both dry and moist; moderate medium and coarse prismatic breaking to moderate fine and medium angular blocky structure; very hard when dry, friable when moist, sticky and very plastic when wet; roots, pores and clay films as in B21t; 20 percent gravel; pH 8.0; gradual smooth boundary.
B23tca RSL No. 64652	22-31 inches (56-79 cm), dark red (2.5YR 3/6) dry, moist, and crushed; gravelly clay; moderate fine and medium subangular blocky structure; very hard when dry, friable when moist, sticky and plastic when wet; common fine and very fine roots; few fine tubular and exped interstitial pores; few thin clay skins on ped faces in pores, bridges; 30 percent gravel and few cobble; slight effervescence in matrix and strong effervescence in spots; pH 8.2; gradual smooth boundary.
B3tca RSL No. 64653	31-38 inches (79-97 cm), red (2.5YR 4/6) with common medium faint lime mottles of pink (5YR 7/4) gravelly clay, dark red (2.5YR 3/6) and light reddish brown (5YR 6/4 when moist; massive, breaking to moderate fine and medium subangular blocky structure; very hard when dry, friable when moist, sticky and plastic when wet; few thin clay films on ped faces and in pores; 30-40 percent fine, medium and coarse gravel; slightly effervescent in matrix and strong in mottles and common thin lime coatings on gravel; pH 8.2; clear smooth boundary.
Cca RSL No. 64654	38-53 inches (97-135 cm), pink (5YR 8/2) with many fine and medium distinct mottles and iron stains of red (2.5YR 5/6) very gravelly loam, reddish yellow (5YR 6/6) and red (2.5YR 4/6) when moist; massive; extremely hard with weak cementation of lime, iron and silica; very firm when moist; slightly sticky and nonplastic when wet; few moderately thick clay films on gravel and as bridges; 60-70 percent gravel; strong effervescence in matrix and violent effervescence in mottles and thin lime coatings on gravels; pH 8.2.

1/ The White House series is in a fine, mixed, thermic family of Ustollic Haplargids. This pedon has an argillic horizon with an abrupt upper boundary.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Ustollic Paleargid, fine, montmorillonitic, mesic

SOIL Showlow loam (taxadjunct) SOIL Nos. S56Ariz-9-28 LOCATION Navajo County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 56173 - 56180

Depth (In.)	Horizon	1B1b Total Sand (2–0 05)	Silt (0 05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0 02–0.002)	Int II (0.2–0 02)	(2–0 1)	3A1a Carbonate clay	3A1a Non carbonate clay	1/ Coarse fragments 2A2: > 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0–2	A1	62.1	19.4	18.5	6.6	14.1	13.0	19.9	8.5	10.9	8.5	30.2	53.6			36		
2–6	B21t	45.9	16.6	37.5	4.3	9.2	10.6	15.6	6.2	8.5	8.1	23.0	39.7			20		
6–14	B22t	35.4	11.0	53.6	5.9	8.7	7.6	9.9	3.3	5.0	6.0	13.4	32.1			8		
14–20	B23t	55.9	9.8	34.3	14.8	14.9	10.5	12.4	3.3	3.9	5.9	13.5	52.6			34		
20–27	B24t	52.0	8.1	39.9	7.2	13.7	11.4	14.7	5.0	3.1	5.0	16.0	47.0			11		
27–33	B31	56.2	9.4	34.4	9.7	17.0	11.9	12.8	4.8	3.6	5.8	15.3	51.4			16		
33–46	B32ca	61.3	7.5	31.2	7.1	14.9	15.2	18.2	5.9	2.0	5.5	17.2	55.4			10		
46–55	C1	71.5	5.7	22.8	13.2	19.5	16.6	17.4	4.8	2.2	3.5	15.4	66.7			19		

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C1b Free Fe_2O_3	6E1b Carbonate as $CaCO_3$	Bulk density: 4A1f 1/3 bar	4A1h Oven dry		3B2	Water content:	4B1c 1/3 bar	4B2 15 bar	4D1	4D1	pH: 8C1b	8C1a	8C1a
													Extensibility LEf	Extensibility LE	Saturated Paste	H_2O 1:1	H_2O 1:10
	Pct	Pct		Pct.	Pct.	g/cc	g/cc	g/cc	Cm	Pct	Pct	Pct	Pct	Pct.			

SHOWLOW LOAM (taxadjunct) 1/
56Ariz-9-28-1 through 8

Location: Navajo County, Arizona near the E ¼ corner of Sec. 7, T 11 N, R 19 E or about 2.1 miles west of Cottonwood Wash on State Hwy. 160 about 300 feet north of highway. Date of Sampling: May 16, 1956. Collectors: J. D. Freeman, M. S. James, Gerald Kester, W. G. Harper, R. E. Nelson and George Wendt. Vegetation: Blue grama, pinon, ponderosa, juniper and oaks. Climate: Estimated about 18 inches precipitation. Nearest weather station (Pinedale): Mean annual temperature 48.9° F.; January average 29.4° F.; July average 69.4° F.; mean annual precipitation 18.84 inches. Parent Material: Tertiary or Quaternary alluvium high in quartzite pebbles but also containing sandstone, limestone and other rock material. Relief: On an undulating old valley plain. Slope 3 percent to the northeast. Elevation: 6,400 feet. Drainage: Well drained. Runoff is rapid; permeability very slow through the B horizon.
Remarks: Occasional rounded pebbles ranging up to 2 inches in diameter occur on the surface and form a slight gravel pavement in places. Many tongues of B24 and B3 material continue into the B32ca horizon.
Classification: Ustollic Paleargid, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 56173	0-2" -- Very dark grayish brown (10YR 3/2) dry, very dark brown (2/2) moist; loam; moderate very fine crumb or very fine granular; soft when dry, loose to very friable when moist, nonsticky and nonplastic when wet; many grass roots; moderately permeable; noncalcareous; pH 8; abrupt, smooth lower boundary.
B21t RSL No. 56174	2-6" -- Dark reddish gray (5YR 4/2) dry, dark reddish brown (3/3) moist; clay; strong coarse to medium subangular blocky; very hard when dry, very firm when moist, very sticky and very plastic when wet; many tree roots; slowly permeable; noncalcareous; pH 6.5; clear, smooth lower boundary.
B22t RSL No. 56175	6-14" -- Reddish brown (2.5YR 4/4) dry, (4/4) moist; clay; moderate medium to coarse prisms that break to strong coarse subangular blocky; many clay films and slickensides throughout; extremely hard when dry, extremely firm when moist, very plastic and very sticky when wet; tree roots common; very slowly permeable; noncalcareous; pH 6; clear, wavy lower boundary.
B23t RSL No. 56176	14-20" -- Reddish brown (2.5YR 5/4) dry and moist; clay with many rounded pebbles; very weak medium to coarse prisms that break to weak medium to coarse subangular blocky; many clay films on the faces of aggregates are reddish brown (2.5YR 4/4) dry and moist; extremely hard when dry, extremely firm when moist, very sticky and very plastic when wet; tree roots common; very slowly permeable; noncalcareous; pH 6.8; clear, wavy lower boundary.
B24t RSL No. 56177	20-27" -- Reddish brown (2.5YR 4/4) dry, (4.5/4) moist; clay; very weak medium to coarse prisms that break to weak coarse to medium angular blocky; many clay films on the faces of peds; many slickensides; the faces of aggregates are reddish brown (2.5YR 4/4) moist; extremely hard when dry, extremely firm when moist, very sticky and very plastic when wet; tree roots common; very slowly permeable; noncalcareous; pH 7.2; clear, wavy lower boundary.
B31 RSL No. 56178	27-33" -- Reddish brown (2.5YR 5/4) dry, (4.5/4) moist; heavy sandy clay loam; massive; very hard when dry, very firm when moist, sticky when wet; few tree roots; very slowly permeable; calcareous; pH 8; clear, wavy lower boundary.
B32ca RSL No. 56179	33-46" -- Reddish brown (5YR 5/4) dry, (4/4) moist; sandy clay loam; massive and compact; very hard when dry, very firm when moist, slightly sticky and very plastic when wet; very few plant roots; slowly permeable; slightly calcareous where lime specks are apparent; gradual, wavy lower boundary.
C1 RSL No. 56180	46-55" -- Light reddish brown (5YR 6/4) dry, reddish brown (5/5) moist; sandy clay loam; massive and compact; hard when dry, slightly firm when moist, slightly sticky and plastic when wet; very few plant roots; slowly permeable; slightly calcareous in a few small spots where lime is apparent; pH 7.8.

1/ The Showlow series is in a fine, montmorillonitic, mesic family of Ustollic Haplargids. This pedon has an argillic horizon that has an abrupt upper boundary.

CONSECUTIVE PEDON NUMBER C 71 8 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES GUNSIGHT SOIL NO. S71 ARIZ. 10- 1 SAMPLE NO. 1 48-1 53 ORGAN PIPE MON AREA

SOIL FAMILY: TYPIC CALCIORTHID,LOAMY-SKELETAL,MXD,HYPRTHRMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.		DEPTH CM.		HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	SILTS-- CO. 2- .2U	CLAYS----- FINE LT .2U	CARBO NATE 3A1A	1A2A INT. COARSE FRAGMENTS- II .2- .02	PCT. OF WHOLE SOIL 75- 20	I 20-5	II 5-2	III
					PERCENT OF LESS THAN 2MM															PCT. OF LT 75		
1	48	0-	5	A1	64.0	30.9	5.1	18.8	7.4	3.4	10.1	24.3	22.3	8.6	3.6	1.5		54.0	37A	3	19	15
1	49	5-	17	B21	60.6	32.2	7.2	15.2	7.4	3.6	10.3	24.1	22.3	9.9	5.2	2.0		54.0	37A	5	19	14
1	50	17-	31	B22	61.0	29.9	9.1	18.8	7.6	3.4	9.5	21.7	19.3	10.6	6.1	3.0		48.0	37A	5	17	15
1	51	31-	58	C 1CA	56.0	32.0	12.0	22.2	9.6	4.1	8.2	11.9	13.6	18.4			4	30.7	58A	20	22	16
1	52	58-	77	C 2CA	64.5	22.2	13.3	32.3	11.7	4.3	6.4	9.8	11.1	11.1			2	24.7	72*	27	23	19
1	53	77-	119	C 3CA	71.3	15.2	13.5	32.6	15.0	6.7	6.9	10.1	7.3	7.9			1	21.0	75*	23	32	19

SAMPLE NO.		DEPTH CM.		ORG. CAR- BON 6A1A	MATTER NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L I M I T LL 4F1	PL 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
				-PERCENT--		-PERCENT-		PCT.	PCT.	NO.40	GRAMS PER CC				----PERCENT---			-PERCENT--				
1	48	0-	5	0.16	0.024	2		0.5			1.36			0.76			4.4			8.4		7.7
1	49	5-	17	0.17	0.024	5		0.5				1.36	1.37	0.77	24.5	16.3	5.3	0.2	0.2	8.5		7.8
1	50	17-	31	0.17		6		0.4				1.26	1.28	0.78	25.5	15.4	5.8	0.5	0.4	8.5		7.7
1	51	31-	58			39		0.3				1.19	1.21	0.62	40.4	30.8	6.5	0.6	0.3	8.3	9.1	7.9
1	52	58-	77			17		0.3				1.13	1.17	0.48	37.3	30.4	8.8	1.2	0.6	8.1	8.7	8.0
1	53	77-	119			11		0.3				1.07	1.12	0.45	39.6	30.8	7.8	1.5	0.7	8.1	8.8	7.9

SAMPLE NO.		DEPTH CM.		EXTRACTABLE BASES--- CA 5B4A 6N2E	MG 5B4A 6G2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	--C E C-- NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1A	MG 6G1A	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	8A1 SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
				MEQ/100G					PCT.	-MEQ/100G		MMHO	MEQ/1000 ML								PPM	
1	48	0-	5	17.6	1.5	0.1	1.4	20.6	100+		8.7											
1	49	5-	17	18.6	1.2	0.1	0.6	20.5	100+		8.5											
1	50	17-	31	18.9	1.4	0.2	0.3	20.8	100+		8.9											
1	51	31-	58	16.7	1.3	2.0	0.2	20.2	100+		5.1	4.99	12.2	2.6	32.3	0.2		1.7	42.9			8.2
1	52	58-	77	26.1	3.3	6.9	0.3	36.6	100+		6.0	15.4	44.8	14.5	110.0	0.3		2.7	131.0	43.0		7.8
1	53	77-	119	21.8	3.1	6.2	0.4	31.5	100+		6.2	14.0	37.5	15.2	103.0	0.6		1.1	108.0	47.4		7.2

SAMPLE NO.		DEPTH CM.		WATER EXCHANGBLE AT SAT. 8A	NA 5B4B	NA 5D2	SAR 5E	-GYPSUM- AMT. 6F1B	REQ. 6P3A	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY DTA 7A2E I	7A2E II	7A2E III	7A3 IV	-L.T. .0002 MM- X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
				PCT.	MEQ.	PCT.		PCT.	MEQ.									
1	48	0-	5		0.1	1				MT 4	MI 3	KK 1					MT MONTMORT	1 TRACE
1	49	5-	17		0.1	1				MT 4	MI 3	KK 1					MI MICA	2 SMALL
1	50	17-	31		0.2	2											KK KAOLINIT	3 MODERATE
1	51	31-	58	43.6	0.6	12	12			MI 4	MT 1	KK 1						4 ABUNDANT
1	52	58-	77	47.6	1.7	28	20	0.3										5 DOMINANT
1	53	77-	119	47.9	1.3	20	20	0.3										6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
*=THE 75-250MM FRACTION IS INCLUDED.

GUNSIGHT GRAVELLY SANDY LOAM
S71 Ariz-10-1-(1-7*)

Location: Pima County, Arizona. 3/16 mile west and 1/8 mile north of southeast corner, Section 31, T17S, R5W, Organ Pipe Cactus National Monument. Date of Sampling: April 5, 1971.
Description by: Y.H. Havens, E.Chamberlin. Collectors: K. Flach, E. Chamberlin, K. Vogt.
Classification: Typic Calciorthid, loamy-skeletal, mixed, hyperthermic.
Vegetation: Creosotebush, saguaro and cholla cacti, mesquite, paloverde, ironwood and triangle bursage. Use: Desert rangeland. Climate: Mean annual precipitation 9 inches. Mean annual air temperature 69° F. Parent Material: Mixed alluvium--dominantly quartzite, granite, schist and basic igneous rocks. Topography: Nearly level to gently sloping with slope of 1 percent. Elevation: 1450 feet. Drainage: Well drained with moderate permeability. Soil Moisture: Dry.
Remarks: 80 percent of surface covered with fine to coarse subangular gravel.

HORIZON	DESCRIPTION
A1 RSL 7148	0 to 5 cm (0 to 2 inches), light brown (7.5YR 6/4) gravelly fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium platy structure; slightly hard, very friable, nonsticky, slightly plastic; few very fine roots; few fine and medium tubular pores; 50 percent gravel; slightly effervescent; moderately alkaline (pH 8.1 thymol blue); abrupt wavy boundary.
B21 RSL 7149	5 to 18 cm (2 to 7 inches), light brown (7.5YR 6/4) very gravelly fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; common very fine and few medium roots; few fine tubular pores; 55 percent gravel; strongly effervescent; moderately alkaline (pH 8.1); clear wavy boundary.
B22 RSL 7150	18 to 30 cm (7 to 12 inches), light brown (7.5YR 6/4) gravelly light loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and common medium roots; few fine tubular pores; 45 percent gravel; violently effervescent; common fine pink (7.5YR 8/4) filaments of lime; moderately alkaline (pH 8.2); abrupt irregular boundary.
C1ca RSL 7151	30 to 58 cm (12 to 23 inches), pinkish white (7.5YR 8/2) and pink (7.5YR 8/4) very gravelly light loam, brown (7.5YR 5/4) and light brown(7.5YR 6/4) moist; massive; hard and very hard, friable, slightly sticky, plastic; common very fine, fine and medium roots; few fine tubular and common fine interstitial pores; 60 percent gravel; 15 to 20 percent of horizon consists of krotovinas filled with soil materials from A and B horizons; krotovinas are 3 to 6 feet apart and up to 12 inches in diameter; violently effervescent; space between gravel is completely filled with limy soil material; moderately alkaline (pH 8.2); clear irregular boundary.
C2ca RSL 7152	58 to 76 cm (23 to 30 inches),pinkish white (7.5YR 8/2) and pink (7.5YR 8/4) very gravelly sandy loam, brown (7.5YR 5/4) and light brown (7.5YR 6/4) moist; massive; hard, friable, slightly sticky, plastic; common very fine roots; few fine tubular and common fine interstitial pores; 60 to 70 percent gravel; 15 to 20 percent of horizon consists of krotovinas filled with soil materials from A and B horizons, krotovinas are 3 to 6 feet apart and up to 12 inches in diameter; violently effervescent; moderately alkaline (pH 8.3); clear wavy boundary.
C3ca RSL 7153	76 to 119 cm (30 to 47 inches), light brown (7.5YR 6/4) very gravelly loam, brown (7.5YR 5/4) moist; massive; very hard, friable, slightly sticky, plastic; few very fine roots; many fine interstitial pores; 60 percent gravel; violently effervescent; many medium and coarse pinkish white (7.5YR 8/2) hard lime masses, pink (7.5YR 7/4) moist; moderately alkaline (pH 8.3); clear wavy boundary.
*C4- RSL	119 to 152 cm (47 to 60 inches), light brown (7.5YR 6/4) very gravelly sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, slightly sticky

CONSECUTIVE PEDON NUMBER C 71 9 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES GUNSIGHT SOIL NO. S71 ARIZ. 10- 9 SAMPLE NO. 1 54-1 58 ORGAN PIPE MON AREA

SOIL FAMILY: TYPIC CALCIORTHID,LOAMY-SKELETAL,MXD,HYPRTHRMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.		DEPTH CM.		HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	SILTS-- CO. .2U	CLAYS---- FINE .2U	CARBO NATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS- PCT. OF WHOLE SOIL	I 75-20	II 20-5	III 5-2
					PERCENT OF LESS THAN 2MM															PCT. OF LT 75		
1	54	0-	5	A1	57.3	35.7	7.0	11.2	6.7	4.2	10.5	24.7	24.4	11.3				55.9	51A	10	31	10
1	55	5-	25	B2	55.9	36.7	7.4	14.4	7.7	4.1	9.2	20.5	23.0	13.7			TR	49.5	43A	9	21	12
1	56	25-	46	C 1CA	52.7	35.2	12.1	21.8	7.6	3.3	7.5	12.5	16.8	18.4			3	33.8	62*	27	21	14
1	57	46-	81	C 2CA	58.7	25.7	15.6	29.9	10.1	3.8	6.7	8.2	11.0	14.7			3	22.8	69*	24	28	17
1	58	81-	140	C 3CA	43.5	42.4	14.1	6.8	9.2	4.6	7.7	15.2	19.7	22.7			2	39.6	43*	6	26	9

SAMPLE NO.		DEPTH CM.		ORG. CAR-BON 6A1A	MATTER NITRO-GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	I M I T P L 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
				PERCENT		PERCENT		PCT.	PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT				
1	54	0-	5	0.15	0.022	3		0.6			1.02			0.71			5.7			8.5		7.7
1	55	5-	25	0.16	0.022	12		0.4				1.02	1.03	0.78	41.5	27.4	5.3	0.3	0.3	8.5		7.7
1	56	25-	46	0.21		33		0.3				1.06	1.08	0.60	47.5	41.0	7.4	0.6	0.4	8.4	9.4	7.9
1	57	46-	81			21						1.20	1.24	0.50	37.3	27.8	8.4	1.1	0.5	8.0	8.7	7.9
1	58	81-	140			27						1.12	1.19	0.76	41.4	29.0	11.6	2.0	1.5	8.0	8.7	7.9

SAMPLE NO.		DEPTH CM.		EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6D2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1A	MG 6O1A	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
				MEQ/100G				PCT.		MMHO	MEQ/1000 ML									PPM	
1	54	0-	5	20.0	1.9	0.1	0.9	22.9	100+		12.3										
1	55	5-	25	21.2	1.6	0.4	0.6	23.8	100+		11.3										
1	56	25-	46	18.8	1.1	5.9	0.2	26.0	100+		9.6	7.4	6.4	1.6	61.2	0.2		2.4	62.2			8.0
1	57	46-	81	21.5	2.0	8.9	0.4	32.8	100+		10.4	13.3	35.8	7.8	100.0	0.2		3.4	104.0	33.0		7.7
1	58	81-	140	29.5	3.6	10.4	0.5	44.0	100+		12.4	15.2	40.5	11.7	113.0	0.2		4.7	117.0	43.0		7.6

SAMPLE NO.		DEPTH CM.		WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM- AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY I 7A2E	II 7A2E	III 7A2E	IV 7A2E	DTA 7A3 PCT.	-L.T. .0002 MM- X RAY I 7A2E	II 7A2E	III 7A2E
1	54	0-	5		0.1	1				MI	3	MT	2	KK	1		
1	55	5-	25		0.4	4				MI	4	MT	3	KK	1		
1	56	25-	46	46.7	3.0	32	31										
1	57	46-	81	53.5	3.5	34	21		7.3	MI	5	MT	3	KK	1		
1	58	81-	140	61.3	3.5	28	22										

MINERAL CODE: MI MICA, MT MONTMORT, KK KAOLINIT

RELATIVE AMOUNT: 1 TRACE, 2 SMALL, 3 MODERATE, 4 ABUNDANT, 5 DOMINANT, 6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
*=THE 75-250MM FRACTION IS INCLUDED.

GUNSIGHT VERY GRAVELLY LOAM

S71 Ariz-10-9-(1-5*)

Location: Pima County, Arizona. ½ mile south and ¼ mile east of the northeast corner Section 2, T18S, R5W, Organ Pipe Cactus National Monument. Date of Sampling: April 8, 1971.
Description by: Y. H. Havens, E. Chamberlin. Collectors: K. Flach, K. Vogt, E. Chamberlin.
Classification: Typic Calciorthid, loamy-skeletal, mixed, hyperthermic.
Vegetation: Creosotebush, cholla cactus, ocotillo and sixweeks grama. Use: Desert rangeland. Climate: Mean annual precipitation 7 to 9 inches. Mean annual temperature 69° F. Parent Material: Mixed alluvium from basalt, andesitic and rhyolitic tuff and schist. Topography: Gently sloping, with 1 to 2 percent slope. Elevation: 1490 feet. Drainage: Well drained with moderate permeability. Soil Moisture: Dry.
Remarks: 50 to 60 percent of surface covered with gravel.

HORIZON	DESCRIPTION
A1 RSL 7154	0 to 5 cm (0 to 2 inches), light brown (7.5YR 6/4) very gravelly loam, dark brown (7.5YR 4/4) moist; weak medium platy structure; slightly hard, very friable, nonsticky, slightly plastic; few very fine roots; many very fine and fine interstitial pores; 50 percent gravel by volume; strongly effervescent; moderately alkaline (pH 8.2 thymol blue); abrupt smooth boundary.
B2 RSL 7155	5 to 25 cm (2 to 10 inches), pink (7.5YR 7/4) very gravelly loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, nonsticky, slightly plastic; few fine and medium roots; violently effervescent; few fine pinkish white (7.5YR 8/2) lime filaments; moderately alkaline (pH 8.3); clear wavy boundary.
C1ca RSL 7156	25 to 46 cm (10 to 18 inches), white (N/8) and pinkish gray (7.5YR 7/2) very gravelly loam, pinkish gray (7.5YR 7/2) and brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky, slightly plastic; few fine and medium roots; common very fine interstitial pores; 70 percent gravel; violently effervescent; many large pinkish white (7.5YR 8/2) hard lime masses and all gravel is coated with lime; strongly alkaline (pH 8.5); gradual wavy boundary.
C2ca RSL 7157	46 to 81 cm (18 to 32 inches), pinkish white (7.5YR 8/2), pinkish gray (7.5YR 7/2) and pink (7.5YR 7/4) very gravelly sandy loam, pinkish gray (7.5YR 7/2) and brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky, plastic; few very fine roots; common very fine interstitial and few fine tubular pores; 75 percent gravel; violently effervescent; many large pinkish white (7.5YR 8/2) hard lime masses, and all gravel is coated with lime; moderately alkaline (pH 8.3); gradual wavy boundary.
C3ca RSL 7158	81 to 140 cm (32 to 55 inches), pinkish white (7.5YR 8/2), pinkish gray (7.5YR 7/2) and pink (7.5YR 7/4) very gravelly loam, pinkish gray (7.5YR 7/2) and brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky, plastic; common very fine interstitial and few fine tubular pores; 40 percent gravel; violently effervescent; many large hard pinkish white (7.5YR 8/2) lime masses and all gravel is coated with lime; moderately alkaline (pH 8.3).

CONSECUTIVE PEDON NUMBER C 71 5 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES HARQUA TAXADJUNCT SOIL NO. S71 ARIZ. 10- 5 SAMPLE NO. 1 26-1 32 ORGAN PIPE MON AREA

SOIL FAMILY: TYPIC CALCIORTHID,LOAMY-SKELETAL,MXD,HYPRTHRMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1

SAMPLE NO.		DEPTH CM.		HORZ.	TOTAL SAND 2-.05	FRACTION SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2- .2U	FINE LT .2U	CARBONATE 3A1A	INT. II .2-.02	1A2A COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75-20	II 20-5	III 5-2
					PERCENT OF LESS THAN 2MM															PCT. OF LT 75			
1	26	0-	3	A2	29.1	56.0	14.9	2.4	1.8	1.2	5.1	18.6	23.9	32.1	14.0	0.9		46.4	20A	7	11	2
1	27	3-	8	B2tsa	40.1	45.2	14.7	7.5	5.4	2.5	7.6	17.1	18.9	26.3	13.2	1.5		41.6	31A	6	17	7
1	28	8-	23	B31casa	51.7	34.5	13.8	14.9	6.0	2.5	7.9	20.4	17.9	16.6	10.3	3.5	TR	44.2	45A	17	18	10
1	29	23-	36	B32casa															61A	27	21	13
1	30	36-	48	C1casa															74A	37	23	14
1	31	48-	68	C2casa															63A	10	29	23
1	32	68-	132	C3casa															62A	9	30	23

SAMPLE NO.		DEPTH CM.		ORG.MATTER CAR- BON	NITRO GEN	CARBONATE AS CACO3	EXT. IRON	ATTERBERG L I M I T	BULK DENSITY EST 1/3 BAR	DRY	CM WATER CONTENT 1/10 BAR	1/3 BAR	15 BAR	EXTENSBLTY LEF	LE	PH H2O	H2O	CACL2
				6A1A	6B1A	6E1B	6E1B	6C2B	4F1	4F2	4A1F	4A1F	4A1H	3B2	4B1C	4B1C	4B2	4D1	4D1	8C1A	8C1A	8C1E
				-PERCENT--		-PERCENT-		PCT.	PCT.	NO.40	GRAMS PER CC				----PERCENT---			-PERCENT--				
1	26	0-	3	0.05	0.013	TR						1.44	1.52	0.88	19.1	16.2	7.2	1.8	1.6	8.4	9.0	7.6
1	27	3-	8	0.07	0.016	4					1.44			0.81			10.2			8.1	9.2	8.1
1	28	8-	23	0.12		8						1.23	1.27	0.72	34.3	21.2	7.0	1.1	0.8	7.9	8.5	7.9
1	29	23-	36			19								0.77			8.5	0.6	0.5	7.8		7.8
1	30	36-	48			29						0.75	0.78	0.55	70.6	55.5	7.8	1.3	0.7	7.8		7.8
1	31	48-	68			30						0.85	0.90	0.65	54.7	49.5	8.9	1.9	1.2	7.7		7.8
1	32	68-	132			25						1.07	1.12	0.60	35.4	30.1	10.0	1.5	0.9	7.8		7.8

SAMPLE NO.		DEPTH CM.		EXTRACTABLE BASES CA	MG	NA	K	SUM	BASE SAT.	C E C NA+ OAC	NH4+ OAC	EC	WATER EXTRACT FROM SATURATED PASTE CA	MG	NA	K	CO3	HCO3	CL	8A1 SO4	B	PH SAT. PASTE
				6B4A	6B4A	6B4A	6B4A			5A2A	5A6A	8A1A	6N1A	6O1A	6P1A	6Q1A	6I1A	6J1A	6K1A	6L1B	6T1A	8C1B
				6N2E	6O2D	6P2A	6Q2A			-MEQ/100G		MMHO	----------MEQ/1000 ML----------								PPM	
				-------MEQ/100G--------					PCT.													
1	26	0-	3	11.4	2.8	4.8	1.4	20.4	100+		17.4	4.36	3.4	1.0	37.9	0.4		2.9	31.5		0.8	7.6
1	27	3-	8	21.4	3.6	13.4	1.2	39.6	100+		23.9	22.2	38.4	8.9	183.0	0.9		2.9	191.0	9.0	0.3	7.6
1	28	8-	23	19.5	4.5	12.3	0.6	36.9	100+		12.0	36.8	142.3	44.3	246.0	0.6		3.3	353.0	27.5	5.4	7.5
1	29	23-	36	27.1	5.2	11.9	0.4	44.6	100+		9.0											
1	30	36-	48	30.1	5.5	11.2	0.3	47.1	100+		7.2											
1	31	48-	68	25.4	5.2	12.8	0.3	43.7	100+		7.3											
1	32	68-	132	22.7	5.5	14.3	0.3	42.8	100+		8.3											

SAMPLE NO.		DEPTH CM.		WATER EXCHANGBLE AT SAT. 8A PCT.	NA 5B4B MEQ.	NA 5B2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY --LESS THAN 0.002 MM---- X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	DTA IV 7A2E	DTA PCT. 7A3	-L.T. .0002 MM- X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	MINERALOGY MINERAL CODE	RELATIVE AMOUNT
1	26	0-	3	27.5	3.8	22	26		2.6						MI 3	MT 2			1 TRACE
1	27	3-	8	39.8	6.1	26	38		3.8						MI 3			MI MICA	2 SMALL
1	28	8-	23	41.7	2.1	17	25	0.1							MI 5			MT MONTMORT	3 MODERATE
1	29	23-	36		11.9	100+													4 ABUNDANT
1	30	36-	48		11.2	100+													5 DOMINANT
1	31	48-	68		12.8	100+													6 INDETER.
1	32	68-	132		14.3	100+													

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

HARQUA VERY GRAVELLY LOAM (taxadjunct) 1/

S71 Ariz-10-5-(1-7*)

Location: Pima County, Arizona. 3/16 mile west and 1/16 mile north of the southeast corner of Section 31, T17S, R5W, Organ Pipe Cactus National Monument. Date of Sampling: April 7,1971. Description by: Y. H. Havens, E. Chamberlin. Collectors: K. Flach, E.Chamberlin, K. Vogt. Classification: Typic Calciorthid, loamy-skeletal, mixed, hyperthermic. Vegetation: Creosotebush and turks-head. Use: Desert rangeland. Climate: Mean annual precipitation 8 to 10 inches. Mean annual air temperature 69° F. Parent Material: Mixed alluvium from schist, granite, quartzite and basic igneous rocks. Topography: Nearly level with less than 1 percent slope. Elevation: 1450 feet. Drainage: Well drained with moderately slow permeability. Soil Moisture: Dry.
Remarks: 80 percent of surface covered with fine, medium and coarse subrounded gravel.

HORIZON	DESCRIPTION
A2 RSL 7126	0 to 3 cm (0 to 1 inch), pink (7.5YR 7/4) very gravelly loam, brown (7.5YR 5/4) moist; weak medium platy structure; slightly hard, very friable, slightly sticky, slightly plastic; many very fine and fine vesicular pores; 60 percent gravel by volume; slightly effervescent; moderately alkaline (pH 8.2 thymol blue); abrupt smooth boundary.
B2tsa RSL 7127	3 to 8 cm (1 to 3 inches), yellowish red (5YR 5/6) gravelly light clay loam, yellowish red (5YR 4/6) moist; weak medium prismatic parting to moderate fine and medium subangular and angular blocky structure; hard, friable, sticky, plastic; common fine tubular pores; few thin clay films on faces of peds and in pores; 20 percent gravel; slightly effervescent; moderately alkaline (pH 8.2); clear wavy boundary.
B31casa RSL 7128	8 to 23 cm (3 to 9 inches), light brown (7.5YR 6/4) gravelly loam, strong brown (7.5YR 5/6) moist; massive; soft, friable, slightly sticky, slightly plastic; few very fine roots; many very fine vesicular pores; 30 percent gravel; strongly effervescent; most of gravel have pinkish white (7.5YR 8/2) lime coating, pinkish gray (7.5YR 7/2) moist; moderately alkaline (pH 8.2); clear wavy boundary.
B32casa RSL 7129	23 to 36 cm (9 to 14 inches), pinkish white (7.5YR 8/2) and pink (7.5YR 7/4) very gravelly loam, pinkish gray (7.5YR 7/2) and light brown (7.5YR 6/4) moist; massive; slightly hard, friable, slightly sticky, plastic; common fine interstitial pores; 55 percent gravel; violently effervescent; all gravel have pinkish white (7.5YR 8/2) lime coating, pinkish gray (7.5YR 7/2) moist; many pinkish white (7.5YR 8/2) slightly hard lime masses; moderately alkaline (pH 8.2); clear wavy boundary.
C1casa RSL 7130	36 to 48 cm (14 to 19 inches), pinkish white (7.5YR 8/2) and pink (7.5YR 8/4) very gravelly loam, pinkish gray (7.5YR 7/2) and pink (7.5YR 7/4) moist; massive; very hard, friable, slightly sticky, plastic; common fine interstitial pores; 70 percent gravel weakly cemented; violently effervescent; many pinkish white (7.5YR 8/2) and pink (8/4) hard lime masses; moderately alkaline (pH 8.2); clear wavy boundary.
C2casa RSL 7131	48 to 68 cm (19 to 27 inches), pinkish white (7.5YR 8/2) and pink (8/4) very gravelly sandy loam, pinkish gray (7.5YR 7/2) and pink (7/4) moist; massive; hard, friable, slightly sticky, slightly plastic; common fine interstitial and few fine tubular pores; 65 percent gravel; violently effervescent; many pinkish white (7.5YR 8/2) and pink (8/4) hard lime masses; all gravel is lime coated; moderately alkaline (pH 8.2); clear wavy boundary.
C3casa RSL 7132	68 to 132 cm (27 to 52 inches), pinkish white (7.5YR 8/2) and pink (7.5YR 8/4 and 7/4) very gravelly sandy loam or very gravelly loam, pinkish gray (7.5YR 7/2) and light brown (7.5YR 6/4) moist; massive; hard, friable, slightly sticky, slightly plastic; many fine and few very fine interstitial pores; 70 percent gravel; violently effervescent; many pinkish white (7.5YR 8/2) and pink (8/4) hard lime masses--all gravel is lime coated; moderately alkaline (pH 8.2).

CONSECUTIVE PEDON NUMBER C 67 58 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES PERRYVILLE SOIL NO. S67 ARIZ. 7- 9 SAMPLE NO. 7 681-7 687 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC CALCIORTHID,CRSE-LMY,CARBONATIC,HYPRTHRMC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A.02	1A2A INT. COARSE II	FRAGMENTS PCT. OF WHOLE SOIL	I 75-20 PCT. OF	II 20-5 LT 75	III 5-2
			PERCENT OF LESS THAN 2MM																	
7 681	0- 23	AP	42.6	39.9	17.5	5.4	7.3	4.4	9.7	15.8	19.4	20.5			3	40.7	20	TR	20Z	N
7 682	23- 41	C 1CA	36.3	43.9	19.8	7.2	5.8	3.4	7.2	12.7	17.4	26.5			6	34.5	35	TR	35Z	N
7 683	41- 69	C 2CA	36.9	45.0	18.1	7.6	6.6	4.0	7.5	11.2	15.0	30.0			6	30.7	43	TR	43Z	N
7 684	69- 97	C 3CA	39.3	45.1	15.6	5.8	8.3	4.8	8.5	11.9	16.3	28.8			4	33.3	24	TR	24Z	N
7 685	97-142	C 4CA															5	TR	5Z	N
7 686	142-165	C 5CA															4	TR	4Z	N
7 687	165-1832	C 6CA															55*	21	27Z	N

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2	19-2	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	P L 4F2	BULK DENSITY EST 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSIBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT-		-PERCENT-		PCT.	PCT.	NO.40	GRAMS PER CC			-PERCENT-			-PERCENT-				
7 681	0- 23	0.21	0.029	19		0.4			1.28	1.32	0.89		26.8	7.9	1.0	0.9		9.0	
7 682	23- 41	0.10		33					1.08	1.14	0.82		36.3	8.8	1.8	1.5		9.2	
7 683	41- 69	0.08		36		0.3			0.87	0.93	0.80		51.7	8.8	2.2	1.8		9.2	
7 684	69- 97	0.06		34					0.85	0.89	0.91		60.6	9.1	1.5	1.4		9.1	
7 685	97-142	0.03		36					1.56	1.61	0.97		20.0	8.8	1.1	1.0			
7 686	142-165			24					1.54	1.58	0.98		20.4	8.1	0.9	0.8			
7 687	165-183			10					1.47	1.49	0.60		17.4	5.9	0.5	0.3			

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4C	MG 5B3A 6D4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA-OAC 5A2A	NH4-OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA	MG	NA	K	CO3	HCO3	CL	SO4	B	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
7 681	0- 23			0.4	0.5	0.9			9.0	1.14	5.2	2.0	3.3	0.3		1.9	1.4			7.9
7 682	23- 41			0.9	0.5	1.4			6.8											8.1
7 683	41- 69			0.7	0.3	1.0			7.3											7.9
7 684	69- 97			0.8	0.3	1.1			7.8											7.8
7 685	97-142																			
7 686	142-165																			
7 687	165-183																			

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT SAT. 8A	NA 5B4B	NA 5D2	SAR 5E	GYPSUM AMT. 6F1B	REQ. 6P3A	CLAY MINERALOGY LESS THAN 0.002 MM X RAY I 7A2E	II 7A2E	III 7A2E	IV 7A2E	DTA 7A3	L.T. .0002 MM X RAY I 7A2E	II 7A2E	III 7A2E
		PCT.	MEQ.	PCT.		PCT.	MEQ.					PCT.			
7 681	0- 23	46.9	0.2	3	2			MI 4	MT 3	KK 2					
7 682	23- 41		0.9	13											
7 683	41- 69		0.7	10				MI 4	MT 3	KK 2					
7 684	69- 97		0.8	10											
7 685	97-142														
7 686	142-165														
7 687	165-183														

MINERAL CODE: MI MICA, MT MONTMORT, KK KAOLINIT

RELATIVE AMOUNT: 1 TRACE, 2 SMALL, 3 MODERATE, 4 ABUNDANT, 5 DOMINANT, 6 INDETER.

SAMPLE PREPARATION CODES
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.
*=THE 75-250MM FRACTION IS INCLUDED.

PERRYVILLE LOAM
S-67-Ariz-7-9

Location: Maricopa County, Arizona. 615 feet north and 579 feet east of the SW corner of SE¼ of Section 9, T3N, R1E. Approximately 1½ miles NE of Sun City. Date of Sampling: October 13, 1967.
Description by: G. Hartman, S. Torrance, J. Jay. Collectors: K. Flach, D. Nettleton.
Classification: Typic Calciorthid, coarse-loamy, carbonatic, hyperthermic.
Vegetation: None. Use: Cropland--idle. Climate: Mean annual precipitation 8.0 inches (Litchfield Park). Mean annual air temperature 70° F.; January 50° F., July 91° F. Parent Material: Alluvium from andesitic tuff, basalt, schist and granite. Topography: Nearly level old alluvial fan sloping less than 1 percent to the southeast. Elevation: 1220 feet. Drainage: Well drained. Moderate permeability. Medium runoff. Soil Moisture: Dry at time of sampling.

HORIZON	DESCRIPTION
Ap RSL 67681	0 to 23 cm (0 to 9 inches), very pale brown (10YR 7/3) gravelly loam, brown (10YR 5/3) when moist; weak fine granular structure; slightly hard, friable, sticky and plastic; few fine roots; many (50 percent) medium and fine white extremely hard rounded lime concretions, 15-20 percent gravel (concretions); violently effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
C1ca RSL 67682	23 to 41 cm (9 to 16 inches), very pale brown (10YR 7/3) very gravelly loam, brown (10YR 5/3) when moist; massive; hard, very friable, sticky and plastic; no roots; few fine tubular and many fine interstitial pores; many (60 percent) medium white rounded lime concretions, 35-40 percent gravel (concretions); violently effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C2ca RSL 67683	41 to 69 cm (16 to 27 inches), very pale brown (10YR 7/3) very gravelly loam, brown (10YR 5/3) when moist; massive; very hard, friable, sticky and plastic; no roots; common fine interstitial pores; many fine and medium (70 percent) white extremely hard rounded lime concretions, 35-40 percent gravel (concretions); violently effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C3ca RSL 67684	69 to 97 cm (27 to 38 inches), very pale brown (10YR 7/3) gravelly loam, brown (10YR 5/3) when moist; slightly hard, friable, sticky and plastic; common fine tubular and many fine interstitial pores; many (80 percent) white fine and medium extremely hard rounded lime concretions, about 20-25 percent gravel (concretions); violently effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C4ca RSL 67685	97 to 142 cm (38 to 56 inches), very pale brown (10YR 7/3) sandy loam, pale brown (10YR 6/3) when moist; massive; very hard, firm, slightly sticky, slightly plastic; many fine tubular pores; many (80 percent) white fine and medium soft lime masses and few extremely hard rounded lime concretions, violently effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C5ca RSL 67686	142 to 165 cm (56 to 65 inches), very pale brown (10YR 7/3) sandy loam, dark yellowish brown (10YR 4/4) when moist; massive; very hard, firm, slightly sticky and slightly plastic; common fine tubular and interstitial pores; almost continuous white rounded soft lime masses and a few concretions that form a weakly cemented pan in places, 3-5 percent gravel (concretions), 10 percent cobbles discarded; violently effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
IIC6ca RSL 67687	165 to 183 cm (65 to 72 inches), very pale brown (10YR 7/3) very gravelly loamy sand, brown (10YR 5/3) when moist; single grain; loose when dry and moist; nonsticky and nonplastic; many fine interstitial pores; about 50 percent quartzite, andesite gravel; strongly effervescent; moderately alkaline (pH 8.0).

CONSECUTIVE PEDON NUMBER C 67 59 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES PERRYVILLE SOIL NO. S67 ARIZ. 7-10 SAMPLE NO. 7 688-7 695 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC CALCIORTHID,CRSE-LMY,CARBONATIC,HYPRTHRMC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	VCS 2-1	SANDS CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	INT. II .2- .02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM															PCT. OF LT 75			
7 688	0- 23	AP1	48.8	36.3	14.9	4.6	7.6	5.6	12.3	18.7	20.3	16.0			2	46.4	19	2	17Z	N
7 689	23- 38	AP2	48.8	36.0	15.2	5.8	8.7	5.7	11.7	16.9	20.3	15.7			3	44.3	23	TR	23Z	N
7 690	38- 58	C 1CA	37.0	44.7	18.3	6.6	6.6	3.9	8.3	11.6	17.2	27.5			8	33.7	36*	TR	--	--
7 691	58- 81	C 2CA	36.8	43.2	20.0	8.9	6.7	4.0	7.1	10.1	15.2	28.0			8	29.4	46	16	30Z	N
7 692	81-109	C 3CA	41.5	37.1	21.4	12.5	8.3	4.7	7.5	8.5	11.7	25.4			8	24.4	55	17	38Z	N
7 693	109-1352	C 4CA															71	23	48Z	N
7 694	135-1502	C 5CA															32	TR	32Z	N
7 695	150-1653	C 6CA															88*	50	36Z	N

SAMPLE NO.	DEPTH CM.	ORG. CARBON 6A1A PERCENT	MATTER NITROGEN 6B1A PERCENT	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B PERCENT	EXT. IRON FE 6C2B PCT.	ATTERBERG L L 4F1 PCT.	P L 4F2 NO.40	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSIBLITY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
									GRAMS PER CC				PERCENT			PERCENT				
7 688	0- 23	0.23	0.036	13		0.4			1.27	1.32	0.90		33.1	7.0	1.3	1.2		8.6		
7 689	23- 38		0.032	14				1.27			0.87			7.6				8.9		
7 690	38- 58			39		0.3			1.43	1.47	0.77		22.0	7.9	0.9	0.7		8.9		
7 691	58- 81			38				1.47			0.68			8.7				9.0		
7 692	81-109			35					1.52	1.54	0.59		20.8	9.7	0.4	0.3		8.9		
7 693	109-135			22				1.55			0.41			10.4						
7 694	135-150			39				1.58			0.78			9.3						
7 695	150-165			26					1.60	1.60	0.18		20.2	9.2						

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A	MG 5B3A	NA 5B4A	K 5B4A	SUM	BASE SAT.	C E C NA- OAC	NH4- OAC	WATER EXTRACT FROM SATURATED PASTE 8A1 EC	CA	MG	NA	K	CO3	HCO3	CL	SO4	B	PH SAT. PASTE
		MEQ/100G				PCT.	MEQ/100G		MMHO	MEQ/1000 ML									PPM	
7 688	0- 23	0.2	0.4	0.6			9.4	2.46	14.7	5.3	2.3	0.2		1.9	2.4			7.7	
7 689	23- 38	0.6	0.8	1.4			9.3	0.98	5.3	2.2	2.3	0.2		2.2	1.6			7.9	
7 690	38- 58	0.7	0.3	1.0			6.6											7.9	
7 691	58- 81	0.7	0.3	1.0			6.6											7.9	
7 692	81-109	0.7	0.3	1.0			6.7											7.9	
7 693	109-135																		
7 694	135-150																		
7 695	150-165																		

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM-- X RAY I 7A2E	II 7A2E	III 7A2E	IV 7A2E	DTA PCT. 7A3	--L.T. .0002 MM-- X RAY I 7A2E	II 7A2E	III 7A2E	MINERAL CODE	RELATIVE AMOUNT
7 688	0- 23	40.8	0.1	1	1			MI 4	MT 3	KK 2						MI MICA	1 TRACE
7 689	23- 38	46.9	0.5	5	1											MT MONTMORT	2 SMALL
7 690	38- 58		0.7	11				MI 5	MT 3	KK 2						KK KAOLINIT	3 MODERATE
7 691	58- 81		0.7	11													4 ABUNDANT

PERRYVILLE LOAM 1/
S-67-Ariz-7-10

[redacted]

13, 1967.
Description by: G. Hartman, S. Torrance, J. Jay. Collectors: K. Flach, D. Nettleton.
Classification: Typic Calciorthid, coarse-loamy, carbonatic, hyperthermic.
Vegetation: None--last crop was cotton. Use: Irrigated cropland. Climate: Mean annual precipitation 8 inches (Litchfield Park). Mean annual temperature 70° F; January 50° F., July 91° F. Parent Material: Alluvium from andesitic tuffs, granite, schist, and basalt. Topography: Nearly level old alluvial fan sloping less than 1 percent to the southwest. Elevation: 1200 feet. Drainage: Well drained. Moderate permeability. Medium runoff. Soil Moisture: Dry when sampled.

HORIZON	DESCRIPTION
Ap1 RSL 67688	0 to 23 cm (0 to 9 inches), light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 5/4) when moist; weak fine granular structure; slightly hard, very friable, slightly sticky and plastic; common fine roots; few fine interstitial pores; many extremely hard fine and medium pinkish white rounded lime concretions, 15 to 20 percent gravel (concretions); violently effervescent; moderately alkaline (pH 8.0); [redacted]

[redacted]

RSL 5/4 when moist; massive; slightly hard, very friable, slightly sticky and plastic;
67689 common fine roots; few fine interstitial pores; many (40 percent) fine and medium pinkish

CONSECUTIVE PEDON NUMBER C 67 53 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES LAVEEN SOIL NO. S67 ARIZ. 7- 3 SAMPLE NO. 7 639-7 644 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC CALCIORTHID,COARSE-LOAMY,MXD,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	SILTS-- CO. .2U	CLAYS---- FINE LT .2U	CARBO NATE 3A1A	1A2A INT. II .2- .02	-COARSE FRAGMENTS- PCT. OF WHOLE 20 I 75-	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														SOIL	PCT. OF LT 75		
7 639	0- 20	AP	54.0	34.4	11.6	8.0	11.0	5.3	8.8	20.9	22.4	12.0				48.5	9	TR	9Z	N
7 640	20- 38	C 1	50.1	35.6	14.3	10.5	9.6	4.3	7.1	18.6	22.4	13.2				45.2	9	TR	9Z	N
7 641	38- 61	C 2CA	50.0	33.6	16.4	9.5	8.4	3.7	6.8	21.6	20.6	13.0				46.3	12	3	9Z	N
7 642	61- 84	C 3CA	47.9	34.9	17.2	8.5	8.3	3.7	6.5	20.9	17.6	17.3			3	42.3	9	TR	9Z	N
7 643	84-112	C 4CA	47.7	34.7	17.6	7.3	7.0	3.6	6.5	23.3	19.0	15.7			3	46.2	9	TR	9Z	N
7 644	112-168	C 5CA	40.4	41.4	18.2	8.0	7.1	4.2	6.1	15.0	16.9	24.5			4	35.4	11	TR	11Z	N

SAMPLE NO.	DEPTH CM.	ORG. CAR- BON 6A1A	MATTER NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6F1B	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	I M I T PL 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	PH H2O 1/10 8C1A	PH CACL2 8C1E
		PERCENT		PERCENT		PCT.	PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT				
7 639	0- 20	0.23	0.029	5		0.4			1.46	1.48	0.95		18.9	5.9	0.5	0.4		9.5		
7 640	20- 38	0.17	0.021	7		0.4			1.37	1.40	0.95		19.1	6.2	0.7	0.7		9.2		
7 641	38- 61	0.11		10		0.3			1.34	1.40	0.94		18.5	8.6	1.5	1.4		9.3		
7 642	61- 84	0.08		15					1.44	1.51	0.95		14.3	6.3	1.6	1.5		9.4		
7 643	84-112			12					1.45	1.51	0.95		14.2	6.5	1.4	1.3		9.6		
7 644	112-168			29		0.2			1.49	1.55	0.94		19.8	7.7	1.3	1.2		9.6		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4C	MG 5B3A 6O4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G				PCT.	MMHO	MEQ/100G			MEQ/1000 ML								PPM	
7 639	0- 20	TR	1.3	0.6	1.9			10.4	1.04	2.0	0.5	7.6	0.1		6.7	1.4				8.2
7 640	20- 38		1.2	0.3	1.5			10.4												8.0
7 641	38- 61		1.6	0.2	1.8			9.4												8.1
7 642	61- 84		1.9	0.2	2.1			8.5	1.99	3.0	0.7	13.2	0.1		1.9	4.8				7.9
7 643	84-112		1.4	0.2	1.6			8.7												8.1
7 644	112-168		1.4	0.2	1.6			6.8												8.4

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	-GYPSUM- AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM-- X RAY I 7A2E	II 7A2E	III 7A2E	DTA IV 7A3	-L.T. .0002 MM- X RAY I 7A2E	II 7A2E	III 7A2E
7 639	0- 20	32.2	1.1	10	7			MT 3	MI 3	KK 2				
7 640	20- 38		1.2	12				MI 4	MT 3	KK 2				
7 641	38- 61		1.6	17				MI 4	MT 3	KK 3				
7 642	61- 84	42.3	1.3	16	10									
7 643	84-112		1.4	16										
7 644	112-168		1.4	21										

MINERAL CODE: MT MONTMORT, MI MICA, KK KAOLINIT

RELATIVE AMOUNT: 1 TRACE, 2 SMALL, 3 MODERATE, 4 ABUNDANT, 5 DOMINANT, 6 INDETER.

SAMPLE PREPARATION CODES
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.

LAVEEN LOAM
S-67-Ariz-7-3

Location: Maricopa County, Arizona. 286 feet east and 534 feet south of the NW corner of the SW¼ Section 4, T1S, R9W., 16 miles west-southwest of Tonopah. Date of Sampling: October 10, 1967.
Description by: G. Hartman, S. Torrance, J. Jay. Collectors: K. Flach, D. Nettleton, A. DeWall.
Classification: Typic Calciorthid, coarse-loamy, mixed, hyperthermic.
Vegetation: Last crop was safflower. Use: Cultivated. Climate: Mean annual precipitation is approximately 7 inches. Mean annual air temperature about 70° F; January 50° F., July 90° F. Parent Material: Alluvium from andesitic tuff, granite, schists, etc. Topography: Nearly level alluvial fan sloping less than 0.5 percent to the NE. Elevation: 1,200 feet. Drainage: Well drained with moderate permeability. Medium runoff. Soil Moisture: Moist.
Remarks: This sample represents the Laveen in the Harquahala Valley but is not modal for the series. Sampled from backhoe pit.

HORIZON	DESCRIPTION
Ap RSL 67639	0 to 20 cm (0 to 8 inches), light yellowish brown (10YR 6/4) loam, dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, nonsticky, slightly plastic; many fine roots; few fine and medium interstitial pores; strongly effervescent; moderately alkaline (pH 8.4); abrupt smooth boundary.
C1 RSL 67640	20 to 38 cm (8 to 15 inches), light yellowish brown (10YR 6/4)loam, dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, slightly sticky, plastic; common very fine roots; common fine tubular and few fine interstitial pores; common fine white lime veins, about 5 percent gravel; violently effervescent; moderately alkaline (pH 8.2); clear smooth boundary.
C2ca RSL 67641	38 to 61 cm (15 to 24 inches), light yellowish brown (10YR 6/4)loam, brown (7.5YR 5/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many fine tubular pores; many fine pinkish white lime veins and common pinkish white soft lime masses, about 5 percent gravel; violently effervescent; moderately alkaline; clear smooth boundary.
C3ca RSL 67642	61 to 84 cm (24 to 33 inches), light yellowish brown (10YR 6/4) loam, brown (7.5YR 5/4) when moist; massive; hard, friable, slightly sticky, plastic; common fine roots; many fine tubular pores; many pinkish white fine lime veins and common medium soft lime masses, about 7 percent gravel or hard lime nodules; violently effervescent; moderately alkaline (pH 8.2); clear smooth boundary.
C4ca RSL 67643	84 to 112 cm (33 to 44 inches), light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) when moist; massive; hard, firm, slightly sticky, plastic; no roots; many fine tubular pores; common pinkish white fine lime veins and many fine pinkish white soft lime masses, about 7 percent gravel or concretion; violently effervescent; moderately alkaline (pH 8.2); clear smooth boundary.
C5ca RSL 67644	112 to 168 cm (44 to 66 inches), pinkish white (7.5YR 7/2) loam, brown (7.5YR 5/4) when moist; massive; very hard, very firm, sticky and plastic; no roots; few fine tubular pores; many (90 percent) medium pinkish white soft lime masses, about 10 percent gravel and concretions; violently effervescent; moderately alkaline (pH 8.0).

CONSECUTIVE PEDON NUMBER C 67 54 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES LAVEEN SOIL NO. S67 ARIZ. 7- 8 SAMPLE NO. 7 645-7 650 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC CALCIORTHID,COARSE-LOAMY,MXD,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION 2- .05	SANDS .05- .002	SILTS LT .002	CLAYS	VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A.02	1A2A INT. II .2-.02	COARSE FRAGMENTS- PCT. OF WHOLE SOIL	I 75-20 PCT. OF LT 75	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM																		
7 645	0- 36	AP	56.2	31.4	12.4		5.4	11.1	8.6	14.4	16.7	20.6	10.8			45.4	4	TR	4Z	N	
7 646	36- 46	C 1	56.3	30.0	13.7		7.2	11.9	8.0	12.8	16.4	19.0	11.0			1 42.6	6	TR	6Z	N	
7 647	46- 66	C 2CA	52.3	31.8	15.9		7.0	11.8	7.6	11.3	14.6	18.1	13.7			39.0	11	TR	11Z	N	
7 648	66- 97	C 3CA															27	TR	27Z	N	
7 649	97-142	C 4CA															23	TR	23Z	N	
7 650	142-163	C 5CA															21	TR	21Z	N	

SAMPLE NO.	DEPTH CM.	ORG. MATTER CARBON 6A1A -PERCENT--	NITROGEN 6B1A --	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	19-2 6E1B	EXT. IRON FE 6C2B PCT.	ATTERBERG LIMIT LL 4F1 PCT.	PL 4F2 NO.40	BULK DENSITY EST 1/3 BAR 4A1F GRAMS PER CC	DRY 4A1F	CM 4A1H 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSIBLITY LEF 4D1 -PERCENT---	LE 4D1 -PERCENT--	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
7 645	0- 36	0.33	0.039	5		0.5			1.59	1.61	0.98		14.6	5.3	0.4	0.4		8.9	
7 646	36- 46	0.22	0.036	6		0.5			1.55	1.59	0.96		15.2	6.6	0.9	0.8		9.0	
7 647	46- 66	0.14		14		0.3			1.32	1.38	0.94		24.6	6.9	1.5	1.4		9.0	
7 648	66- 97	0.09		21					1.30	1.37	0.85		24.3	7.6	1.8	1.5		9.0	
7 649	97-142	0.07		28					1.31	1.41	0.87		23.6	9.1	2.5	2.1		9.2	
7 650	142-163			34					1.39	1.44	0.88		22.9	9.3	1.2	1.0		9.2	

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4C	MG 5B3A 6O4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA+ OAC 5A2A	NH4+ OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
7 645	0- 36			0.2	0.7	0.9		10.8		1.66	9.1	4.3	2.1	0.5		4.0	5.1			8.0
7 646	36- 46			0.4	0.6	1.0		10.1												7.8
7 647	46- 66			0.3	0.3	0.6		8.5												7.9
7 648	66- 97			0.5	0.2	0.7		8.7												8.0
7 649	97-142			0.4	0.1	0.5		7.9												8.1
7 650	142-163			0.3	0.1	0.4		7.5												8.3

SAMPLE NO.	DEPTH CM.	WATER AT 8A SAT. PCT.	EXCHANGEBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY --LESS THAN 0.002 MM--- X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 PCT.	CLAY MINERALOGY -L.T. .0002 MM- X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
7 645	0- 36	31.6	0.1	1	1												1 TRACE
7 646	36- 46		0.4	4												MI MICA	2 SMALL
7 647	46- 66		0.3	4												MT MONTMORT	3 MODERATE
7 648	66- 97		0.5	6													4 ABUNDANT
7 649	97-142		0.4	5													5 DOMINANT
7 650	142-163		0.3	4									MI 3 MT 2				6 INDETER.

SAMPLE PREPARATION CODES
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.

LAVEEN LOAM
S-67-Ariz-7-8

Location: Maricopa County, Arizona. 400 feet north and 194 feet west of the SE corner of the NW¼, Section 17, T3N, R1E. Approximately 3 miles NE of Sun City, Arizona. Date of Sampling: October 11, 1967.
Description by: G. Hartman, S. Torrance, J. Jay. Collectors: K. Flach, D. Nettleton.
Classification: Typic Calciorthid, coarse-loamy, mixed, hyperthermic.
Vegetation: Cotton. Use: Cultivated land. Climate: Mean annual precipitation est. 8.00 inches (Litchfield Park). Mean annual air temperature 70° F.; January 50· F., July 90° F. Parent Material: Medium textured old alluvium from many sources. Topography: Nearly level alluvial fan sloping less than 1 percent to the southwest. Elevation: 1250 feet. Drainage: Well drained with moderate permeability. Medium runoff. Soil Moisture: Moist.
Remarks: Sampled from backhoe pit.

HORIZON	DESCRIPTION
Ap RSL 67645	0 to 36 cm (0 to 14 inches), pale brown (10YR 6/3) loam, dark brown (10YR 4/5) when moist; weak medium and fine subangular blocky and granular structure; hard, friable, slightly sticky, plastic; many fine roots; many fine interstitial pores; few fine pebbles; strongly effervescent; moderately alkaline (pH 8.0 thymol blue); abrupt smooth boundary.
C1	36 to 46 cm (14 to 18 inches) light [illegible]
RSL 67646	yellowish brown (7.5YR 5/4) and light gray (7.5YR 7/2) when moist; massive; hard, friable, slightly sticky and plastic; many fine roots; many fine and few medium tubular pores and common fine interstitial pores; few fine pinkish white soft lime masses and few (3 percent) fine pinkish white rounded lime concretions; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
C2ca RSL 67647	46 to 66 cm (18 to 26 inches), light yellowish brown (10YR 6/4) loam, brown (7.5YR 5/4) when moist; massive; hard, friable, sticky and plastic; many fine roots; common medium and fine tubular and few fine interstitial pores; common fine and medium pinkish white soft lime masses and many (10 percent)rounded lime concretions, violently effervescent; moderately alkaline (pH 8.0); clear wavy boundary.
C3ca RSL 67648	66 to 97 cm (26 to 38 inches), light yellowish brown (10YR 6/4) loam, brown (7.5YR 5/4) when moist; massive; very hard, friable, sticky and plastic; common fine roots; many very fine and fine tubular pores and few fine interstitial pores; common fine and medium pinkish white (7.5YR 8/2) soft lime masses and many (25 percent) pinkish white extremely hard rounded lime concretions, violently effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
C4ca RSL 67649	97 to 142 cm (38 to 56 inches), light yellowish brown (10YR 6/4) loam, brown (7.5YR 5/4) when moist; massive; hard, firm, sticky and plastic; few fine roots; many very fine and common fine tubular pores and few fine interstitial pores; common medium pinkish white (7.5YR 8/2) soft lime masses and many (25 percent) pinkish white medium extremely hard rounded lime concretions, violently effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
C5ca RSL 67650	142 to 163 cm (56 to 64 inches), light yellowish brown (10YR 6/4) loam, brown (7.5YR 5/4) and pinkish white (7.5YR 7/2) when moist; massive; hard, friable, sticky and plastic; few fine roots; many very fine tubular pores; common fine pinkish white soft lime masses and many (25 percent) pinkish white (7.5YR 8/2) extremely hard rounded lime concretions, violently effervescent; moderately alkaline (pH 8.0).

CONSECUTIVE PEDON NUMBER C 67 55 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES LAVEEN SOIL NO. S67 ARIZ. 7-13 SAMPLE NO. 7 651-7 657 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC CALCIORTHID,COARSE-LOAMY,MXD,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	SILTS CO. 2- .2U	CLAYS FINE LT .2U	CARBONATE 3A1A	INT. 1I .2-.02	COARSE FRAGMENTS 1A2A PCT. OF WHOLE SOIL 2	I 75- 20 PCT. OF	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM																	
7 651	0- 15	AP1	52.3	35.3	12.4	5.1	9.5	7.3	13.4	17.0	23.9	11.4			1	48.8	8	TR	8Z	N
7 652	15- 38	AP2	52.9	34.4	12.7	5.2	9.0	7.3	12.8	18.6	22.3	12.1			1	48.5	9	TR	9Z	N
7 653	38- 61	C 1	45.2	37.3	17.5	8.3	8.0	5.4	9.5	14.0	19.7	17.6			3	39.3	18	TR	18Z	N
7 654	61- 97	C 2CA	40.3	39.5	20.2	6.5	6.7	4.6	8.7	13.8	19.6	19.9			4	38.7	12	TR	12Z	N
7 655	97-127	C 3CA	33.3	46.9	19.8	7.8	5.7	3.6	6.6	9.6	13.2	33.7			6	26.7	30	TR	30Z	N
7 656	127-213	C 4CA															15	TR	15Z	N
7 657	213-249	C 5													--		1	TR	1Z	N

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	I M PL 4F2	I T 1/3 BAR 4A1F	BULK DENSITY 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		PERCENT		PERCENT		PCT.	PCT.NO.40		GRAMS PER CC				PERCENT			PERCENT				
7 651	0- 15	0.59	0.053	8		0.4				1.44	1.45	0.95	19.4	6.2	0.2	0.2		8.7		
7 652	15- 38	0.35	0.038	8						1.50	1.54	0.95	18.2	7.0	0.9	0.8		9.0		
7 653	38- 61			16		0.4				1.60	1.64	0.88	16.5	8.3	0.8	0.7		9.2		
7 655	97-127			39						1.34	1.42	0.82	20.7	8.4	2.0	1.6		9.1		
7 656	127-213			32					1.34			0.92		9.5				9.3		
7 657	213-249			31					1.34			0.99		9.7				9.5		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4C	MG 5B3A 6O4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6J1A	HCO3 6K1A	CL 6L1B	SO4 6T1A	B	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
7 651	0- 15			1.6	2.0	3.6		8.5		4.50	15.1	16.8	29.6	5.1		7.9	61.5			7.6
7 652	15- 38			0.7	0.9	1.6		8.7												7.9
7 653	38- 61			0.8	0.9	1.7		8.3												7.9
7 654	61- 97			1.0	1.0	2.0		8.1		1.68	4.0	2.2	7.7	0.5		2.2	9.0			7.9
7 655	97-127			0.8	0.6	1.4		6.2												8.0
7 656	127-213			0.7	0.5	1.2		6.4												8.3
7 657	213-249			1.5	0.6	2.1		11.0												8.4

SAMPLE NO.	DEPTH CM.	WATER AT 8A SAT. PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY <.002 MM X RAY I 7A2E	II 7A2E	III 7A2E	IV 7A2E	DTA 7A3 PCT.	>.002 MM X RAY I 7A2E	II 7A2E	III 7A2E	MINERAL CODE
7 651	0- 15	35.9	0.5	6	7											
7 652	15- 38		0.7	8												
7 653	38- 61		0.8	10												
7 654	61- 97	48.5	0.6	8	4											
7 655	97-127		0.8	13												
7 656	127-213		0.7	11												
7 657	213-249		1.5	14												

RELATIVE AMOUNT
1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.

LAVEEN LOAM
S-67-Ariz-7-13

Location: Maricopa County, Arizona. 1090 feet north and 160 feet west of the SE corner of Section 6, T1S, R2E. 1 mile west of Laveen. Date of Sampling: October 12, 1967.
Description by: G. Hartman, S. Torrance. Collectors: D. Nettleton, D. Hendricks.
Classification: Typic Calciorthid, coarse-loamy, mixed, hyperthermic.
Vegetation: Last crop was safflower. Use: Cultivated land. Climate: Mean annual precipitation 7.6 inches Goulds Road. Mean annual air temperature 70° F; January 51° F, July 90° F. Parent Material: Medium textured alluvium from a wide range of materials. Topography: Nearly level stream terrace. Slope of less than 1 percent to the northeast. Elevation: 1030 feet. Drainage: Well drained. Moderate permeability, medium runoff. Soil Moisture: Moist at time of sampling. Sampled from backhoe pit.
Remarks: Modal profile. Last two horizons sampled with auger.

HORIZON	DESCRIPTION
Ap1 RSL 67651	0 to 15 cm (0 to 6 inches), pale brown (10YR 6/3) loam, dark yellowish brown (10YR 4/4) when moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine interstitial pores; few mica flakes; strongly effervescent; moderately alkaline (pH 8.0 thymol blue); abrupt smooth boundary.
Ap2 (B) RSL 67652	15 to 38 cm (6 to 15 inches), light brown (7.5YR 6/4) loam, dark brown (7.5YR 4/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine tubular and few fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
C1 RSL 67653	38 to 61 cm (15 to 24 inches), pink (7.5YR 7/4) loam, brown (7.5YR 5/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine interstitial and common fine tubular pores; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C2ca RSL 67654	61 to 97 cm (24 to 38 inches), pink (7.5YR 7/4) loam, brown (7.5YR 5/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine tubular and interstitial pores; common fine and medium pinkish white soft lime masses and few (5 to 10 percent) extremely hard rounded pinkish white lime concretions, violently effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C3ca RSL 67655	97 to 127 cm (38 to 50 inches), pink (7.5YR 7/4) loam, brown (7.5YR 5/4) when moist; massive; hard, friable, slightly sticky and slightly plastic; few fine tubular and interstitial pores; many (40 percent) medium and coarse pinkish white soft lime masses and common (25 percent) medium and coarse pinkish white extremely hard rounded lime concretions; violently effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C4ca RSL 67656	127 to 213 cm (50 to 84 inches), pink (7.5YR 7/4) loam, brown (7.5YR 5/4) when moist; massive; hard, friable, sticky and plastic; few fine tubular and interstitial pores; many (40 percent) medium and coarse pinkish white soft lime masses and common (20 percent) fine and medium pinkish white extremely hard rounded lime concretions, violently effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C5 RSL 67657	213 to 249 cm (84 to 98 inches), same as above but contains 5 percent rounded lime concretions and 30 percent soft lime masses.

CONSECUTIVE PEDON NUMBER C 71 10 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES PERRYVILLE TAXADJUNCT SOIL NO. S71 ARIZ. 10- 8 SAMPLE NO. 1 59-1 63 ORGAN PIPE MON AREA

SOIL FAMILY: TYPIC CALCIORTHID,COARSE-LOAMY,MXD,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND	SILT	CLAY	SANDS VCS	CS	MS	FS	VFS	SILTS CSI	FSI	CLAYS CO.	FINE	CARBO	INT. II	COARSE FRAGMENTS PCT. I	II	III
[illegible]																			

				.05	.002	.002	.5	.25	.10	.05	.02	.002	.2U	.2U	3A1A.02	WHOLE SOIL	20 PCT.	OF	LT 75
				PERCENT OF LESS THAN 2MM															
1	59	0- 5	A1	59.2	34.4	6.4	14.2	8.9	6.1	11.5	18.5	19.3	15.1			44.2	31A	1	16	13
1	60	5- 38	C 1CA	57.2	32.4	10.4	15.2	9.6	5.7	9.9	16.8	17.1	15.3		2	39.2	39A	1	18	19
1	61	38- 71	C 2CA	59.9	23.3	16.8	9.5	11.4	9.2	13.2	16.6	12.5	10.8			36.2	34A	--	15	18
1	62	71-100	C 3CA	47.7	34.8	17.5	10.4	6.5	4.1	8.2	18.5	15.7	19.1		4	39.0	24A	1	12	11
1	63	100-152	2C 4CA	46.8	37.3	15.9	5.1	5.4	3.9	9.5	22.9	19.2	18.1		3	47.9	11A	--	4	7

SAMPLE NO.	DEPTH CM.	ORG. CAR- BON 6A1A -PERCENT-	MATTER NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B PCT.	ATTERBERG L I M I T LL 4F1 PCT.	PL 4F2 NO.40	BULK DENSITY EST 1/3 BAR 4A1F GRAMS	1/3 BAR 4A1F PER	ORY 4A1H CC	CM 3B2	WATER CONTENT 1/10 BAR 4B1C -PERCENT-	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1 -PERCENT-	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
1	59	0- 5	0.07	0.012	8	0.5				1.33	1.36	0.82	22.3	16.5	5.1	0.7	0.6	8.6		7.7
1	60	5- 38	0.13	0.015	12	0.5				1.14	1.21	0.79	35.5	26.4	6.3	2.0	1.6	8.4	9.3	7.8
1	61	38- 71	0.06		8	0.6				1.25	1.34	0.81	25.8	19.6	6.8	2.3	1.9	8.0	8.6	7.8
1	62	71-100			17					1.33	1.45	0.86	29.7	21.6	7.4	2.9	2.5	8.1	8.9	7.9
1	63	100-152			15					1.42	1.53	0.94	25.8	17.8	6.8	2.5	2.4	8.3	9.2	7.9

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1A	MG 6Q1A	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		-MEQ/100G-					PCT.	-MEQ/100G		MMHO	-MEQ/1000 ML-								PPM	
1	59	0- 5	19.2	1.7	0.1	0.9	21.9	100+		12.7										
1	60	5- 38	19.6	1.5	3.5	0.3	24.9	100+		10.5	4.17	5.2	1.3	31.2	0.1		1.7	33.0		8.0
1	61	38- 71	22.4	2.8	7.7	0.4	33.3	100+		10.8	14.6	41.6	11.5	107.0	0.3		3.0	116.0	44.4	7.7
1	62	71-100	20.4	3.1	7.6	0.4	31.5	100+		9.9	13.3	28.9	9.8	98.6	0.4		3.6	104.0	27.0	7.8
1	63	100-152	19.2	3.2	7.2	0.4	30.0	100+		10.7	11.0	17.8	6.8	86.1	0.4		2.1	83.6	25.5	7.8

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.
1	59	0- 5	0.1	1			
1	60	5- 38	47.5	2.0	19	17	
1	61	38- 71	45.9	2.8	26	21	0.6
1	62	71-100	48.5	2.8	28	22	0.3
1	63	100-152	46.4	3.2	30	25	0.1 0.5

SAMPLE NO.	DEPTH CM.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY I 7A2E	II 7A2E	III 7A2E	IV 7A2E	DTA PCT. 7A3	-L.T. .0002 MM- X RAY I 7A2E	II 7A2E	III 7A2E
1	59	0- 5	MT 4	MI 3	KK 1				
1	60	5- 38	MI 4	MT 2	KK 1				
1	61	38- 71							
1	62	71-100							
1	63	100-152							

MINERAL CODE: MT MONTMORT, MI MICA, KK KAOLINIT

RELATIVE AMOUNT: 1 TRACE, 2 SMALL, 3 MODERATE, 4 ABUNDANT, 5 DOMINANT, 6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

PERRYVILLE GRAVELLY SANDY LOAM (taxadjunct) 1/
S71 Ariz-10-8-(1-5*)

Location: Pima County, Arizona. ½ mile east and ½ mile south of northwest corner (projected) Section 20, T18S, R5W, Organ Pipe Cactus National Monument. Date of Sampling: April 7, 1971.
Description by: Y. H. Havens, E. Chamberlin. Collectors: K. Flach, K. Vogt, E. Chamberlin.
Classification: Typic Calciorthid, coarse-loamy, mixed, hyperthermic.
Vegetation: Creosotebush and bursage. Use: Desert rangeland. Climate: Mean annual precipitation 7 to 9 inches. Mean annual air temperature 69° F. Parent Material: Mixed alluvium from basalt, andesite and rhyolite. Topography: Gently sloping, convex, with 1 to 2 percent slope. Elevation: 1500 feet. Drainage: Well drained with moderate permeability. Soil Moisture: Dry.
Remarks: 60 percent of surface covered by gravel.

HORIZON

A1 RSL 7159 — 0 to 5 cm (0 to 2 inches), light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 5/4) moist; weak thick platy structure; slightly hard, very friable, nonsticky, nonplastic; many very fine and fine vesicular pores; 35 percent gravel by volume; strongly effervescent; moderately alkaline (pH 8.2 thymol blue); abrupt wavy boundary.

C1ca RSL 7160 — 5 to 38 cm (2 to 15 inches), pink (5YR 7/3) gravelly sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, nonsticky, slightly plastic; common very fine roots; few fine tubular pores; 40 percent gravel; violently effervescent; many fine and medium pinkish white (7.5YR 8/2) slightly hard lime masses and nearly all gravel is lime coated; strongly alkaline (pH 8.5); clear wavy boundary.

C2ca RSL 7161 — 38 to 71 cm (15 to 28 inches), light brown (7.5YR 6/4) gravelly loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; common very fine roots; few very fine, fine and medium tubular pores; 30 percent gravel; violently effervescent; common fine and medium pinkish white (7.5YR 8/2) lime masses (slightly hard), and part of gravel is lime coated; moderately alkaline (pH 8.4); clear wavy boundary.

C3ca RSL 7162 — 71 to 100 cm (28 to 39 inches), light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky, plastic; many very fine and fine tubular pores; 15 to 20 percent gravel; violently effervescent; common medium and coarse slightly hard lime masses with thin lime coatings on some gravel; moderately alkaline (pH 8.3); gradual wavy boundary.

IIC4ca RSL 7163 — 100 to 152 cm (39 to 60 inches), light brown (7.5YR 6/4) heavy loam, brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky, plastic; many very fine and fine tubular pores; 5 percent gravel; violently effervescent; common medium and coarse slightly hard lime masses with thin lime coatings on some gravel; moderately alkaline (pH 8.4).

1/ The Perryville series is in a coarse-loamy, carbonatic, family of Typic Calciorthids. This pedon has a control section with less than 40 percent carbonate.

CONSECUTIVE PEDON NUMBER C 71 11 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES RILLITO SOIL NO. S71 ARIZ. 10-10 SAMPLE NO. 1 64-1 67 ORGAN PIPE MON AREA

SOIL FAMILY: TYPIC CALCIORTHID,COARSE-LOAMY,MXD,HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE	DEPTH	HORZ	TOTAL FRACTION SAND	SILT	CLAY	SANDS VCS	CS	MS	FS	VFS	SILTS CSI	FSI	CLAYS CO	FINE	CARBO	INT. LT	COARSE PCT	FRAGMENTS I	II	III
1	64	0- 6	A1	65.7	28.0	6.3	15.7	10.5	5.6	11.6	22.3	16.2	11.8				45.8	29A	4	15	10
1	65	6- 35	B2	60.0	29.1	10.9	17.6	9.5	4.8	9.4	18.7	9.9	19.2			1	34.5	37A	16	10	11
1	66	35- 68	C 1CA	42.9	37.9	19.2	11.5	7.6	4.0	7.6	12.2	25.9	12.0			9	42.6	24A	5	6	13
1	67	68-122	C 2CA	55.6	28.5	15.9	18.0	10.5	6.1	9.0	12.0	11.7	16.8			6	28.8	47A	6	17	23

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR-BON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L I M I T LL 4F1	PL 4F2	BULK DENSITY EST 1/3 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT--		-PERCENT-		PCT.	PCT.NO.40		GRAMS PER CC				----PERCENT---			-PERCENT--				
1	64	0- 6	0.11	0.015	6		0.5		1.16			0.85			3.7			8.5		7.8
1	65	6- 35	0.17	0.022	12		0.5			1.16	1.19	0.80	31.4	21.1	4.9	0.9	0.7	8.4		7.8
1	66	35- 68	0.17		43		0.3			1.33	1.40	0.86	23.3	18.7	6.5	1.7	1.5	8.4	9.1	8.1
1	67	68-122			34		0.4			1.45	1.51	0.67	21.8	17.0	6.2	1.4	0.9	8.3	9.0	8.1

RILLITO GRAVELLY SANDY LOAM
S71 Ariz-10-10-(1-4*)

Location: Pima County, Arizona. 3/8 mile south and 3/8 mile west of northeast corner, Section 10. T15S, R5W, Organ Pipe Cactus National Monument. Date of Sampling: April 8, 1971. E.Chamberlin
Description by: Y.H.Havens, E.Chamberlin. Collectors: K. Flach, K. Vogt.
Classification: Typic Calciorthid, coarse-loamy, mixed, hyperthermic.
Vegetation: Creosotebush, paloverde, ocotillo, saguaro and triangle bursage. Use: Desert rangeland. Climate: Mean annual precipitation 7 to 9 inches. Mean annual temperature 69° F. Parent Material: Mixed alluvium from rhyolite, rhyolitic tuff, basalt, and granitic rocks. Topography: Gently sloping--concave, with slope of 2 to 3 percent. Elevation: 1800 feet. Drainage: Well drained with moderate permeability. Soil Moisture: Dry.
Remarks: 50 percent of surface covered with gravel.

HORIZON	DESCRIPTION
A1 RSL 7164	0 to 6 cm (0 to 2½ inches), light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 5/4) moist; weak medium platy structure; slightly hard, very friable, slightly sticky, slightly plastic; few very fine roots; common very fine and fine tubular pores; strongly effervescent; 40 percent gravel; moderately alkaline (pH 8.0 thymol blue); abrupt smooth boundary.
B2 RSL 7165	6 to 35 cm (2½ to 14 inches), light brown (7.5YR 6/4) gravelly sandy loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; many very fine, fine and medium roots; common fine interstitial pores; 15 percent gravel; violently effervescent; pinkish white (7.5YR 8/2) lime coatings on underside of some gravel; moderately alkaline (pH 8.2); clear wavy boundary.
C1ca RSL 7166	35 to 68 cm (14 to 27 inches), white (N/8) and light brown (7.5YR 6/4) gravelly loam, pink (7.5YR 7/4) and brown (7.5 YR 5/4) moist; massive; hard, friable, slightly sticky, plastic; few very fine and fine roots; common very fine tubular pores; 20 percent gravel; violently effervescent; many hard pinkish white (7.5YR 8/2) lime masses and lime coatings on all gravel; moderately alkaline (pH 8.4); clear wavy boundary.
C2ca RSL 7167	68 to 122 cm (27 to 48 inches), pinkish white (7.5YR 8/2) weakly cemented gravelly sandy loam, light brown (7.5YR 6/4) moist; massive; very hard, very friable, slightly sticky, slightly plastic; few fine and medium roots; common very fine tubular pores; 40 to 50 percent gravel; violently effervescent; moderately alkaline (pH 8.4).

CONSECUTIVE PEDON NUMBER C 69160 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES DRY LAKE TAXADJUNCT SOIL NO. S69 ARIZ. 2-14 SAMPLE NO. 9 839-9 842 WILLCOX AREA

SOIL FAMILY: USTOLLIC CALCIORTHID,SANDY OVER LOAMY,MXD,THRMC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05 SAND	TOTAL FRACTION .05 .002 SILT	TOTAL FRACTION .002 CLAY	SANDS VCS 2-1	SANDS CS 1- .5	SANDS MS .5- .25	SANDS FS .25- .10	SANDS VFS .1- .05	SILTS CSI .05- .02	SILTS FSI .02- .002	CLAYS CO. 2- .2U	CLAYS FINE LT .2U	CLAYS CARBONATE 3A1A.02	INT. II .2- .02	COARSE FRAGMENTS OF WHOLE SOIL 75- 20	COARSE FRAGMENTS I PCT.	COARSE FRAGMENTS II 20-5	COARSE FRAGMENTS III 5-2
			PERCENT OF LESS THAN 2MM																	
9 839	0- 23	AP	88.5	6.5	5.0	0.7	19.8	19.6	38.1	10.3	5.9	0.6			36.8	--A	--	--	--	--
9 840	23- 61	A12	85.5	7.1	7.4	1.0	16.2	15.9	40.2	12.2	5.7	1.4			41.6	--A	--	--	--	--
9 841	61- 902C	1CA	57.9	19.5	22.6	1.4	9.7	11.4	24.6	10.8	10.2	9.3		14	34.8	--G	--	--	--	--
9 842	90-1502C	2CA	40.9	29.2	29.9	2.1	5.2	7.0	18.0	8.6	11.6	17.6		15	30.5	--G	--	--	--	--

SAMPLE NO.	DEPTH CM.	ORG. CAR- BON 6A1A -PERCENT--	MATTER NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	CARBONATE 19-2 6F1B	EXT. IRON FE 6C2B PCT.	ATTERBERG L L 4F1 PCT.	ATTERBERG P L 4F2 PCT.	ATTERBERG I P T NO.40	BULK DENSITY EST 1/3 4A1F	BULK DENSITY 8AR 4A1F	BULK DENSITY DRY 4A1H	CM 3B2	WATER CONTENT 1/10 8AR 4B1C	WATER CONTENT 1/3 BAR 4B1C	WATER CONTENT 15 BAR 4B2	EXTENSBLTY LEF 4D1	EXTENSBLTY LE 4D1	PH H2O 1/1 8C1A	PH H2O 1/10 8C1A	PH CACL2 8C1E
										GRAMS PER CC				PERCENT			PERCENT				
9 839	0- 23	0.50	0.047	1		0.1	NP	NP		1.46	1.48	1.00		5.5	3.1		0.5	0.5	7.6		7.5
9 840	23- 61	0.40	0.040	2		0.1				1.63	1.64	1.00		5.5	4.4		0.2	0.2	7.7		7.8
9 841	61- 90	0.34		29		TR				1.53	1.58	1.00		17.7	10.9		1.1	1.1	7.6	8.9	7.8
9 842	90-150	0.24		39		TR	53	31		1.28	1.37	1.00		25.3	16.0		2.3	2.3	7.6	8.9	8.1

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6D2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- DAC 5A2A	C E C NH4- DAC 5A6A	WATER EXTRACT FROM SATURATED PASTE EC 8A1A	CA 6N1B	MG 6D1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
9 839	0- 23			0.1	1.4	1.5			5.8											
9 840	23- 61			0.1	1.3	1.4			5.9											
9 841	61- 90			0.4	1.0	1.4			4.9	0.96	4.4	2.4	5.4	1.0		3.3	2.7			7.7
9 842	90-150			6.0	0.3	6.3			6.6	6.2	12.9	18.2	52.6	2.2		2.5	31.8	46.3		7.8

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	EXCHANGBLE NA 5D2 PCT.	EXCHANGBLE SAR 5E	GYPSUM AMT. 6F1B PCT.	GYPSUM REQ. 6P3A MEQ.	CLAY MINERALOGY LESS THAN 0.002 MM X RAY I 7A2E	CLAY MINERALOGY II 7A2E	CLAY MINERALOGY III 7A2E	CLAY MINERALOGY IV 7A2E	DTA PCT. 7A3	CLAY MINERALOGY L.T. .0002 MM X RAY I 7A2E	CLAY MINERALOGY II 7A2E	CLAY MINERALOGY III 7A2E	MINERAL CODE
9 839	0- 23		0.1	2												
9 840	23- 61		0.1	2				MI 3								MI MICA
9 841	61- 90	46.9	0.1	3	3											
9 842	90-150	82.9	1.6	25	13			MI 2								

RELATIVE AMOUNT

1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
G=GROUND WHOLE. HORIZON INDURATED OR GRAVEL TOO SOFT TO BE SEPARATED. ALL DATA FOR WHOLE SOIL.

DRY LAKE LOAMY SAND (taxadjunct) 1/
S69Ariz-2-14

Location: Cochise County, Arizona. 350 feet south and 250 feet east of the northwest corner of Sec. 10, T. 16 S., R. 25 E. West of Kansas Settlement Road, about 7½ miles east and 3 miles south of Cochise. Date of sampling: October 16, 1969. Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.

Classification: Ustollic Calciorthid, sandy over loamy, mixed, thermic.

Vegetation: Tumble weeds. Use: Idle cropland. Climate: Precipitation about 11 inches. Mean annual air temperature 58°F., January 41°F., July 78°F. Parent Material: Alluvium and lake sediments from acid and basic igneous rocks and sedimentary rocks. Topography: Nearly level to gently sloping and undulating lower fans, valley plains and lake margins. Slope, 0.2 percent, west facing. Elevation: 4185 feet. Drainage: Moderately well and well drained. Runoff is very slow. Permeability is rapid in the upper part but slow in the lower horizons. Soil Moisture: Dry when sampled.

Remarks: Field determinations of pH by thymol blue indicator in 1:5 dilution. This sample was not paired.

HORIZON	DESCRIPTION
Ap RSL 69839	0 to 23 cm (0 to 9 inches), grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; single grained; loose, nonsticky, nonplastic; common fine and very fine roots; many fine interstitial and few fine tubular pores; few fine white rounded and irregularly shaped lime concretions; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
A12 RSL 69840	23 to 61 cm (9 to 24 inches), grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist, single grained; loose, nonsticky, nonplastic; common fine and very fine and few medium roots; few very fine tubular pores; common fine rounded and irregularly shaped white lime concretions; strongly effervescent; moderately alkaline (pH 8.2); clear irregular boundary.
IIC1ca RSL 69841	61 to 90 cm (24 to 35½ inches), white (10YR 8/2) and very pale brown (10YR 7/3) heavy loam, very pale brown (10YR 7/3) and brown (10YR 5/3) moist; 5 percent of mass is in strata of brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; massive; very hard, friable, sticky, plastic; many very fine and fine roots; few fine tubular pores; very thin, less than 1 mm, laminar stratum at 24 inches, 25 to 30 percent by volume of large irregularly shaped soft lime masses; violently effervescent; strongly alkaline (pH 8.6); gradual wavy boundary.
IIC2ca RSL 69842	90 to 150 cm (35½ to 59 inches), white (10YR 8/2) heavy loam or light clay loam, very pale brown (10YR 7/3) moist; massive; very hard, friable, sticky, plastic; few very fine and fine roots; few very fine and fine tubular pores; 25 to 30 percent by volume of large irregularly shaped soft lime masses; violently effervescent; strongly alkaline (pH 8.6).

1/ The Dry Lake series is in a sandy over loamy, mixed, thermic family of Typic Calciorthids. This pedon has an average of 0.46 percent O.C. and a sand-clay ratio of 15 in the surface 40 cm.

U. S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Ustollic Calciorthid, coarse-loamy, carbonatic, thermic

SOIL Karro loam SOIL No. S64Ariz-2-23 LOCATION Cochise County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 64624 - 64630

Depth (In.)	Horizon	1B1b Total Sand (2–0 05)	Total Silt (0 05–0 002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0 1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0 002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non carbonate clay	Coarse fragments 1A2a: > 2	2 – 19	19 –76
		Size class and particle diameter (mm) 3A1														Pct	Pct of < 76 mm	
		Pct. of < 2 mm																
0-7	Ap1	48.4	33.5	18.1	2.5	6.2	7.5	19.5	12.7	15.5	18.0	39.5	35.7		12	6	6	
7-12	Ap2	44.5	35.6	19.9	2.2	4.7	6.7	19.2	11.7	16.0	19.6	38.9	32.8		13	6	6	
12-20	C1ca	30.7	33.8	35.5	1.1	2.9	4.3	13.4	9.0	14.9	18.9	32.0	21.7		18	4	4	
20-27	C2ca	23.7	35.0	41.3	1.6	2.0	2.9	10.1	7.1	11.7	23.3	24.9	16.6		15		tr	
27-42	C3ca	30.1	30.1	39.8	1.2	2.7	3.9	12.8	9.5	10.3	19.8	27.7	20.6		17		tr	
42-56	C4ca	26.7	24.0	49.3	2.2	3.6	3.9	10.8	6.2	8.0	16.0	20.4	20.5		19		tr	
56-75+	C5ca	21.7	37.1	41.2	1.9	3.9	3.4	7.8	4.7	6.4	30.7	15.7	17.0		4		tr	

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2b Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$ 1/	3A1a Carbonate in <0.002 mm.	Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry	Bulk density	3B2	Water content	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLEf	4D1 Extensibility COLE	pH: 8C1b Saturated Paste	pH: 8C1a H_2O 1:1	pH: 8C1a H_2O 1:10
	Pct	Pct.		Pct.	Pct.	Pct.	g/cc	g/cc	g/cc	Cm	Pct.	Pct.	Pct.	Pct	Pct.			
0-7	0.84	0.084	10		22	6	1.31	1.35		0.97		26.5	14.0	0.011	0.010		7.9	8.6
7-12	0.60	0.071	8		24	7	1.28	1.33		0.97		27.8	14.2	0.012	0.012		8.0	8.6
12-20	0.30				35	18	1.29	1.38		0.98		27.9	14.4	0.023	0.022		8.1	8.7
20-27	0.23				47	26							17.4				8.0	8.7
27-42	0.18				48	23	1.22	1.32		1.00		31.3	19.7	0.027	0.027		8.0	8.7
42-56	0.13				49	30							15.2				8.1	8.7
56-75+	0.13				79	37	1.50	1.56		1.00		20.1	10.3	0.015	0.015		8.2	8.8

Depth (In)	Extractable bases 5B1a: 6N2b Ca	6O2c Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch Capacity: 5A2a NaOAc	5A1a NH_4OAc	Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	6I1a CO_3	6J1a HCO_3	6K1a Cl	6L1b SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter								mmho/cm
0-7	23.0	3.4	1.0	1.6	29.0			13.4	7.2	1.4	3.7	0.5	-	2.0	2.0		1.28
7-12	22.4	3.4	1.0	1.6	28.4			12.8	7.0	1.6	4.3	0.4	-	1.8	2.5		1.32
12-20	18.7	3.7	1.0	1.5	24.9			9.0	4.8	1.5	4.2	0.6	-	1.9	2.1		1.13
20-27	21.7	5.0	1.0	1.1	28.8			9.6	5.8	2.4	3.8	0.6	-	1.9	1.8		1.25
27-42	19.2	5.4	1.0	1.3	26.9			10.4	5.6	2.4	3.9	0.9	-	2.0	1.9		1.29
42-56	20.3	3.1	0.8	1.3	25.5			9.2	5.9	1.6	4.6	0.8	-	1.8	2.7		1.32
56-75+	17.5	2.7	1.0	0.6	21.8			3.2	6.1	2.6	5.6	0.9	-	1.7	3.3		1.54

Depth (In)	8A Water at Saturation	Atterberg limits: Plastic limit	Atterberg limits: Liquid limit	Atterberg limits: Plastic index	5D2 Exchangeable Na	5B1b Exch. Na	Gypsum	Clay mineralogy (<0.002 mm) 3A1: Mont.	Verm.	Mica 7A2	Kaolin.
	Pct.	Pct. of <0.4 mm			Pct.	me/ 100g	Pct.	X-ray			
0-7	48.1				6	0.8					
7-12	50.8				6	0.8		xx	xx	xx	tr
12-20	55.9				9	0.8					
20-27	58.6	31	65	34	8	0.8					
27-42	61.0	25	53	28	8	0.8		xx	xx	xx	tr
42-56	54.7				6	0.6					
56-75+	42.8				25	0.8					

1/ Percent of whole soil including >2 mm.

KARRO LOAM
S64Ariz-2-23

Location: Cochise County, Arizona. 3-1/2 miles east and 14 miles south of Willcox, Arizona. 1075 feet north and 600 feet east of the south 1/4 corner of Sec. 11, T. 16 S., R. 24 E. Date of Sampling: October 21, 1964.
Description by: James Jay and M. L. Richardson. Collectors: K. W. Flach, B. Brasher, James Jay, M. L. Richardson, and R. K. Preece.
Classification: Ustollic Calciorthid, coarse-loamy, carbonatic, thermic.
Vegetation: Cropland. Climate: Precipitation about 11 inches annual. Mean annual temperature is 58°F. at Willcox. Mean January temperature is 41° F., mean July temperature 77° F. Soil temperature at time of sampling was: 24 inches 61° F., 48 inches 64° F., and 96 inches 65° F. Topography: Nearly level valley plain near Willcox Playa. Slopes are smooth and very slightly convex with gradient of 0.2 to 0.3 percent. Elevation: 4210 feet. Drainage: Well drained. Moderately permeable. Slow surface runoff. Soil Moisture: Moist - 50 to 75 percent field capacity. Remarks: Karro soils are associated with soils of the Gothard, Pima, and McAllister series and are in intermittent bodies surrounding the playa. Paired sample is S64Ariz-2-24. Field determinations of pH by thymol blue in 1:5 dilution.

HORIZON	DESCRIPTION
AP1 RSL No. 64624	0-7 inches (1-18 cm), light brownish gray (10YR 6/2) loam, dark yellowish brown (10YR 3/4) when moist; massive, breaking to moderate fine granular structure; slightly hard when dry, friable when moist, slightly sticky and plastic when wet; common fine, medium, and coarse roots; many fine interstitial pores; violently effervescent with HCl; pH 8.2; clear smooth boundary.
AP2 RSL No. 64625	7-12 inches (18-30 cm), pale brown (10YR 6/3) with 25 percent light brown (7.5YR 6/4) loam, dark yellowish brown (10YR 3/4) when moist; massive, breaking to weak to moderate medium subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and plastic when wet; common fine, medium and coarse roots; many fine interstitial pores; violently effervescent; pH 8.2; clear wavy boundary.
C1ca RSL No. 64626	12-20 inches (30-51 cm), light brown (7.5YR 6/4) and 25 percent pink (7.5YR 7/4) loam, brown (7.5YR 5/4) and light brown (7.5YR 6/4) when moist; massive; hard when dry, friable when moist, slightly sticky and plastic when wet; common fine and medium roots; common fine interstitial and tubular pores; violently effervescent; few fine and medium lime-silica(?) cemented nodules that are extremely hard and firm; pH 8.4; gradual smooth boundary.
C2ca RSL No. 64627	20-27 inches (51-69 cm), mottled pinkish gray (7.5YR 7/2) and pinkish white (7.5YR 8/2) gravelly heavy loam, light brown (7.5YR 6/4) and pinkish gray (7.5YR 7/2) when moist; massive and weakly cemented; very hard when dry, friable when moist, slightly sticky and plastic when wet; few fine tubular and common intersitial pores; violently effervescent; approximately 50 percent fine and medium concretions that are extremely hard and very firm; pH 8.6; gradual smooth boundary.
C3ca RSL No. 64628	27-42 inches (69-107 cm), mottled equal parts of pink (7.5YR 7/4) and pinkish white (7.5YR 8/2) gravelly heavy loam, light brown (7.5YR 6/4) and pinkish gray (7.5YR 7/2) when moist; weak medium and coarse prismatic breaking to moderate fine and medium angular blocky structure; very hard when dry, firm when moist, slightly sticky and plastic when wet; few fine roots; many fine and very fine tubular pores and common interstitial pores; approximately 35 percent fine and medium, hard and very fine concretions; violently effervescent; pH 8.6; clear wavy boundary.
C4ca RSL No. 64629	42-56 inches (107-142 cm), similar to C3ca but containing 50 to 60 percent concretions with texture a very gravelly (concretions) heavy loam.
C5ca RSL No. 64630	56-75 inches +(142-190 cm), mottled 75 percent white (N8) and 25 percent pinkish gray (7.5YR 7/2) clay loam, pinkish white (7.5YR 8/2) and pinkish gray (7.5YR 7/2) when moist; massive and weakly cemented, breaking to weak fine and medium subangular blocky structure; very hard when dry, firm when moist, sticky and plastic when wet; no roots; common fine interstitial and many fine and very fine tubular and a few medium tubular pores; violently effervescent; pH 8.6.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Ustollic Calciorthid, coarse-loamy, carbonatic, thermic
SOIL Karro loam SOIL Nos. S64Ariz-2-24 LOCATION Cochise County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 64631 - 64637

Depth (In.)	Horizon	1B1b Size class and particle diameter (mm) 3A1 Total Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	Non carbonate clay		Coarse fragments 1A2a >2 Pct.	1A2a 2–19 Pct. of <76 mm	19–76 Pct. of <76 mm
		Pct. of <2 mm																
0–13	Ap1	50.4	32.4	17.2	4.1	9.8	8.4	17.2	10.9	14.5	17.9	35.1	39.5	12		7	7	
13–22	Ap2	47.2	34.5	18.3	3.4	8.1	7.5	16.3	11.9	16.6	17.9	37.9	35.3	12		10	10	
22–32	C1ca	37.9	32.9	29.2	4.1	7.5	5.5	11.6	9.2	13.1	19.8	28.9	28.7	14			tr.	
32–42	C2ca	25.7	36.2	38.1	2.4	4.1	3.5	8.4	7.3	12.5	23.7	24.8	18.4	14			tr.	
42–53	C3ca	23.3	31.6	45.1	1.8	3.4	3.2	8.8	6.1	11.2	20.4	22.5	17.2	16			tr.	
53–106	C4ca	20.4	29.4	50.2	1.7	3.5	2.7	6.6	5.9	8.3	21.1	18.0	14.5	17			tr.	
106–110+	IIC5	25.7	34.1	40.2	1.0	2.3	2.8	9.3	10.3	9.5	24.6	25.5	15.4	7		27	25	2

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct	C/N		6E1b Carbonate as $CaCO_3$ 1/ Pct.	3A1a Carbonate in <0.002 mm Pct.	Atterberg limits: Plastic limit Pct. of <0.4 mm	Liquid limit	Plastic index		Water content: Pct.	Pct.	4B2 15 bar Pct.			pH: 8C1a 1:1 H_2O	8C1a 1:10 H_2O
0–13	0.90	0.093	10		27	5							14.8			7.8	8.3
13–22	0.60	0.067	9		29	6							15.6			8.0	8.6
22–32	0.34				46	15	30	58	28				15.3			8.1	8.7
32–42	0.18				60	24	22	45	23				15.3			8.1	8.7
42–53	0.16				55	29							14.7			8.1	8.7
53–106	0.11				58	33							16.3			8.1	8.7
106–110+	0.03				29	13							14.6			8.0	8.6

Depth (In.)	Extractable bases 5B1a: 6N2b Ca	6O2c Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum	Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K		6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter									mmho/cm
0–13	24.1	3.2	1.0	1.7	30.0		15.1		18.6	4.0	6.9	0.8		-	2.2	5.0		2.83
13–22	22.6	3.3	0.8	2.0	28.7		14.5		6.4	1.5	3.4	0.4		-	2.3	2.5		1.17
22–32	22.2	3.9	0.8	1.6	28.5		9.4		5.4	2.0	3.2	0.8		-	2.8	2.2		1.13
32–42	20.0	3.6	1.0	1.3	25.9		10.9		4.8	2.2	3.4	0.8		-	2.0	2.2		1.13
42–53	18.5	3.9	1.1	1.5	25.0		11.5		5.5	2.6	5.0	1.0		-	2.2	2.2		1.40
53–106	18.6	4.7	0.9	1.5	25.7		9.6		5.6	2.2	4.4	1.2		-	2.2	2.1		1.37
106–110+	22.4	4.7	0.9	2.0	30.0		15.4		4.9	2.0	3.2	0.8		-	1.8	1.7		1.09

Depth (In.)	8A Water at Saturation Pct.	5D2 Exchangeable Na Pct.	5B1b Exch. Na me / 100 g	Gypsum Pct.			
0–13	51.8	4	0.6				
13–22	54.3	4	0.6				
22–32	53.8	6	0.6				
32–42	49.2	7	0.8				
42–53	49.6	8	0.9				
53–106	52.3	7	0.7				
106–110+	59.9	4	0.7				

1/ Percent of whole soil including >2 mm.

KARRO LOAM
S64Ariz-2-24

Location: Cochise County, Arizona. 5 miles east and 14 miles south of Willcox, Arizona via Kansas Settlement Road. 2000 feet north and 350 feet west of the southeast corner of Sec. 12, T. 16 S., R. 25 E. Date of Sampling: October 21, 1964.
Description by: James Jay and M. L. Richardson. Collectors: K. W. Flach, B. Brasher, James Jay, M. L. Richardson, and R. K. Preece.
Classification: Ustollic Calciorthid, coarse-loamy, carbonatic, thermic.
Vegetation: Cropland. Climate: Precipitation about 11 inches annual. Mean annual temperature is 58° F. at Willcox. Mean January temperature 41° F.; mean July temperature 77° F. Soil temperature at time of sampling was: 20 inches 62° F., 48 inches 64° F., 96 inches 68° F. Parent Material: Mixed alluvium, from rhyolite, ignimbrite, andesite, limestone and quartzite. Topography: Nearly level valley plain on Willcox Playa. Slopes are smooth and very slightly convex with gradient of 0.2 to 0.3 percent. Elevation: 4,240 feet. Drainage: Well drained. Moderately permeable. Slow surface runoff. Soil Moisture: Moist - 50-75 percent field capacity. Remarks: Karro soils are associated with soils of the Gothard, Pima, and McAllister series and are situated in intermittent bodies surrounding the playa. Paired sample is S64Ariz-2-23. Field determinations of pH by thymol blue in 1:5 dilution.

HORIZONS	DESCRIPTION
Ap1 RSL No. 64631	0-13 inches (0-33 cm), light grayish brown (10YR 6/2) loam, brown to dark brown (10YR 4/3) when moist; massive, breaking to moderate and strong fine granular structure; many medium to coarse subrounded clods in upper part; slightly hard when dry, very friable when moist, slightly plastic when wet; common fine, medium, and coarse roots; many fine interstitial pores; violently effervescent lime disseminated; pH 8.4; gradual smooth boundary.
Ap2 RSL No. 64632	13-22 inches (33-56 cm) *, same colors; loam; massive, breaking to weak fine subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; common fine, medium, and large roots; many fine interstitial pores; violently effervescent; pH 8.4; abrupt irregular boundary.
C1ca RSL No. 64633	22-32 inches (56-81 cm) *, mottled pale brown (10YR 6/3) and white (10YR 8/2) very gravelly loam, brown (10YR 5/3) and pale brown (10YR 6/3) when moist; silica(?); extremely hard when dry, firm when moist, non-sticky and slightly plastic; common fine, medium, and large (alfalfa) roots; many fine and very fine tubular pores both in matrix and concretions; 50-60 percent of volume is medium to large, extremely hard, extremely firm lime-silica(?) concretions; violently effervescent; pH 8.6; gradual smooth boundary.
C2ca RSL No. 64634	32-42 inches (81-107 cm) *, mottled pink (7.5YR 7/3) and white (10YR 8.2) light clay loam; light brown (7.5YR 6/4) and very pale brown (10YR 7/3) when moist; massive, breaking to weak fine granular and subangular blocky structure; very hard when dry; firm when moist, slightly sticky and slightly plastic when wet; common fine, medium, and large (alfalfa) roots; many fine and very fine tubular pores both in matrix and concretions; about 10 percent extermely hard, extremely firm concretions; violently effervescent; pH 8.6; gradual smooth boundary.
C3ca RSL No. 64635	42-53 inches (107-135 cm) with pinkish white (7.5YR 8/2) concretions very gravelly loam, light brown (7.5YR 6/4) and pink (7.5YR 7/4) when moist; massive, breaking to weak fine granular and subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; fine, medium and coarse roots; many fine and very fine tubular pores in matrix and concretions; violently effer-vescent; 50-60 percent 1/4 to 1 inch rounded to irregular shaped concretions (concretions included as [illegible]

CONSECUTIVE PEDON NUMBER C 71 2 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES LOMITAS SOIL NO. S71 ARIZ. 10- 3 SAMPLE NO. 1 10-1 12 ORGAN PIPE MON AREA

SOIL FAMILY: LITHIC CAMBORTHID,LOAMY-SKELETAL,MXD,HYPRTHRMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.		DEPTH CM.		HORZ.	TOTAL FRACTION <2 mm SAND 2-.05	SILT .05-.002	CLAY LT .002	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A,.02	1A2A INT. II	COARSE FRAGMENTS PCT. I 2-75	II 20-5	III 5-2
					PERCENT OF LESS THAN 2MM														SOIL	PCT. OF LT 75	
1	10	0-	5	A1	52.7	36.3	9.0	9.3	3.5	2.1	10.5	27.3	28.1	10.2	7.5	1.5		62.8	80*	46	20	5
1	11	5-	25	B2	47.9	39.6	12.5	10.4	2.9	1.9	9.3	23.4	25.4	14.2	9.8	2.7		55.5	80*	46	19	6
1	12	25-	33	C 1CA	46.6	35.2	18.2	15.3	5.2	2.5	7.9	15.7	18.5	16.7			4	39.5	81*	42	21	9

SAMPLE NO.		DEPTH CM.		ORG.MATTER CARBON 6A1A -PERCENT-	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6F1B -PERCENT-	2-20 6E1B	SESQUIOXIDES DI-CIT EXT 6C2B FE -----PERCENT-----	PYROP EXT 6G7A AL	FE 6C5A	AL 6G5A	ATTERBERG LL 4F1	PL 4F2	BULK DENSITY 1/3 BAR PCT.NO.40	DRY GRAMS PER CC	CM 3B2	WATER CONTENT 1/10 BAR 4B1C -----PERCENT-----	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEE 4D1 -PERCENT-	LE 4D1
1	10	0-	5	0.38	0.051	1		0.7	0.1					1.30	1.33	0.34	23.1	18.7	5.9	0.8	0.3
1	11	5-	25	0.31	0.045	5		0.4	TR					1.45		0.32			7.6		
1	12	25-	33	0.40		31		0.2	TR					1.65		0.28			10.2		

SAMPLE NO.		DEPTH CM.		EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4-OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
				MEQ/100G									PERCENT					
1	10	0-	5	12.3	1.8	0.1	1.3	15.5			15.5	11.5	100+		100+		8.2	7.4
1	11	5-	25	20.4	1.8	0.1	1.3	23.6			23.6	11.8	100+		100+		8.2	7.7
1	12	25-	33	19.2	1.6	0.2	0.6	21.6			21.6	8.3	100+		100+		8.3	7.8

SAMPLE NO		DEPTH CM.		CLAY MINERALOGY <.002 MM DTA 7A3 -PERCENT-	LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
1	10	0-	5		MI 4	MT 1	KK 1		MI 3			MI MICA	1 TRACE
1	11	5-	25		MI 4	MT 1	KK 1		MI 3			MT MONTMORT	2 SMALL
1	12	25-	33		MI 5	MT 1	KK 1					KK KAOLINIT	3 MODERATE
													4 ABUNDANT
													5 DOMINANT
													6 INDETER.

SAMPLE PREPARATION CODES
**=THE 75-250MM FRACTION IS INCLUDED.

LOMITAS VERY COBBLY LOAM

S71 Ariz-10-3-(1-4*)

Location: Pima County, Arizona. 1/8 mile east and 1/16 mile north of the southwest corner of Section 11, T18S, R5W, Organ Pipe Cactus National Monument. Date of Sampling: April 6, 1971.
Description by: Y.H.Havens, E.Chamberlin. Collectors: K. Flach, E. Chamberlin, K. Vogt.
Classification: Lithic Camborthid, loamy-skeletal, mixed, hyperthermic.
Vegetation: Triangle bursage, creosotebush, saguaro and organpipe cacti and paloverde. Use: Desert rangeland. Climate: Mean annual precipitation 7 to 9 inches. Mean annual air temperature 69° F. Parent Material: Andesite and welded andesitic tuff. Topography: Moderately steep--concave, with 25 percent slopes. Elevation: 1440 feet. Drainage: Well drained, with moderate permeability to bedrock. Soil Moisture: Dry.
Remarks: 70 percent of surface covered with angular gravel, cobbles and stones.

HORIZON	DESCRIPTION
A1 RSL 7110	0 to 5 cm (0 to 2 inches), brown (7.5YR 5/4) very cobbly loam, dark brown (7.5YR 4/4) moist; weak medium platy structure; slightly hard, friable, nonsticky, slightly plastic; few very fine roots; common very fine tubular and vesicular and common medium tubular pores; 70 percent gravel and cobble by volume; slightly effervescent; moderately alkaline (pH 8.0 thymol blue); abrupt wavy boundary.
B2 RSL 7111	5 to 25 cm (2 to 10 inches), light brown (7.5YR 6/4) very gravelly loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky, slightly plastic; few very fine, fine and medium roots; common very fine interstitial and few fine tubular pores; 75 percent gravel and cobble by volume, strongly effervescent; gravel have pinkish white (5YR 8/2) lime coatings on undersides; moderately alkaline (pH 8.0); clear wavy boundary.
Cca RSL 7112	25 to 33 cm (10 to 13 inches), light brown (7.5YR 6/4) very gravelly loam, dark brown (7.5YR 4/4) moist; massive; soft, very friable, slightly sticky, slightly plastic; common fine and medium roots; common fine interstitial pores;80 percent gravel and cobble by volume; violently effervescent; continu-

CONSECUTIVE PEDON NUMBER C 69206 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES CAVE TAXADJUNCT SOIL NO. S69 ARIZ. 10- 5 SAMPLE NO. 91096-91100 WALNUT G.-TUCSON AREA

SOIL FAMILY: TYPIC PALEORTHID,LOAMY-SKELETAL,MXD,THRMC,SHLLW RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05	SANDS .05- .002	SILTS .002- LT	CLAYS LT .002	VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	CO. CLAY 2- .2U	FINE CLAY LT .2U	CARBONATE CLAY NATE 3A1A	INT. II .2- .02	COARSE FRAGMENTS PCT. OF WHOLE 75- 20	I	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM															SOIL	PCT. OF LT 75		
91096	0- 3	A1	71.2	22.0	6.8		9.4	12.2	12.9	21.7	15.0	17.8	4.2			44.1	69A	--	46	23	
91097	3- 18	C 1	63.7	27.3	9.0		8.9	11.5	9.2	18.5	15.6	20.7	6.6			46.6	68A	--	53	15	
91098	18- 51	C2cam	63.2	25.7	11.1		17.4	17.1	9.9	11.5	7.3	8.0	17.7			6 21.1	--G	--G	--G	--G	
91099	51- 81	C3cam	57.3	29.9	12.8		17.8	11.5	6.7	11.5	9.8	11.0	18.9			6 27.4	--G	--G	--G	--G	
91100	81-104	C4cam	64.4	22.8	12.8		26.9	13.9	7.5	9.5	6.6	7.1	15.7			4 18.7	--G	--G	--G	--G	

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY EST 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT--		-PERCENT-		PCT.	PCT.	NO.40	GRAMS PER CC			----PERCENT---			-PERCENT--				
91096	0- 3	0.73	0.082	1		0.6			1.46	1.50	0.44	15.2	4.4	0.9	0.4	7.6	8.7	7.5	
91097	3- 18	0.46	0.046	1		0.7			1.52	1.55	0.46	12.0	4.4	0.7	0.3	7.8		7.7	
91098	18- 51	0.27		56		0.2					1.00		6.7			7.2	8.3	7.9	
91099	51- 81			53		0.2					1.00		6.8			7.3	8.5	8.0	
91100	81-104			32		0.2					1.00		10.0			7.3	8.0	8.0	

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	-MEQ/100G		MMHO	----------MEQ/1000 ML----------								PPM	
91096	0- 3			0.2	1.2	1.4			8.3	0.81	6.7	1.2	0.9	1.4		8.2	0.2			7.5
91097	3- 18			0.2	1.3	1.5			7.5											
91098	18- 51			4.6	2.3	6.9			3.2	25.0	102.3	101.5	94.9	20.8		3.3	275.0	25.2		7.4
91099	51- 81			4.4	1.3	5.7			3.3	16.4	53.6	53.4	93.4	8.7		1.8	162.0	26.8		7.8
91100	81-104			2.2	1.1	3.3			4.1	8.8	43.7	31.5	37.4	3.5		1.8	64.9	52.0		7.8

SAMPLE NO.	DEPTH CM.	WATER AT 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY LESS THAN 0.002 MM L.T. .0002 MM X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	DTA IV 7A2E	DTA 7A3 PCT.	X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	MINERAL CODE	RELATIVE AMOUNT
91096	0- 3	31.0	0.2	2	TR			MI 2								MI MICA	1 TRACE
91097	3- 18		0.2	3				MI 2									2 SMALL
91098	18- 51	43.0	0.5	16	9	0.1		MI 3									3 MODERATE
91099	51- 81	40.8	0.6	18	13	0.1											4 ABUNDANT
91100	81-104	45.5	0.5	12	6	3.0		MI 4									5 DOMINANT
																	6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
G=GROUND WHOLE. HORIZON INDURATED OR GRAVEL TOO SOFT TO BE SEPARATED. ALL DATA FOR WHOLE SOIL.

CAVE GRAVELLY SANDY LOAM (taxadjunct) 1/
S69Ariz-10-5

Location: Pima County, Arizona. 1,420 feet west and 50 feet north of southeast corner of Sec. 2, T. 15 S., R. 13 E., approximately 30 feet north of Drexel Road, about 3 miles south of intersection of Ajo Road and I-10 in Tucson. Date of sampling: October 9, 1969.
Description by: Y. H. Havens and D. M. Hendricks. Collectors: Y. H. Havens and D. M. Hendricks.
Classification: Typic Paleorthid, loamy-skeletal, mixed, thermic, shallow.
Vegetation: Creosote bush and annual grasses and weeds. Climate: Mean annual temperature is approximately 67-69° F. Mean annual precipitation 10-11 inches. Parent material: Mixed old alluvium from limestone, granite, rhyolite, andesite and sandstone.
Topography: Nearly level to gently sloping old fan. Elevation: 2,475 feet.
Drainage: Well drained. Soil moisture: Dry.
Remarks: 25 to 30 percent gravel on surface.

HORIZON	DESCRIPTION
A1 RSL No. 691096	0-3 cm (0-1 inch), brown (7.5YR 5/4) gravelly sandy loam, dark brown (7.5YR 4/4) moist; weak thick platy structure; slightly hard, very friable, nonsticky, nonplastic; common very fine and fine roots; common fine and very fine interstitial and vesicular and few fine tubular pores; 20 percent gravel; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C1 RSL No. 691097	3-18 cm (1-7 inches), light brown (7.5YR 6/4) gravelly fine sandy loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; common very fine, fine and medium roots; few fine vesicular and interstitial pores; 30 to 35 percent gravel; strongly effervescent; moderately alkaline (pH 8.2); abrupt wavy boundary.
C2cam RSL No. 691098	18-51 cm (7-20 inches), white (10YR 8/2) gravelly indurated layer with thin laminar layer on upper part, very pale brown (10YR 7/3) moist; massive; slightly hard; very few very fine roots; few fine vesicular pores; violently effervescent; moderately alkaline (pH 8.2); abrupt wavy boundary.
C3cam RSL No. 691099	51-81 cm (20-32 inches), white (10YR 8/2) and very pale brown (10YR 8/3) strongly cemented gravelly layer, very pale brown (10YR 7/3) and light yellowish brown (10YR 6/4) moist; massive; extremely hard to very hard, very firm; very few very fine roots; violently effervescent; moderately alkaline (pH 8.2); clear wavy boundary.
C4cam RSL No. 691100	81-104 cm (32-41 inches), white (10YR 8/2) and very pale brown (10YR 8/3) strongly cemented gravelly layer, very pale brown (10YR 7/3) and light yellowish brown (10YR 6/4) moist; massive; very hard to extremely hard; very firm; very few very fine roots; violently effervescent; moderately alkaline (pH 8.2).

1/ The Cave series is in a loamy, mixed, thermic, shallow family of Typic Paleorthids. This pedon has more than 35 percent coarse fragments by volume.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Paleorthid, loamy, carbonatic, thermic, shallow
SOIL Cave gravelly loam (taxadjunct) SOIL Nos. S64Ariz-2-31 LOCATION Cochise County, Arizona
SOIL SURVEY LABORATORY. Riverside, California LAB. Nos. 64581 - 64582

Depth (in.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	3A1 Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 1A2a: > 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0–1	A11	50.8	35.2	14.0	8.4	7.7	4.3	14.3	16.1	22.5	12.7	48.7	34.7			51	37	14
1–8	A12	38.1	37.3	24.6	6.0	5.8	3.4	10.0	12.9	20.0	17.3	39.5	25.2			44	17	27

Depth (in.)	6A1a Organic carbon	6B1a Nitrogen	C/N		6E1b Carbonate as $CaCO_3$ 1/	3A1a Carbonate in <0.002 mm.	Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry		Water content	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLEF	3B2	pH: 8C1a 1:1	pH: 8C1a 1:10
	Pct.	Pct.			Pct.	Pct.	g/cc	g/cc	g/cc	Pct.	Pct.	Pct	in./in.	in./in.	Cm	H_2O	H_2O
0–1	0.90	0.079	11		44	2	1.44	1.49			17.1	7.6	0.012	0.007	0.64	8.3	8.9
1–8	1.63	0.159	10		46	6	1.22	1.28			18.3	11.5	0.017	0.013	0.74	8.2	8.7

Depth (in.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	Cation Exch. Capacity: 5A 1a NH_4OAc	5A3a Sum	Water extract from saturated paste: Ca	Mg	Na	K		CO_3	HCO_3	Cl	SO_4	8A1a Electrical conductivity
	meq/100 g							meq/liter									mmho/cm
0–1	27.4	1.6	0.2	0.8	30.0	13.7											0.65
1–8	32.7	1.8	0.2	0.5	35.2	19.9											0.57

CAVE GRAVELLY LOAM (taxadjunct) 1/
S64Ariz-2-31

Location: Cochise County, Arizona. 2.8 miles from the Johnson mine. 1560 feet east and 1850 feet south of the NW corner of Sec. 14, T. 15 S, R. 22 E and about 100 feet east of the road. Date of Sampling: October 23, 1964

Description by: James Jay and M. L. Richardson. Collectors: K. W. Flach, B. Brasher, James Jay, R. K. Preece, M. L. Richardson.

Classification: Typic Paleorthid, loamy, carbonatic, thermic, shallow.

Vegetation: Brush-grass: Mortonia, beargrass wolfberry, few oak brush, yucca, sotol, guajillo, tall three-awn, slim tridens, sideoats grama, fluff grass. Climate: Precipitation estimated 14-15 inches annual. Parent Material: Alluvium from limestone. Topography: Smooth convex and gently undulating alluvial fan. Slope is 6 percent with a northeast aspect. Elevation: 4950 feet. Drainage: Well drained. Rapid surface runoff. Permeability is variable. Soil Moisture: Slightly moist, 25 percent of field capacity. Remarks: Paired sample is S64Ariz-2-30. Cave and Whitehead soils have similar profiles but occur on different land forms, have markedly different vegetation, and different parent materials. Field determinations of pH by thymol blue in 1:5 dilution.

HORIZON	DESCRIPTION
A11 RSL No. 64581	0-1 inch (0-3 cm), light brownish gray (10YR 6/2) with a very thin surface coating of brownish yellow (10YR 6/6) very gravelly loam, dark brownish gray (10YR 4/2) and dark yellowish brown (10YR 3/4) when moist; moderate medium and fine platy structure; slightly hard when dry, very friable when moist, slightly sticky and plastic when wet; common fine and medium roots; many fine discontinuous and a few fine continuous tubular pores; 60 percent fine gravel and pan fragments; violently effervescent with HCL; pH 8.2; abrupt smooth boundary.
A12 RSL No. 64582	1-8 inches (3-20 cm), brown (1-YR 5/3), gravelly loam, dark brown (10YR 3/3) when moist; moderate fine and medium subangular blocky breaking to moderate fine granular structure; slightly hard when dry, very friable when moist, slightly sticky and plastic when wet; many fine and medium roots; many fine tubular and interstitial pores; violently effervescent; 8.2; abrupt wavy boundary.
Ccam (not sampled)	8 inches (20 cm), indurated lime conglomerate pan which is laminar in top 1/2 to 1 inch. White (N8) pinkish gray (7.5YR 7/2) when moist; massive; extremely hard when dry, and extremely firm when moist; no roots except in fractures; no pores in top 1/2 inch but common tubular fine pores below; violently effervescent.

1/ The Cave series is in a loamy, mixed, thermic, shallow family of Typic Paleorthids. This pedon has carbonatic mineralogy.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Paleorthid, loamy, mixed, thermic, shallow
SOIL Cave gravelly loam SOIL Nos. S64Ariz-2-30 LOCATION Cochise County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 64579 - 64580

Depth (In.)	Horizon	1B1b Total Sand (2-0.05)	Total Silt (0.05-0.002)	Total Clay (< 0.002)	Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Silt: 0.05-0.02	Silt: Int. III (0.02-0.002)	3A1 Int. II (0.2-0.02)	(2-0.1)			Coarse fragments 1A2c: > 2 Pct	2 - 19 (Pct. of < 76 mm)	19 - 76 (Pct. of < 76 mm)
		Pct. of < 2 mm																
0-1	A11	48.2	32.4	19.4	5.8	7.3	4.9	15.5	14.7	19.5	12.9	44.5	33.5			38	31	7
1-5	A12	42.1	32.6	25.3	7.3	7.3	4.2	12.1	11.2	19.1	13.5	38.4	30.9			37	21	16

CAVE GRAVELLY LOAM
S64Ariz-2-30

Location: Cochise County, Arizona. 1.9 miles north of the Johnson mine. 700 feet east and 1000 feet south of the N 1/4 corner of Sec. 23, T. 15 S, R. 22 E, 100 feet east of road. Date of Sampling: October 23, 1964.
Description by: James Jay and M. L. Richardson. Collectors: K. W. Flach, B. Brasher, James Jay, R. K. Preece, and M. L. Richardson.
Classification: Typic Paleorthid, loamy, mixed, thermic, shallow.
Vegetation: Brush-grass: Mortonia scabrella (sandpaper bush), beargrass, yucca, wolfberry, sotol, black grama, sideoats grama, slim tridens, tall three-awn and fluffgrass. Brush is dominant. Climate: Precipitation estimated 14-15 inches annual. Mean annual temperature 58° F. (Willcox). Parent Material: Alluvium from limestone. Topography: Smooth convex and gently undulating alluvial fan. Slope is 5 percent with a northeast aspect. Elevation: 4950 feet. Drainage: Well drained. Rapid surface runoff. Permeability is variable. Soil Moisture: Slightly moist - 25 percent field capacity. Remarks: Cave and Whitehead soils have similar profiles but occur on different land forms, have markedly different vegetation, and different parent materials. Field determinations of pH by thymol blue in 1:5 dilution. Paired sample is S64Ariz-2-31.

HORIZON	DESCRIPTION
A11 RSL No. 64579	0-1 inch (0-3 cm), light brownish gray (10YR 6/2), with a very thin surface crust of brownish yellow (10YR 6/6), very gravelly loam, dark grayish brown (10YR 4/2) and dark yellowish brown (10YR 4/4) when moist; friable when moist, slightly sticky and slightly plastic when wet; common fine and medium roots; many fine and very fine discontinuous and a few fine continuous tubular pores; 50-60 percent fine gravel and lime fragments; violently effervescent with HCl; pH 8.21; abrupt smooth boundary.
A12	1-5 inches (3-13 cm), pinkish gray (7.5YR 6/2) gravelly loam, brown to dark brown (7.5YR
64580	fine gravel and lime fragments; violently effervescent; pH 8.2; abrupt smooth boundary.
Ccam (Not sampled)	5 inches (13 cm), indurated lime conglomerate pan with laminar layer in upper part. Pinkish white to white (7.5YR 8/2 & N8) that is pinkish gray (7.5YR 7/2) when moist; massive; extremely hard both dry and moist; no roots except in fractures; no pores; violently effervescent.

SOIL SURVEY LABORATORY Riverside, California

SOIL TYPE Pastura gravelly loam **LOCATION** Yavapai County, Arizona

SOIL FAMILY: Ustollic Paleorthid, loamy, mixed, mesic, shallow

SOIL NOS. S59Ariz-13-1 **LAB. NOS.** 59393 - 59396 & 59396-A

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 **	TEXTURAL CLASS
0-4	A_1	1.6	5.2	6.7	16.4	12.5	35.6	22.0	42.0	16.1	39	1
4-13	C_1	1.1	4.5	5.8	13.4	9.8	36.3	29.1	35.5	18.8	37	cl
13-20	C2ca	1.6	5.3	6.1	13.6	10.5	34.9	28.0	36.4	17.3	41	cl
20-38	C3cam &C4ca	2.7	8.2	6.5	11.4	8.7	35.7	26.8	28.1	23.1	41	1- cl
20-24*	C3cam										20	

8C1b pH SATURATED PASTE 1:1	6I1a CO_3 meq./l.	8C1a pH 1:10	ORGANIC MATTER 6A1a ORGANIC CARBON %	6B1a NITROGEN %	C/N	6J1a HCO_3 meq./l.	8A1a Elec. Conduc. EC×10³ MILLIMHOS PER CM @25°C.	6E1b $CaCO_3$ equivalent %	4A3a Bulk Density g./cc	MOISTURE TENSIONS 4B2 1/10 ATMOS. %	4B2 1/3 ATMOS. %	4B2 15 ATMOS. %
7.8	-	8.7	1.12	0.115	9.7	3.9	0.5	11				11.4
7.6	-	8.7	1.07	0.121	8.8	2.8	0.5	21				13.7
7.8	-	8.6	0.81	0.092	8.8	3.7	0.5	23				12.7
8.0	-	8.9	0.44	0.052	8.5	2.5	1.0	64				11.3
20-24	Inch horizon*							82				

5A2a CATION EXCHANGE CAPACITY (Na)	EXTRACTABLE CATIONS 5B1a Ca 6N2b	5B1a Mg 6O2c	6H2a H	Exch. 5B1b Na 6P2a	Exch. 5B1b K 6Q2a	BASE SAT. % 5C3	SATURATION EXTRACT SOLUBLE 8A1 6P1a Na	6Q1a K	6N1a Ca	6O1a Mg	6K1a Cl	8A MOISTURE AT SATURATION %
	milliequivalents per 100g. soil →						← milliequivalents per liter →					
24.2				<0.1	1.2		0.1	0.3	4.0	0.6	0.0	36.8
24.4				<0.1	0.6		0.2	0.1	4.4	0.4	0.2	46.4
25.3				<0.1	0.5		0.2	0.1	4.0	0.8	0.1	42.9
9.9				0.1	0.2		1.9	0.1	5.2	3.4	1.1	43.4

* Riv. Lab. No. 59396-A -- Depth 20-24 inches - Strongly cemented calcium carbonate cap - C3cam horizon

** Percent of the whole soil

PASTURA GRAVELLY LOAM

S59Ariz-13-1

Location: Yavapai County, Arizona. 1.5 miles north of Paulden on west side of Highway 89, 325 feet north of Milepost 339 in NW1/4 of Sec. 34, T. 18 N., R. 2 W. Date of Sampling: May 22, 1959.
Description by: Milo James. Collectors: Milo James and Rex Binnie.
Classification: Ustollic Paleorthid, loamy, mixed, mesic, shallow.
Vegetation: Grass aspect with approximate 10 percent crown density. Vegetation consists of ring muhly, black grama, sand dropseed, snakeweed, three-awn, Indianwheat and mallow, in order of occurrence.
Climate: Cold winters, cool summers, 12 inches precipitation, 54° F. mean annual temperature.
Parent Material: Fan alluvium from light gray crystalline Redwall limestone of Mississippian Age with possibly some basalt. Topography: Smooth convex slopes of 1½ percent to the southeast.
Elevation: 4,450 feet. Drainage: Well drained. Soil Moisture: Surface moist from recent shower.
Remarks: Thin scattering of chert fragments and occasional limestone gravel on surface. Limestone or chert gravel and small stones up to 4 inches throughout the lower sections - about 20 percent by volume but may vary considerably in short distances. Root distribution is normal to 30 inches, very few roots below.

HORIZON	DESCRIPTION
A1 RSL No. 59393	0-4 inches (0-10 cm), brown (10YR 4/3) gravelly coarse loam, dark brown (10YR 3/3) moist; moderate very fine to fine granular; slightly hard when dry, very friable moist, slightly sticky and slightly plastic when wet; strongly calcareous; common fine and medium continuous and interstitial pores; numerous medium and fine roots; clear wavy boundary.
C1 RSL No. 59394	4-13 inches (10-33 cm), dark grayish brown (10YR 4/2) gravelly loam, few to numerous fine mycelia of lime, brown (10YR 4/3) moist; weak medium angular blocky breaking to weak fine granular; slightly hard when dry, very friable moist, sticky and plastic when wet; very strongly effervescent; common fine and medium continuous and interstitial pores; common fine and medium roots; few animal burrows; clear wavy boundary.
C2ca	13-20 inches (33-51 cm), brown (10YR 4/3) gravelly loam, brown (10YR 4/3) moist, with common

[redacted]

RSL No. 59395	medium distinct very pale brown lime mottles; massive; slightly hard when dry, very friable moist, sticky and plastic when wet; very strongly effervescent with few small concretions of calcium; common fine and medium continuous and interstitial pores; common fine and medium roots; a few yellowish red (5YR 4/6) clay loam pipes, yellowish red (5YR 4/6) moist, and a few animal burrows; clear irregular boundary.
C3cam RSL No. 59396A	20-24 inches (51-61 cm), white (N 8/) indurated petrocalcic horizon, very pale brown (10YR 7/3) moist; very hard when dry, very firm when moist, nonsticky and nonplastic when wet; strongly effervescent; few fine pores and few fine roots; clear wavy boundary.
C4ca RSL No. 59396	24-38 inches (61-97 cm), white (N 8/) gravelly loam, very pale brown (10YR 7/3) moist; massive except for the top of the horizon which has irregular horizontal laminae, 1/64 - 1/8 inch thick and for the vertical joints at approximately 6 foot intervals in rough hexagonal pattern; weakly cemented; hard when dry, friable moist, nonsticky and nonplastic when wet except for the horizontal laminae and vertical joints which are strongly cemented, very hard when dry, and very firm when moist; very strongly effervescent; few fine roots and few fine pores.

CONSECUTIVE PEDON NUMBER C 69156 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES UNNAMED SOIL NO. S69 ARIZ. 2-10 SAMPLE NO. 9 814-9 815 WILLCOX AREA

SOIL FAMILY: TYPIC FLUVAQUENT,VERY-FINE,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	INT. II .2- .02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75			
9 814	0- 15		0.3	9.9	89.8	--	--	--	0.2	0.1	1.0	8.9			5	1.2	--A	--	--	--
9 815	25- 50		0.4	26.2	73.4	--	--	--	0.2	0.2	5.2	21.0			9	5.5	--A	--	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L I M I T LL 4F1	PL 4F2	BULK DENSITY EST 1/3 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT--		-PERCENT-		PCT.	PCT.NO.40		GRAMS PER CC				----PERCENT---			-PERCENT--				
9 814	0- 15	0.26	0.077	9		0.4			1.50			1.00			24.2			9.8	10.3	9.9
9 815	25- 50	0.38		17		0.1	82	30	1.50			1.00			30.1			9.6	10.2	9.8

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	-MEQ/100G		MMHO	MEQ/1000 ML								PPM	
9 814	0- 15			149.1	2.8	151.9			59.2	63.	0.3	0.1	944.0	1.1	86.5	20.6	609.0	246.0		9.7
9 815	25- 50			176.2	2.1	178.3			43.8	56.5	1.1	0.2	840.0	1.0	79.9	15.2	522.0	222.6		9.8

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT SAT. 8A PCT.	NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	-GYPSUM- AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 PCT.	L.T. .0002 MM X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
9 814	0- 15	75.3	78.0	100+	100+			MI 3	MT 1							MI MICA	1 TRACE
9 815	25- 50	129.4	67.5	100+	100+			MI 3	MT 2	KK 1						MT MONTMORT	2 SMALL
																KK KAOLINIT	3 MODERATE
																	4 ABUNDANT
																	5 DOMINANT
																	6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

UNNAMED
S69Ariz-2-10

Location: Cochise County, Arizona. The Willcox Playa, east of the Southern Pacific Railroad tracks that cross the northwestern part of the playa--about midway between the northern and western margins. Date of Sampling: October 15, 1969.
Description by: None made. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Typic Fluvaquent, very-fine, mixed, thermic.
Vegetation: Barren playa bed. Use: None. Climate: Precipitation about 11 to 12 inches. Mean annual air temperature 58°F., January 41°F., July 78°F. Flooded for long periods. Parent Material: Alluvium from andesite, rhyolite, quartzite, granite and limestone. Topography: Level playa floor. Slope, 0.1 percent or less. Elevation: 4136 feet. Drainage: Poorly to very poorly drained. Runoff is very slow. Permeability is very slow.
Remarks: No attempt was made to describe these samples or the profile. The samples were taken primarily to complete the toposequence sampling.

RSL 69814	0 to 15 cm (0 to 6 inches) clay.
RSL 69815	25 to 50 cm (10 to 20 inches) clay.

CONSECUTIVE PEDON NUMBER C 67 64 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES VINT SOIL NO. S67 ARIZ. 7-14 SAMPLE NO. 7 721-7 727 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC TORRIFLUVENT-SANDY-MIXED-HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	SILTS CO. 2- .2U	CLAYS FINE LT .2U	CARBO NATE 3A1A	INT. II .2- .02	COARSE FRAGMENTS- 1A2A PCT. OF WHOLE SOIL	I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM															PCT. OF LT 75		
7 721	0- 23	AP1	85.1	10.6	4.3	0.7	6.2	18.6	47.0	12.6	9.5	1.1				43.8	1	TR	1Z	N
7 722	23- 36	AP2	88.6	7.7	3.7	0.4	5.6	19.4	50.5	12.7	6.7	1.0				41.6	TR	TR	--	--
7 723	36- 58	C 1															TR	TR	--Z	--
7 724	58- 74	C 2	96.3	2.0	1.7	0.2	10.2	35.3	47.7	2.9	1.4	0.6				18.7	TR	TR	--Z	--
7 725	74- 86	C 3															TR	TR	--Z	--
7 726	86-114	C 4	92.7	4.9	2.4	1.2	6.0	13.3	57.2	15.0	3.1	1.8				51.2	1	TR	1Z	N
7 727	114-157	2C 5	97.2	1.5	1.3	10.8	43.7	30.4	11.6	0.7	0.6	0.9		--		4.1	10	TR	10Z	N

SAMPLE NO.	DEPTH CM.	ORG. CAR- BON 6A1A -PERCENT--	MATTER NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	19-2 6E1B	EXT. IRON FE 6C2B PCT.	ATTERBERG L L 4F1 PCT.	I M 4F2 NO.40	I T PL 4A1F	BULK DENSITY EST 1/3 4A1F GRAMS	1/3 BAR 4A1F PER CC	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C ----PERCENT---	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1 -PERCENT--	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
7 721	0- 23	0.26	0.033	TR					1.27							5.4			8.1		7.2
7 722	23- 36	0.19		TR						1.27	1.27	1.00		15.1		5.4			8.2		7.4
7 723	36- 58				1				1.44							6.4			8.3		7.6
7 724	58- 74	0.02		TR					1.44												
7 725	74- 86			TR					1.44												
7 726	86-114			TR						1.44	1.44	0.99		12.5							
7 727	114-157			TR					1.44												

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES--- CA 5B3A	MG 5B3A	NA 5B4A	K 5B4A	SUM	BASE SAT.	C E C-- NA- OAC	NH4- OAC	WATER EXTRACT FROM SATURATED PASTE 8A1 EC	CA	MG	NA	K	CO3	HCO3	CL	SO4	B	PH SAT. PASTE

VINT LOAMY FINE SAND
S67Ariz-7-14

Location: Maricopa County, Arizona. 1450 feet east and 200 feet south of the northwest corner of Sec. 19, T. 2 S., R. 7 E. Date of Sampling: October 13, 1967.
Description by: E. Adams, J. Saunders, J. Jay. Collectors: K. Flach, D. Nettleton, E. Adams, E. Chamberlin, J. Saunders, J. Jay.
Classification: Typic Torrifluvent, sandy, mixed, hyperthermic.
Vegetation: Fallow. Use: Cropland. Climate: Mean annual precipitation is about 8 inches. Mean annual air temperature is about 80° F. Temperature at 20 inches approximately 80° F. Parent Material: Mixed - acid and basic igneous and metamorphosed sedimentaries. Topography: Flood plains and low fans. Elevation: 1280 feet. Drainage: Well drained. Permeability is rapid. Soil Moisture: Slightly moist below 9 inches Remarks: This profile deviates slightly from the modal in that the C2 (23 to 29 inches) horizon is weak coarse subangular blocky structure rather than weak fine subangular blocky structure. Field determination of pH by thymol blue indicator in 1:5 dilution.

HORIZON	DESCRIPTION
Ap1 RSL No. 67721	0-23 cm (0-9 inches), pale brown (10YR 6/3) loamy fine sand, dark brown (10YR 4/3) moist; massive with a weak platy structure at the upper 1/4 inch; soft when dry, very friable when moist, nonsticky and nonplastic when wet; many fine and medium roots; many fine interstitial pores; very slightly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
Ap2 RSL No. 67722	23-36 cm (9-14 inches), pale brown (10YR 6/3) loamy fine sand, dark brown (10YR 4/3) moist; massive; soft when dry, very friable when moist, nonsticky and nonplastic when wet; common fine roots; many fine interstitial pores; very slightly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C1 RSL No. 67723	36-58 cm (14-23 inches), pale brown (10YR 6/3) loamy fine sand, dark brown (10YR 4/3) moist; massive; soft when dry, very friable when moist, nonsticky and nonplastic when wet; common fine roots; many fine interstitial pores; very slightly effervescent; moderately alkaline (pH 8.0); there is a very dark brown (10YR 2/2) band about 1/16 inch thick; abrupt smooth boundary.
C2 RSL No. 67724	58-74 cm (23-29 inches), pale brown (10YR 6/3) loamy coarse sand, dark brown (10YR 4/3) moist; massive; soft when dry, very friable when moist, nonsticky and nonplastic when wet; few fine roots; many fine interstitial pores; very slightly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
C3 RSL No. 67725	74-86 cm (29-34 inches), pale brown (10YR 6/3) loamy fine sand, dark brown (10YR 4/3) moist; very dark brown (10YR 2/2) bands 1/16 to 1/8 inch thick make up 25 percent of this horizon; soft when dry, very friable when moist, nonsticky and nonplastic when wet; few fine roots; many fine interstitial pores; very slightly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
C4 RSL No. 67726	86-114 cm (34-45 inches), pale brown (10YR 6/3) loamy fine sand, dark brown (10YR 4/3) moist; very dark brown (10YR 2/2) bands 1/16 to 1/8 inch thick make up 15 percent of this horizon; soft when dry, very friable when moist, and nonsticky and nonplastic when wet; few fine roots; many fine interstitial pores; very slightly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
IIC5 RSL No. 67727	114-157 cm (45-62 inches), pale brown (10YR 6/3) sand, dark yellowish brown (10YR 4/4) moist; loose when dry, loose when moist, and nonsticky and nonplastic when wet; no roots; many fine interstitial pores; very slightly effervescent; moderately alkaline (pH 8.0).

CONSECUTIVE PEDON NUMBER C 67 48 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES GILMAN SOIL NO. S67 ARIZ. 7- 2 SAMPLE NO. 7 598-7 604 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC TORRIFLUVENT,CRS-LMY,MXD(CALC.),HYPRTHRMC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	SILTS CO. 2-.2U	CLAYS FINE LT .2U	CARBONATE 3A1A	1A2A INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75			
7 598	0- 15	AP1	67.5	22.7	9.8	1.8	3.5	4.5	24.3	33.4	15.3	7.4				64.7	2	TR	2Z	N
7 599	15- 38	AP2	68.0	22.3	9.7	1.8	3.6	5.1	24.5	33.0	14.4	7.9				63.3	3	TR	3Z	N
7 600	38- 66	C 1	52.0	35.3	12.7	1.3	2.6	2.8	13.6	31.7	20.1	15.2				60.9	1	TR	1Z	N
7 601	66- 99	C 2	48.0	38.7	13.3	0.7	1.2	1.3	11.5	33.3	22.6	16.1			--	64.9	TR	TR	--	--
7 602	99-137	C 3															TR	TR	--	--
7 603	137-165	C 4															5	TR	5Z	N
7 604	165-178	2C 5															48	TR	48Z	N

SAMPLE NO.	DEPTH CM.	ORG. MATTER CARBON 6A1A -PERCENT--	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	2 19-2 6E1B	EXT. IRON FE 6C2B PCT.	ATTERBERG L L 4F1 PCT.	I M I T PL 4F2 NO.40	BULK DENSITY EST 1/3 BAR 4A1F GRAMS	1/3 BAR 4A1F PER CC	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2 -PERCENT---	EXTENSIBLITY LEF 4D1 -PERCENT--	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
7 598	0- 15	0.19	0.030	1		0.5				1.68	1.70	0.99		12.0	6.2	0.4	0.4		9.3	
7 599	15- 38	0.21	0.029	1					1.68			0.98			6.4				9.1	
7 600	38- 66			3		0.5				1.47	1.52	0.99		17.0	8.1	1.1	1.1		9.3	
7 601	66- 99			4						1.38	1.45	1.00		22.4	8.4	1.7	1.7		9.4	
7 602	99-137			3					1.38			1.00			7.2					
7 603	137-165			3					1.38			0.97			6.4					
7 604	165-178			3					1.38			0.68			5.8					

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4C	MG 5B3A 6O4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM -MEQ/100G--------	BASE SAT. PCT.	C E C NA- OAC 5A2A -MEQ/100G	NH4- OAC 5A6A	EC 8A1A MMHO	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A -MEQ/1000 ML----------	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A PPM	PH SAT. PASTE 8C1B
7 598	0- 15			3.0	2.4	5.4			16.6	2.99	8.3	1.7	18.0	0.3		4.1	4.9			7.8
7 599	15- 38			3.4	2.5	5.9			17.8	4.42	14.9	3.0	22.0	0.1		2.3	6.6			7.8
7 600	38- 66			2.1	2.2	4.3			16.9	0.32										8.2
7 601	66- 99			2.0	1.3	3.3			17.3											8.1
7 602	99-137																			8.0
7 603	137-165																			8.1
7 604	165-178																			8.3

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	DTA IV 7A2E	DTA PCT. 7A3	-L.T. .0002 MM- X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	MINERAL CODE	RELATIVE AMOUNT
7 598	0- 15	35.9	2.4	14	8			MT 4	MI 3	KK 2						MT MONTMORT	1 TRACE
7 599	15- 38	31.0	2.7	15	7											MI MICA	2 SMALL
7 600	38- 66		2.1	12				MT 4	MI 3	KK 2						KK KAOLINIT	3 MODERATE
7 601	66- 99		2.0	12													4 ABUNDANT
7 602	99-137																5 DOMINANT
7 603	137-165																6 INDETER.
7 604	165-178																

SAMPLE PREPARATION CODES
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.

GILMAN VERY FINE SANDY LOAM

S-67-Ariz-7-2

Location: Maricopa County, Arizona. 150 feet east and 280 feet south of the NW corner of the NE¼ Section 26, T2N, R9W., 12 miles west of Tonopah. Date of Sampling: October 9, 1967. Description by: G. Hartman, S. Torrance, J. Jay. Collectors: K. Flach, D. Nettleton, A. DeWall.
Classification: Typic Torrifluvent, coarse-loamy, mixed (calcareous), hyperthermic.
Vegetation: Cultivated--onions. Use: Cultivated crops. Climate: Mean annual precipitation 7 inches. Mean annual temperature 69° F., January 50° F., July 88° F. Parent Material: Alluvium from a wide variety of igneous and sedimentary rocks. Topography: Nearly level alluvial fan sloping less than 0.5 percent to the southwest. Elevation: 1280 feet. Drainage: Well drained, moderately permeable subsoil. Medium runoff. Soil Moisture: Moist.
Remarks: Particle size distribution run only on control section. Sampled from backhoe pit.

HORIZON	DESCRIPTION
Ap1 RSL 67598	0 to 15 cm (0 to 6 inches), light yellowish brown (10YR 6/4) very fine sandy loam, dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.0 thymol blue); abrupt smooth boundary.
Ap2 RSL 67599	15 to 38 cm (6 to 15 inches), light yellowish brown (10YR 6/4) very fine sandy loam, dark brown (7.5YR 4/4) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and common micro roots; few fine tubular and interstitial pores; strongly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.
C1 RSL 67600	38 to 66 cm (15 to 26 inches), light brown (7.5YR 6/4) loam, dark brown (7.5YR 4/4) when moist; massive; slightly hard, friable, sticky and plastic; many very fine and common micro roots; many very fine tubular pores and common fine tubular and interstitial pores; common fine white lime veins, strongly effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.
C2 RSL 67601	66 to 99 cm (26 to 39 inches), light brown (7.5YR 6/4) very fine sandy loam, dark brown (7.5YR 4/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine micro roots; many very fine and common fine tubular pores; common fine white lime veins, strongly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
C3 RSL 67602	99 to 137 cm (39 to 54 inches), light brown (7.5YR 6/4) very fine sandy loam, dark brown (7.5YR 4/4) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; very few micro roots; common fine and medium tubular pores and common fine interstitial pores; few fine white lime veins; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C4 RSL 67603	137 to 165 cm (54 to 65 inches), light brown (7.5YR 6/4) sandy loam, dark brown (7.5YR 4/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine tubular pores; about 1 percent rounded gravel; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
IIC5 RSL 67604	165 to 178 cm (65 to 70 inches), brown (7.5YR 5/4) gravelly sandy loam, dark brown (7.5YR 4/4) when moist; massive; slightly hard, very friable, nonsticky, slightly plastic; common medium and fine tubular pores; estimated 40 percent rounded gravel; weakly effervescent; moderately alkaline (pH 8.0).

CONSECUTIVE PEDON NUMBER C 67 50 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES GILMAN SOIL NO. S67 ARIZ. 7- 7 SAMPLE NO. 7 611-7 617 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC TORRIFLUVENT,CRS-LMY,MXD(CALC.),HYPRTHRMC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION 2- .05-.002	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	SILTS-- CO. 2-.2U	CLAYS---- FINE LT .2U	CARBO NATE 3A1A	1A2A INT. II .2-.02	COARSE FRAGMENTS- PCT. OF WHOLE 20 I 75-3	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM													SOIL	PCT. OF LT 75		
7 611	0- 36	AP	52.6	36.8	10.6	5.2	6.5	5.6	14.4	20.9	26.4	10.4				56.1	4 TR	4	--
7 612	36- 51	B2	51.8	38.0	10.2	5.8	5.3	4.8	14.6	21.3	27.0	11.0				57.3	3 TR	3Z	N
7 613	51- 71	C 1	49.0	43.6	7.4	1.3	2.3	4.1	18.3	23.0	35.3	8.3				69.6	1 TR	1Z	N
7 614	71- 91	C 2	39.9	52.8	7.3	1.4	1.9	2.5	10.8	23.3	42.4	10.4				72.7	TR TR	--	--
7 615	91-109	C 3	51.4	41.1	7.5	1.5	2.7	4.3	16.6	26.3	32.3	8.8			--	69.0	1 TR	1	--
7 616	109-127	C 4															2 TR	2Z	N
7 617	127-152	C 5															1 TR	1	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR-BON 6A1A	NITRO-GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-19 6E1B	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	P L 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT--		-PERCENT-		PCT.	PCT.	NO.40	GRAMS PER CC				----PERCENT---			-PERCENT--				
7 611	0- 36	0.42	0.052	TR						1.66	1.70	0.97		14.3	4.9	0.8	0.8		8.8	
7 612	36- 51	0.19	0.029	1						1.57	1.61	0.98		13.7	5.9	0.8	0.8		9.1	
7 613	51- 71			2						1.45	1.48	0.99		15.5	5.6	0.7	0.7		9.2	
7 614	71- 91			2					1.45			1.00			6.1				9.3	
7 615	91-109			2					1.43			0.99			4.7				9.4	
7 616	109-127									1.37	1.44	0.99		18.4	7.4	1.7	1.7			
7 617	127-152								1.37			0.99			5.2					

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4C	MG 5B3A 6O4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT. PCT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A MMHO	WATER EXTRACT FROM SATURATED PASTE CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	8A1 SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	-MEQ/100G		MMHO	MEQ/1000 ML								PPM	
7 611	0- 36			0.7	1.8	2.5			11.3	3.48	14.8	5.5	10.2	3.0		3.2	6.3			7.6
7 612	36- 51			0.5	1.0	1.5			10.9											7.8
7 613	51- 71			0.6	0.6	1.2			9.5											8.1
7 614	71- 91			0.8	0.5	1.3			10.1											8.1
7 615	91-109			0.8	0.4	1.2			9.5											8.1
7 616	109-127																			8.0
7 617	127-152																			8.0

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	-GYPSUM- AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- -X RAY- DTA 7A2E I	7A2E II	7A2E III	7A2E IV	7A3 PCT.	-L.T. .0002 MM- -X RAY- 7A2E I	7A2E II	7A2E III	MINERAL CODE
7 611	0- 36	30.4	0.4	3	3											
7 612	36- 51		0.5	5												MI MICA
7 613	51- 71		0.6	6				MI 4	KK 1							KK KAOLINIT
7 614	71- 91		0.8	8												
7 615	91-109		0.8	8												
7 616	109-127															
7 617	127-152															

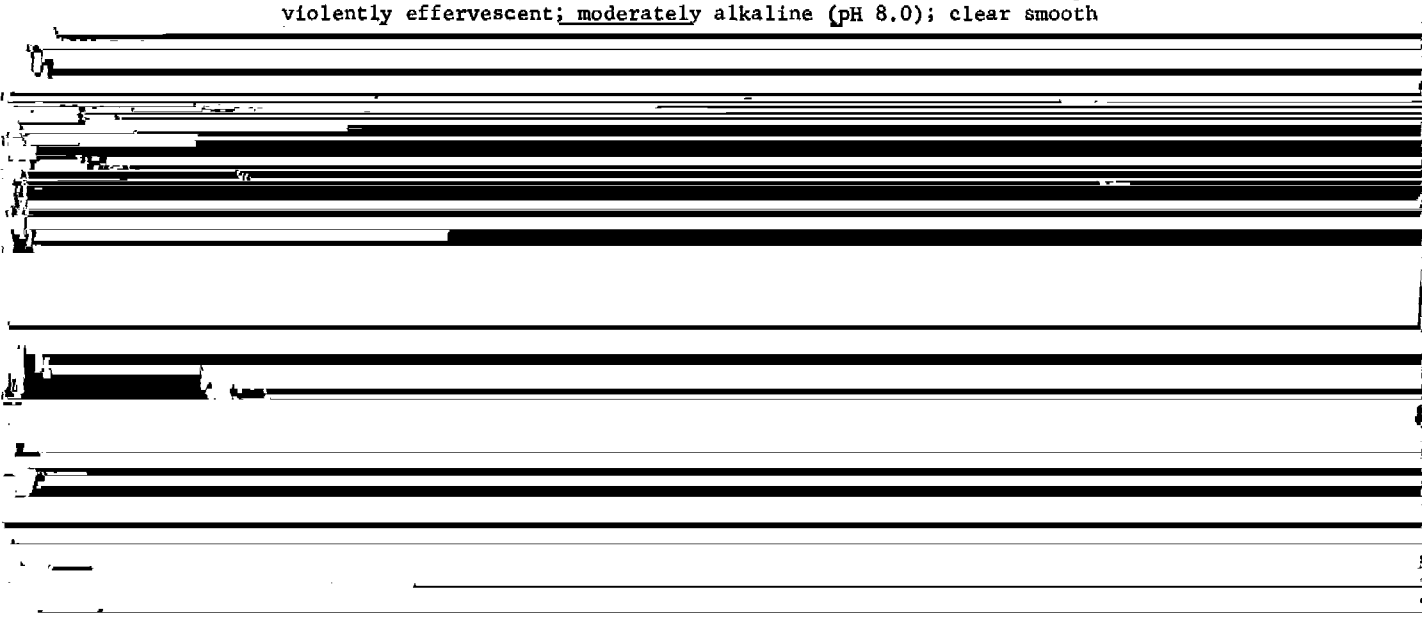
RELATIVE AMOUNT
1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
N=NOT DETERMINED.
¿=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.

GILMAN LOAM
S-67-Ariz-7-7

Location: Maricopa County, Arizona. 63 feet east and 213 feet north of the SW corner Section 6, T2N, R1W., 4 miles northwest of Litchfield Park. Date of Sampling: October 10, 1967. Description by: G. Hartman, S. Torrance, J. Jay. Collectors: K. Flach, D. Nettleton, A. DeWall.
Classification: Typic Torrifluvent, coarse-loamy, mixed (calcareous), hyperthermic.
Vegetation: Maize. Use: Cultivated land. Climate: Mean annual precipitation is approximately 7.7 inches. Mean annual air temperature 70° F.; January 52° F., July 90° F. Parent Material: Recent alluvium from a wide variety of igneous and sedimentary rocks. Topography: Nearly level alluvial fan sloping less than 0.5 percent to the southeast. Elevation: 1110 feet. Drainage: Well drained with moderate permeability. Medium runoff. Soil Moisture: Moist.
Remarks: Sampled from backhoe pit.

HORIZON	DESCRIPTION
Ap RSL 67611	0 to 36 cm (0 to 14 inches), pale brown (10YR 6/3) loam, dark brown (10 YR 4/3) when moist; massive; hard, friable, sticky, plastic; common fine and medium roots; few fine tubular and interstitial pores; slightly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
B2 RSL 67612	36 to 51 cm (14 to 20 inches), yellowish brown (10YR 5/4) loam with few fine faint pinkish white (7.5YR 8/2) lime veins, dark brown (10YR 4/3) and pink (7.5YR 7/4) when moist; massive; slightly hard, firm, sticky and plastic; common fine medium and coarse roots; few fine tubular and common fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
C1 RSL 67613	51 to 71 cm (20 to 28 inches), light yellowish brown (10YR 6/4) very fine sandy loam, dark brown (10YR 4/4) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots; few fine tubular and many fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
C2 RSL 67614	71 to 91 cm (28 to 36 inches), light yellowish brown (10YR 6/4) very fine sandy loam, brown (7.5YR 5/4) when moist; massive; slightly hard, very friable, nonsticky and slightly plastic; common fine and medium roots; few fine tubular and many fine interstitial pores; few fine pinkish white lime veins, violently effervescent; moderately alkaline. (pH 8.0); gradual smooth boundary.
C3 RSL 67615	91 to 109 cm (36 to 43 inches), light yellowish brown (10YR 6/4) very fine sandy loam, dark brown (10YR 4/4) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots; few fine tubular and common fine interstitial pores; violently effervescent; moderately alkaline (pH 8.0); clear smooth



RSL 67616	dark brown (7.5YR 4/4) when moist; massive; hard, friable, slightly sticky, plastic; common fine and medium roots; few fine tubular and common fine interstitial pores; few fine pinkish white lime veins; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Torrifluvent, coarse-loamy, mixed, calcareous, mesic
SOIL Fruitland fine sandy loam (taxadjunct) SOIL Nos. 865Ariz-1-14 LOCATION Apache County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65713 - 65719

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	1/ Coarse fragments 1A2a: >2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0- 2	A11	55.5	27.7	16.8	2.0	6.5	6.6	18.5	21.9	16.9	10.8	50.4	33.6	0	17	-	-	-
2- 9	A12	44.4	36.0	19.6	0.5	2.0	2.6	14.4	24.9	20.3	15.7	55.4	19.5	0	20	-	-	-
9-24	C1	64.2	22.4	13.4	0.3	3.1	6.9	25.9	28.0	13.6	8.8	58.0	36.2	0	13	-	-	-
24-30	C2	22.2	51.7	26.1	0.2	0.5	0.7	5.4	15.4	20.7	31.0	40.2	6.8	0	26	-	-	-
30-34	A11	61.6	22.4	16.0	6.9	10.5	8.9	18.6	16.7	11.3	11.1	38.8	44.9	0	16	-	-	-
34-39	A12b	62.2	23.8	14.0	7.9	12.3	9.0	18.9	14.1	12.4	11.4	36.6	48.1	0	14	-	-	-
39-65+	C3b	60.2	25.5	14.3	2.4	5.7	6.7	21.5	23.9	14.4	11.1	51.2	36.3	0	14	-	-	-

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$	Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry	3B2 Cm	Water content: Pct.	Water content: 4B1c 1/3 bar	Water content: 4B2 15 bar	4D1 Extensibility COLE f in./in.	4D1 Extensibility COLE in./in.	pH: 8C1b Saturated Paste	pH: 8C1a H_2O 1:1	pH: 8C1a H_2O 1:10
	Pct	Pct.		Pct.	Pct.	g/cc	g/cc	g/cc	Pct.	Pct.	Pct.					
0- 2	1.13	0.092	12		3						10.8			7.3	7.8	
2- 9	0.50	0.044	11		4	1.22	1.30	1.00		22.8	13.1	0.021	0.021	7.5	8.0	
9-24	0.18				4	1.31	1.36	1.00		12.9	8.6	0.013	0.013	7.7	8.2	
24-30	0.44				3	0.99	1.13	1.00		35.1	21.2	0.046	0.046	7.6	8.1	
30-34	0.92				3	1.27	1.34	1.00		13.4	10.1	0.018	0.018	7.7	8.2	
34-39	0.46				5	1.42	1.48	1.00		13.1	8.5	0.015	0.015	7.7	8.3	
39-65+	0.13				5	1.34	1.40	1.00		15.3	8.8	0.014	0.014	8.1	8.5	

Depth (In.)	Extractable bases: 6N2a Ca	6O2a Mg	6P2a Na	5B1a 6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A2a NaOAc	5A1a NH_4OAc	Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter								mmho/cm
0- 2	25.1	3.6	0.3	1.6	30.6			24.4	5.8	1.2	0.4	0.1	-	5.7	0.4		0.62
2- 9	38.7	4.2	0.7	0.9	44.5			33.3	4.2	0.9	1.2	0.6	-	4.5	0.3		0.53
9-24	28.0	3.1	1.9	0.5	33.5			23.2	2.0	0.4	3.6	0.1	-	4.6	0.2		0.51
24-30	49.0	7.2	7.2	1.7	65.1			52.4	7.9	1.7	18.0	0.2	-	3.5	7.8	16.6	2.58
30-34	27.4	3.0	4.1	1.5	36.0			24.3	14.6	2.8	20.8	0.5	-	9.0	8.8	17.0 2/	3.04
34-39	26.1	2.8	3.2	0.3	32.4			22.0	6.8	1.8	13.5	0.4	-	6.8	6.7	6.8 2/	1.89
39-65+	28.4	3.6	2.5	0.7	35.2			23.3	2.2	0.7	5.0	0.2	-	3.6	2.4		0.73

Depth (In.)	8A Water at Saturation Pct	5D2 Exchangeable Na Pct.	5B1b Exch. Na meq / 100g	6F1a Gypsum Pct.	5C1 Base Sat. NH_4OAc Pct.	Clay mineralogy (<0.002 mm) 7A: Mont.	Verm.	Mica	Kaolin	
						< X-ray >				
0- 2	46.8	tr.	tr.		100+	xxxx				
2- 9	53.0	1	0.4		100+					
9-24	41.7	7	1.7		100+	xxxx				
24-30	71.1	12	6.4	tr.	100+					
30-34	39.9	14	3.4	tr.	100+					
34-39	36.7	12	2.7		100+					
39-65+	38.3	9	2.2		100+	xxxx				

1/ >2 mm not determined; data based on crushed samples of the whole soil.

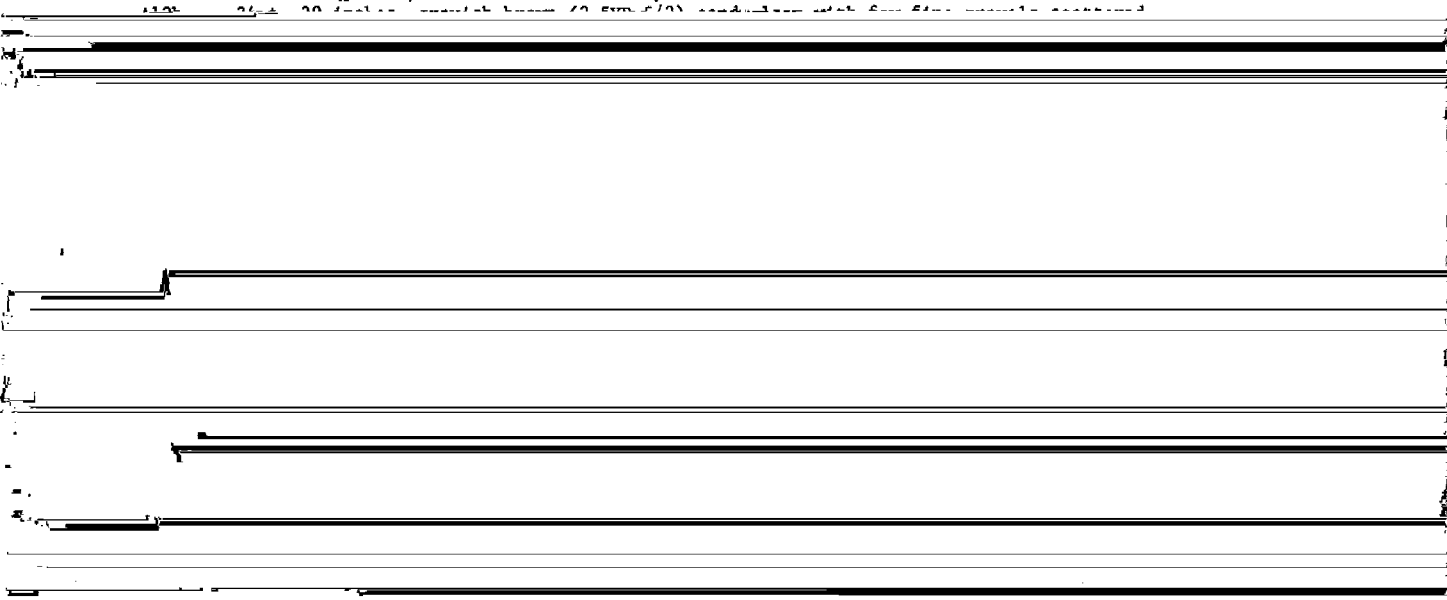
Some of the >2 mm particles do not slake in water and cannot be separated consistently in sample preparation. All >2 mm fragments resemble the fine earth (<2 mm) fraction in water retention and chemical properties.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

FRUITLAND FINE SANDY LOAM (taxadjunct) 1/
S65Ariz-1-14

Location: Apache County, Arizona. A pit located 792 feet east of the center of Section 29, T. 7 N., R. 30 E. East of Highway 180 opposite Riggs Creek Road about 1-1/4 miles northeast of Nutrioso. Date of Sampling: September 23, 1965.
Collectors: M.L. Miller, K.N. Larson, J.E. Jay, R.E. Nelson, and B. Brasher.
Vegetation: Not cultivated. Grass aspect with 26 percent basal cover and 8 percent shrub canopy cover. Blue grama, western wheatgrass, mountain muhly, squirreltail, rabbitbrush, squawbush and very few Ponderosa pines and junipers. Climate: 17 inches ppt. 48°F. approximate M.A.T. Parent Material: Alluvium from volcanic tuff and ash. Relief: Smooth convex alluvial fans with 5 percent slope and north aspect at pit site. Elevation: 7,550 feet. Drainage: Runoff is slow. Soil is well drained. moderate to moderately rapid.
Remarks: This soil usually has some stratification. Angular to flat fragments of tuff from 2 mm to 1/2 inch thick and up to 1½ inches across, may occur at any depth in the profile. These are more numerous near the upper portions of alluvial fans where they may comprise 5 to 10 percent of the mass of the profile. Determination of pH was made with a Hellige-Truog field kit. Measure of free carbonate was obtained by observing reaction to dilute HCl.
Classification: Typic Torrifluvent, coarse-loamy, mixed, calcareous, mesic.

HORIZON	DESCRIPTION
A11 RSL No. 65713	0 to 2 inches, light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; abundant fine roots; many fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
A12 RSL No. 65714	2 to 9 inches, light gray (10YR 7/2) fine sandy loam, brown (10YR 5/3) when moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and plastic; abundant fine roots; many fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
C1 RSL No. 65715	9 to 24 inches, light brownish gray (10YR 6/2) fine sandy loam, brown (10YR 5/3) when moist; massive breaking to weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and plastic; plentiful fine roots; many fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
C2 RSL No. 65716	24 to 30 inches, light gray (10YR 7/2) loam, brown (10YR 5/3) when moist; massive breaking to weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and plastic; abundant fine roots; few fine tubular and common fine interstitial pores; violently effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
A11 RSL No. 65717	30 to 34 inches, grayish brown (2.5YR 5/2) fine sandy loam, dark brown (10YR 3/3) when moist; massive breaking to moderate fine subangular blocky and granular structure; slightly hard, very friable, slightly sticky and plastic; plentiful fine roots; few fine tubular and common fine interstitial pores; weakly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
A12b	34 to 39 inches, grayish brown (2.5YR 5/2) sandy loam with few fine gravels scattered



RSL No. 65718	throughout, dark grayish brown (10YR 4/2) when moist; massive breaking to weak fine subangular blocky and granular structure; hard, very friable, nonsticky and slightly plastic; plentiful fine roots; few fine tubular and common fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.2); clear wavy boundary.
C3b RSL No. 65719	39 to 65 inches +, light gray (10YR 7/2) fine sandy loam with 10 percent gravels of which 2 percent are larger than 3/4 inch, brown (10YR 5/3); massive breaking to weak fine subangular blocky and granular structure; hard, very friable, nonsticky and slightly plastic; few fine roots; many fine interstitial and few fine tubular pores; violently effervescent; moderately alkaline (pH 8.2).

There is a thin gravelly lense 1/4 inch thick between the C1 and C2 horizons, the pebbles

CONSECUTIVE PEDON NUMBER C 69203 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES ANTHONY SOIL NO. S69 ARIZ. 10- 2 SAMPLE NO. 91079-91084 WALNUT G.-TUCSON AREA

SOIL FAMILY: TYPIC TORRIFLUVENT,CRSE-LOAMY,MXD,CALCAR.,THRMC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL SAND 2-.05	FRACTION SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.20	FINE LT .20	CARBONATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL I 75-20	II 20-5 PCT. OF	III 5-2 LT 75
			PERCENT OF LESS THAN 2MM																
91079	0- 20	AP1	71.6	18.4	10.0	2.6	8.6	13.4	31.8	15.2	11.8	6.6				44.1	3A	--	--	3
91080	20- 30	AP2	68.7	21.5	9.8	3.7	7.5	11.1	29.5	16.9	14.3	7.2				47.9	--A	--	--	--
91081	30- 61	C 1	65.3	25.6	9.1	2.7	6.9	9.8	26.6	19.3	17.2	8.4				52.6	--A	--	--	--
91082	61- 86	C 2	67.8	24.8	7.4	6.0	10.8	9.2	26.4	15.4	15.3	9.5				46.2	--A	--	--	--
91083	86-107	C 3	57.2	34.9	7.9	4.8	8.8	7.5	21.5	14.6	18.1	16.8				45.6	--A	--	--	--
91084	107-137	2TB	61.5	17.9	20.6	7.1	12.3	9.3	18.6	14.2	12.1	5.8				36.5	--A	--	--	--

SAMPLE NO.	DEPTH CM.	ORG. CARBON 6A1A -PERCENT--	MATTER NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	2-20 6E1B	EXT. IRON FE 6C2B PCT.	ATTERBERG LIMIT LL 4F1 PCT.	PL 4F2 NO.40	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F GRAMS PER CC	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2 ----PERCENT---	EXTENSBLTY LEF 4D1 -PERCENT--	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
91079	0- 20	0.09	0.014	1		0.5			1.65			0.98			4.5			7.7		7.8
91080	20- 30	0.10		2		0.4				1.69	1.72	1.00		9.4	4.5	0.6	0.6	7.6		7.8
91081	30- 61	0.09		2		0.5			1.60			1.00			4.2			7.7		7.9
91082	61- 86			1		0.4				1.50	1.52	1.00		18.5	3.9	0.4	0.4	7.8		7.8
91083	86-107			1		0.5			1.50			1.00			4.3			7.9		7.9
91084	107-137			TR		0.6				1.42	1.56	1.00		18.4	6.9	3.2	3.2	7.7	8.9	7.7

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT. PCT.	CEC NA+ OAC 5A2A -MEQ/100G	NH4+ OAC 5A6A	EC 8A1A MMHO	WATER EXTRACT FROM SATURATED PASTE CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A MEQ/1000 ML	HCO3 6J1A	CL 6K1A	SO4 6L1B	8A1 B 6T1A PPM	PH SAT. PASTE 8C1B
91079	0- 20			0.3	0.9	1.2			6.9											
91080	20- 30			0.2	1.0	1.2			6.7											
91081	30- 61			0.4	1.2	1.6			7.0											
91082	61- 86			0.7	1.1	1.8			6.6											
91083	86-107			0.9	1.1	2.0			8.7											
91084	107-137			1.0	0.8	1.8			9.6	1.21	3.6	1.5	7.7	0.2		2.7	1.7	8.1		7.8

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 PCT.	-L.T. .0002 MM- X RAY 7A2E I	7A2E II	7A2E III
91079	0- 20		0.3	4				MI 4	MT 2	KK 2					
91080	20- 30		0.2	3											
91081	30- 61		0.4	6				MT 2	MI 2	KK 1					
91082	61- 86		0.7	11											
91083	86-107		0.9	10				MT 2	MI 2	KK 2					
91084	107-137	34.4	0.7	9	5			MI 4	KK 2	MT 1					

MINERAL CODE	RELATIVE AMOUNT
MI MICA	1 TRACE
MT MONTMORT	2 SMALL
KK KAOLINIT	3 MODERATE
	4 ABUNDANT
	5 DOMINANT
	6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

ANTHONY SANDY LOAM
S69Ariz-10-2

Location: Pima County, Arizona. Approximately 400 feet north and 1,600 feet west of the southeast corner of Sec. 18, T. 12 S., R. 11 E., on Glover Ranch. About 8 miles west of Rillito on Silver Bell Road.
Date of sampling: September 29, 1969.
Description by: Y. H. Havens and D. M. Hendricks. Collectors: Y. H. Havens and D. M. Hendricks.
Classification: Typic Torrifluvent, coarse-loamy, mixed, calcareous, thermic.
Vegetation: Idle cropland. Climate: Mean annual temperature approximately 68° F. Mean annual precipitation approximately 10 inches. Parent material: Mixed recent alluvial materials from granite, andesite, rhyolite, shale and some limestone. Topography: Nearly level fan. Elevation: 2,010 feet. Drainage: Well drained. Soil moisture: Dry.

HORIZON	DESCRIPTION
Ap1 RSL No. 691079	0-20 cm (0-8 inches), light brown (7.5YR 6/4) sandy loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, very friable, slightly sticky, nonplastic; few fine roots; few fine interstitial pores; 3 to 5 percent gravel; slightly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.
Ap2 RSL No. 691080	20-30 cm (8-12 inches), light brown (7.5YR 6/4) sandy loam, dark brown (7.5YR 4/4) moist; weak thick platy structure; slightly hard, very friable, nonsticky, nonplastic; few gravel; slightly effervescent; moderately alkaline (pH 8.3); clear wavy boundary.
C1 RSL No. 691081	30-61 cm (12-24 inches), light yellowish brown (10YR 6/4) fine sandy loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, very friable, slightly sticky, nonplastic; few very fine roots; few fine tubular pores; few gravel; slightly to strongly effervescent; strongly alkaline (pH 8.5); clear wavy boundary.
C2 RSL No. 691082	61-86 cm (24-34 inches), light brown (7.5YR 6/4) sandy loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky, nonplastic; few very fine roots; common fine interstitial pores; few to common gravel; strongly effervescent; moderately alkaline (pH 8.4); gradual wavy boundary.
C3 RSL No. 691083	86-107 cm (34-42 inches), light brown (7.5YR 6/4) fine sandy loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky, nonplastic; few very fine roots; few fine interstitial pores; few fine gravel; few very fine mica flakes; strongly effervescent; strongly alkaline (pH 8.5); clear smooth boundary.
IIB2tb RSL No. 691084	107-137 cm (42-54 inches), yellowish red (5YR 5/6) sandy clay loam, yellowish red (5YR 4/6) moist; moderate medium and coarse subangular blocky structure; hard, friable, slightly sticky, slightly plastic; few very fine roots; common very fine and fine tubular pores; common thin clay films on ped faces and in pores; few gravel; slightly effervescent; moderately alkaline (pH 8.2).

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Torrifluvent, fine, mixed (calcareous), mesic
SOIL Navajo clay SOIL Nos. S62Ariz-9-1 LOCATION Navajo County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62337 - 62344

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand (Pct. of < 2 mm): 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: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: > 2" Pct.	2 – 19 (Pct. of < 76 mm)	19 – 76 (Pct. of < 76 mm)
0- 5	A	2.8	43.7	53.5	0.0	0.0	0.1	0.6	2.1	4.0	39.7	6.6	0.7			2		
5-20	C1	1.6	42.4	56.0	0.0	0.0	0.0	0.3	1.3	2.3	40.1	3.8	0.3			1		
20-35	C2	2.6	40.2	57.2	0.0	0.0	0.1	1.3	1.2	3.0	37.2	5.0	1.4			3		
35-50	C3	3.2	37.9	58.9	0.0	0.0	0.0	0.7	2.5	1.1	36.8	4.2	0.7			3		
50-65	C4	1.6	36.9	61.5	0.0	0.0	0.0	0.4	1.2	2.8	34.1	4.3	0.4			4		
65-76	C5	0.8	35.2	64.0	0.0	0.0	0.0	0.3	0.5	2.6	32.6	3.3	0.3			4		
76-90	C6	0.8	30.9	68.3	0.0	0.0	0.0	0.3	0.5	1.6	29.3	2.4	0.3			5		
90-121	C7	1.9	42.7	55.4	0.0	0.0	0.0	0.4	1.5	2.9	39.8	4.7	0.4			3		

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct	3A1a Carbonate in <0.002 mm Pct.	Bulk density: 4A1f 1/3 bar g/cc	4A1h Oven dry g/cc	g/cc	Water content: 4B1c 1/3 bar Pct.	4B2 15 bar Pct	Pct	4D1 Extensibility in./in.			pH: 8C1b Sat. Paste	8C1a 1:10
0- 5	0.51	0.053	10	2.0	9	1	1.42	1.68		23.6	17.6		0.056			7.1	7.6
5-20	0.36			2.0	9	1	1.52	1.77		22.3	18.5		0.049			7.2	7.8
20-35	0.26			2.0	8	1	1.52	1.76		25.4	18.7		0.049			7.4	8.0
35-50	0.25			2.0	8	1	1.53	1.78		23.5	18.6		0.049			7.4	8.0
50-65	0.20			2.0	8	1	1.52	1.82		25.1	20.0		0.056			7.5	8.0
65-76	0.18			1.7	7	1	1.43	1.79		29.0	20.5		0.072			7.6	8.2
76-90	0.18			1.5	6	1					19.7					7.6	8.3
90-121	0.16			2.0	9	2					18.4					7.7	8.4

	Extractable bases 5B1a: 6N2c	6O2c	6P2a	6Q2a		Cation Exch. Capacity	Water extract from saturated paste 8A1: 6N1a	6O1a	6P1a	6Q1a		6I1a	6J1a	6K1a		8A1a

NAVAJO CLAY

S62 Ariz-9-1

Location: Central Navajo County Area, Arizona. 1320 feet east and 50 feet north of the SW corner [redacted] Date of Sampling: June 12, 1962

Collectors: R.E. Nelson, Lothair Grant, Daryl Cox, R.W. Mitchell and Jim Jay.
Classification: Typic Torrifluvent, fine, mixed (calcareous), mesic.
Vegetation: This area is devoid of any perennial vegetation. Some annual weeds and grass may grow following summer or early spring rains. Use: Range. Climate: Precipitation is approximately 8" annually. The average temperature during the coldest season of the year is approximately 35° and during the warmest season of the year, 75°F. The mean annual temperature is approximately 55°F. Parent Material: Recent alluvium principally from the Moenkopi and Chinle formations but with some influence from limestone and basic igneous materials. Elevation: 4800 feet. Relief: Level to nearly level floodplain, slightly concave, slope approximately 0.2 percent to the northeast. Drainage: Well drained, slow runoff due to slope and position, very slow permeability.
Remarks: Modal profile. Color of crushed peds in all C horizons one value higher, reddish brown (2.5YR 5/4) when dry. Color of peds crushed and uncrushed same when moist. Examination and sampling done in backhoe pit to 76 inches. 76 to 121" taken out with auger.

HORIZON	DESCRIPTION
	Surface soil is covered with network of cracks roughly hexagonal in shape, 12 to 18 inches across each polygon with cracks approximately 1/2 inch wide and 5 inches deep. A network of fine cracks covers each hexagon.
A RSL 62337	0 to 5 inches, reddish brown (5YR 5/3) clay, reddish brown (5YR 4/3) when moist; weak medium and coarse platy structure; hard, firm, very sticky and very plastic; no roots; few fine discontinuous simple tubular and many fine interstitial pores; strongly effer- [redacted]
C1 RSL 62338	5 to 20 inches, reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) when moist; weak medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; no roots; few fine discontinuous simple exped tubular and many interstitial pores; few small pressure faces; strongly effervescent; moderately alkaline, pH 8.0; gradual smooth boundary.
C2 RSL 62339	20 to 35 inches, reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) when moist; few pink (5YR 8/3) dry, light reddish brown (5YR 6/4) when moist, fine faint lime or gypsum mycelia and small soft segregations; nearly massive but with tendency toward weak medium angular blocky structure; very hard, very firm, very sticky and very plastic; no roots; few fine discontinuous simple exped tubular and many fine interstitial pores; few small slickensides and pressure faces; strongly effervescent; moderately alkaline, pH 8.0; gradual smooth boundary.
C3 RSL 62340	35 to 50 inches, color, texture, lime segregations, structure, roots, pores and reaction same as horizon above; many slickensides and pressure faces ranging up to 1-1/2 inches long; gradual smooth boundary.
C4 RSL 62341	50 to 65 inches, reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) when moist; few fine faint pink (5YR 6/3) dry, light reddish brown (5YR 6/4) moist; lime or gypsum mycelia and small, soft segregations; nearly massive but with tendency toward weak medium angular blocky structure; very hard, very firm, very sticky and very plastic; no roots; few fine discontinuous simple exped tubular and many fine interstitial pores; few small slickensides and pressure faces; strongly effervescent; moderately alkaline, pH 8.0; no natural boundary; rest of profile arbitrarily divided for sampling purposes.
C5	65 to 76 inches, same as horizon above.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Torrifluvent, fine, mixed (calcareous), mesic
SOIL Navajo clay SOIL Nos. S62Ariz-9-2 LOCATION Navajo County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62345 - 62352

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: (0.05–0.02)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: > 2*	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0- 5	A	4.2	39.4	56.4	0.0	0.1	0.1	1.1	2.9	2.0	37.4	5.7	1.3			1		
5-19	C1	2.9	38.1	59.0	0.0	0.0	0.1	0.8	2.0	2.7	35.4	5.3	0.9			1		
19-34	C2	1.8	35.1	63.1	0.0	0.0	0.1	0.4	1.3	1.1	34.0	2.7	0.5			0		
34-49	C3	1.8	31.4	66.8	0.0	0.0	0.0	0.4	1.4	1.8	29.6	3.5	0.4			1		
49-64	C4	1.6	31.5	66.9	0.0	0.0	0.0	0.3	1.3	1.9	29.6	3.4	0.3			1		
64-91	C5	1.8	26.0	72.2	0.0	0.0	0.0	0.3	1.5	2.4	23.6	4.2	0.3			3		
91-110	C6	1.8	22.7	75.5	0.0	0.0	0.0	0.4	1.4	1.3	21.4	3.0	0.4			3		
110-134+	C7	1.8	29.3	68.9	0.0	0.0	0.0	0.4	1.4	3.3	26.0	5.0	0.4			5		

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N		6E1b Carbonate as $CaCO_3$	3A1a Carbonate in <0.002 mm	Atterberg limits: Plastic limit	Liquid limit	Plastic index		Water content:	4B2 15 bar			pH: 8C1b Sat. Paste	8C1a 1:10
	Pct.	Pct			Pct.	Pct.	Pct. of <0.4 mm				Pct.	Pct.	Pct.			
0- 5	0.42	0.050	8		9	1						17.7			7.2	7.8
5-19	0.30				8	2	17	44	27			18.4			7.4	7.8
19-34	0.20				7	2						20.6			7.5	8.0
34-49	0.17				8	1						20.0			7.5	8.1
49-64	0.18				7	2						21.5			7.5	8.1
64-91	0.18				6	2						24.0			7.6	8.1
91-110	0.18				5	2						25.7			7.6	8.2
110-134+	0.17				6	2						22.7			7.6	8.2

Depth (In.)	Extractable bases 5B1a: 6N2c Ca	6O2c Mg	6P2a Na	6Q2a K	Cation Exch Capacity 5A2a NaOAc	Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity
	meq/100 g					meq/liter								mmho/cm
0- 5	60.7	20.9	27.9	1.4	20.0	600	170	500	4.1	-	0.5	1268		86
5-19	50.5	9.8	19.0	1.4	21.7	282	77.4	320	2.7	-	0.5	657		61
19-34	37.0	8.5	18.4	1.4	20.5	144	44.3	230	1.9	-	0.5	397		34.5
34-49	37.9	8.9	18.2	1.4	24.9	110	42.5	200	1.7	-	0.5	345		31.5
49-64	42.2	11.0	29.6	1.5	32.9	96.8	34.9	205	1.3	-	0.5	313		31.6
64-91	44.9	14.5	29.8	1.8	44.6	96.6	44.5	244	1.5	-	0.5	363		34.8
91-110	44.8	17.0	35.0	1.7	51.7	84.1	49.2	275	1.4	-	0.5	366		36.4
110-134+	37.6	14.2	29.5	1.5	35.5	77.2	57.4	263	1.3	-	0.6	346		35.2

Depth (In.)	8A Water at Saturation Pct.	5D1 Exchangeable Na Pct	5B1b Exch. Na meq / 100 g	Gypsum Pct.
0- 5	58.8	15	2.9	
5-19	62.8		-	
19-34	65.5	17	3.4	
34-49	70.4	17	4.2	
49-64	75.9	43	14.1	
64-91	79.6	23	10.4	
91-110	86.3	22	11.3	
110-134+	83.9	21	7.5	

* Percent of <19 mm ; see profile description for estimates of >19 mm.

NAVAJO CLAY
S62 Ariz-9-2

Location: Central Navajo County Area, Arizona. 1050 feet west and 1320 feet south of the NE corner of Sec. 23, R15E, T20N. 7 miles NW of Winslow, Arizona. Date of Sampling: June 13, 1962.
Collectors: R.E. Nelson, Lothair Grant, Daryl Cox, R.W. Mitchell and Jim Jay.
Classification: Typic Torrifluvent, fine, mixed (calcareous), mesic.
Vegetation: This area is devoid of any perennial vegetation. Some annual weeds and grass may grow following summer or early spring rains. Use: Rangeland. Climate: Precipitation is approximately 8" annually. The average temperature during the coldest season of the year is approximately 35° and during the warmest season of the year 75°F. The mean annual temperature is approximately 55°F. Parent Material: Recent alluvium principally from the Moenkopi and Chinle formations but with some influence from limestone and basic igneous materials. Elevation: 4800 feet. Relief: Level to nearly level floodplain, slightly concave, slope approximately 0.2 percent to the northeast. Drainage: Well drained, slow runoff due to slope and position, very slow permeability.
Remarks: Modal profile. Color of crushed peds in all C horizons one value higher, reddish brown (2.5YR 5/4) when dry - no change when crushed, in moist color.
Examination and sampling done in backhoe pit to 79 inches. 79" to 141" taken out with auger.

HORIZON	DESCRIPTION
	Surface soil covered with network of cracks roughly hexagonal in shape, 12 to 18 inches across each polygon with cracks approximately 1/2 inch wide and 5 inches deep. A network of fine cracks covers each hexagon.
A RSL 62345	0 to 5 inches, reddish brown (5YR 5/3) clay, reddish brown (5YR 4/3) when moist; weak medium and coarse platy structure; hard, firm, very sticky and very plastic; no roots; few fine discontinuous tubular and many fine interstitial pores; strongly effervescent; moderately alkaline, pH (Hellige-Truog) 8.0; abrupt smooth boundary.
C1 RSL 62346	5 to 19 inches, reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) when moist; weak medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; no roots; few fine inped tubular and many fine interstitial pores; few small pressure faces; strongly effervescent; moderately alkaline, pH 8.0; gradual smooth boundary.
C2 RSL 62347	19 to 34 inches, reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) when moist; nearly massive but with tendency toward weak medium angular blocky structure; very hard, very firm, very sticky and very plastic; no roots; few fine tubular and common fine interstitial pores; common small pressure faces; strongly effervescent; moderately alkaline, pH 8.0; gradual smooth boundary.
C3 RSL 62348	34 to 49 inches, same as horizon above (C2) but having common slickensides and pressure faces up to 1 inch in size and a gradual smooth boundary.
C4 RSL 62349	49 to 64 inches, reddish brown (2.5YR 4/4) clay, dark reddish brown (2.5YR 3/4) when moist; few fine faint pink (5YR 8/3) dry and light reddish brown (5YR 6/4) moist lime and gypsum mycelia and small soft segregations; nearly massive but with tendency toward weak medium angular blocky structure; very hard, very firm, very sticky and very plastic; no roots; few fine tubular and common fine interstitial pores; common small slickensides and pressure faces; strongly effervescent; moderately alkaline, pH 8.0; gradual smooth boundary.
C5 RSL 62350	64 to 91 inches, same as horizon C4 above but with common fine faint pink (5YR 8/3) dry to light reddish brown (5YR 6/4) moist lime and gypsum mycelia and small soft segregations and common fine and medium dark reddish brown (5YR 3/2) when moist, stainings; no boundary - arbitrary separation for sampling.
C6 RSL 62351	91 to 110 inches, same as horizon above. Arbitrarily broken for sampling purposes.
C7 RSL 62352	110 to 134 inches, same as horizon above. Arbitrarily broken for sampling purposes.

CONSECUTIVE PEDON NUMBER C 69158 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES GRABE SOIL NO. S69 ARIZ. 2-12 SAMPLE NO. 9 824-9 830 WILLCOX AREA

SOIL FAMILY: ANTHROPIC TORRIFLUVNT,CRS-LMY,MXD(CALCR.),THRMC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 — 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05 SAND	.05- .002 SILT	LT .002 CLAY	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	SILTS CO. 2- .2U	CLAYS FINE LT .2U	CARBONATE 3A1A.02	INT. II .2-.02	COARSE FRAGMENTS- PCT. OF WHOLE 20	I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														SOIL	PCT. OF LT 75		
9 824	0- 5	A11	29.1	56.1	14.8	4.3	7.5	4.3	7.0	6.0	16.9	39.2				26.7	--A	--	--	--
9 825	5- 25	A12	25.3	52.3	22.4	6.0	7.4	3.5	5.3	3.1	12.0	40.3				17.9	--A	--	--	--
9 826	25- 53	A13	38.4	41.0	20.6	9.4	11.8	5.9	7.4	3.9	12.3	28.7				19.9	--A	--	--	--
9 827	53- 76	A14	42.9	38.4	18.7	8.8	13.3	6.6	8.4	5.8	12.3	26.1				22.4	--A	--	--	--
9 828	76-100	A15	58.7	28.8	12.5	8.2	12.2	9.7	18.1	10.5	12.6	16.2				32.9	1A	--	TR	1
9 829	100-150	C	72.9	19.4	7.7	14.8	26.4	13.4	12.3	6.0	10.3	9.1				22.0	--A	--	--	--
9 830	0- 25	A1															--A	--	--	--

SAMPLE NO.	DEPTH CM.	ORG. MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG LL 4F1	PL 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	-PH- H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT-		-PERCENT-		PCT.	PCT. NO.40		GRAMS PER CC				-PERCENT-			-PERCENT-				
9 824	0- 5	0.86	0.080	TR		1.0	26	21	1.30			1.00			8.2			7.0	8.5	7.0
9 825	5- 25	1.01	0.091	1		1.0				1.33	1.46	1.00		19.8	10.4	3.2	3.2	7.7		7.6
9 826	25- 53	0.65		1		0.8				1.36	1.48	1.00		17.2	9.1	2.9	2.9	7.5		7.6
9 827	53- 76	0.57		4		0.7	33	20		1.40	1.49	1.00		16.4	8.4	2.1	2.1	7.4	8.4	7.6
9 828	76-100	0.35		3		0.6				1.42	1.49	0.99		13.3	5.1	1.6	1.6	7.6	8.7	7.6
9 829	100-150	0.19		3		0.5	NP	NP		1.58	1.63	1.00		8.5	4.1	1.0	1.0	7.7	8.9	7.6
9 830	0- 25			1		0.8			1.32			1.00			7.8			7.5		7.4

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6D2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	-MEQ/100G		MMHO	MEQ/1000 ML								PPM	
9 824	0- 5			0.1	1.7	1.8		20.3		9.8	2.1	67.9	59.3	0.6		1.8	34.7	108.7		7.7
9 825	5- 25			0.3	1.5	1.8		24.5												
9 826	25- 53			0.2	0.8	1.0		22.3												
9 827	53- 76			0.2	0.5	0.7		18.1	3.06	27.3	4.0	2.3	0.5			2.1	2.1	4.4		7.4
9 828	76-100			0.1	0.3	0.4		11.6	1.06	8.8	1.5	2.1	0.3			2.6	2.7	2.0		7.5
9 829	100-150			0.1	0.2	0.3		7.9	0.66	5.8	1.0	2.0	0.2			2.3	1.0			7.8
9 830	0- 25			0.1	1.2	1.3		16.9												

SAMPLE NO.	DEPTH CM.	WATER AT 8A SAT. PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY <2 MM LESS THAN 0.002 MM X RAY I 7A2E	II 7A2E	III 7A2E	DTA IV 7A2E	DTA PCT. 7A3	<2 MM L.T. .0002 MM X RAY I 7A2E	II 7A2E	III 7A2E
9 824	0- 5	38.0			10			MT	4	MI	3	KK	2		
9 825	5- 25		0.3	1				MT	4	MI	3	KK	2		
9 826	25- 53		0.2	1											
9 827	53- 76	40.7	0.1	1	1			MT	4	MI	3	KK	2		
9 828	76-100	28.4	TR	TR	1										
9 829	100-150	26.2	TR	1	1			MT	4	MI	3	KK	2		
9 830	0- 25		0.1	1											

MINERAL CODE		RELATIVE AMOUNT	
MT	MONTMORT	1	TRACE
MI	MICA	2	SMALL
KK	KAOLINIT	3	MODERATE
		4	ABUNDANT
		5	DOMINANT
		6	INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

GRABE LOAM
S69Ariz-2-12

Location: Cochise County, Arizona. 2,400 feet south and 800 feet west of the northeast corner of Sec. 4, T. 17 S., R. 24 E. West of Cochise Stronghold Road, about 5½ miles north and 5 miles west of Pearce. Date of sampling: October 16, 1969.

Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.

Classification: Anthropic Torrifluvent, coarse-loamy, mixed (calcareous), thermic.

Vegetation: Tobosa, giant sacaton, burroweed, yucca, scattered mesquite, Arizona cottontop, threeawn, black grama and spike dropseed. Use: Formerly livestock range, now subdivided for

CONSECUTIVE PEDON NUMBER C 69170 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES GUEST SOIL NO. S69 ARIZ. 2-24 SAMPLE NO. 9 875-9 880 WILLCOX AREA

SOIL FAMILY: ANTHROPIC TORRIFLUVENT,FINE,MIXED(CALCR.),THRMC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	SILTS FSI .02-.002	CO. CLAYS 2-.2U	FINE CLAYS LT .2U	CARBONATE 3A1A	1A2A INT. 11 .2-.02	COARSE FRAGMENTS PCT. OF WHOLE 2O I 75-SOIL	II 20-5 PCT. OF LT 75	III 5-2
			PERCENT OF LESS THAN 2MM																
9 875	0- 20	AP	25.5	34.0	40.5	1.2	1.6	2.6	11.8	8.3	10.5	23.5				25.8	5A	1	3	1
9 876	20- 43	A12	20.3	35.5	44.2	1.0	1.8	2.7	8.5	6.3	12.0	23.5				23.3	1A	--	--	1
9 877	43- 66	A13	19.9	35.4	44.7	1.0	2.3	2.5	7.4	6.7	11.2	24.2				22.4	1A	--	--	1
9 878	66-100	A14	22.6	34.2	43.2	1.0	2.4	2.9	8.9	7.4	10.1	24.1				22.5	1A	--	--	1
9 879	100-120	AC	23.2	33.3	43.5	0.9	2.5	3.1	9.0	7.7	10.2	23.1				23.3	1A	--	--	1
9 880	120-150	B2TCAB	38.2	19.5	42.3	7.3	8.7	5.8	11.2	5.2	6.0	13.5	42.0	0.3	4	16.2	2A	--	--	2

SAMPLE NO.	DEPTH CM.	ORG. MATTER CARBON 6A1A -PERCENT--	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	19-2 6E1B	EXT. IRON FE 6C2B PCT.	ATTERBERG LIMIT LL 4F1 PCT.	PL 4F2 NO.40	BULK DENSITY EST 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2 -----PERCENT---	EXTENSBLTY LEF 4D1 -PERCENT--	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
									GRAMS PER CC										
9 875	0- 20	0.64	0.070	1		0.7	40	21	1.35	1.67	0.98		27.3	13.9	7.3	7.1	7.8	8.7	7.8
9 876	20- 43	0.41	0.036	1		0.7			1.44	1.81	0.99		25.4	16.2	7.9	7.9	7.7		7.7
9 877	43- 66	0.36		2		0.7			1.43	1.81	0.99		27.1	16.3	8.2	8.1	7.8	9.0	7.7
9 878	66-100	0.32		2		0.7			1.42	1.84	0.99		28.7	17.0	9.0	9.0	7.9	9.1	7.7
9 879	100-120	0.23		5		0.7	48	21	1.38	1.75	0.99		28.2	16.9	8.2	8.2	8.0	9.1	7.7
9 880	120-150			19		0.6			1.42	1.79	0.99		27.3	16.4	8.0	7.9	7.7	9.0	7.8

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA 6N1B	MG 6Q1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	8A1 SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	MEQ/100G		MMHO	MEQ/1000 ML								PPM	
9 875	0- 20			0.8	2.0	2.8			28.3	1.37	9.5	1.8	4.7	0.5		6.9	1.5			7.8
9 876	20- 43			1.9	1.1	3.0			28.3											
9 877	43- 66			2.8	1.1	3.9			27.8	1.09	2.3	1.0	11.1	0.3		3.8	3.1			7.9
9 878	66-100			3.2	1.1	4.3			27.4	0.94	2.0	0.8	13.0	0.3		3.8	1.2	5.2		7.8
9 879	100-120			4.0	1.0	5.0			26.5	1.35	1.9	0.9	11.3	0.1		3.0	3.9	7.0		7.7
9 880	120-150			3.9	1.0	4.9			24.0	2.06	5.4	2.1	15.4	0.2		2.6	5.1	15.3		7.6

SAMPLE NO.	DEPTH CM.	WATER AT 1/3 BAR SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	OTA IV 7A2E	OTA PCT. 7A3	-L.T. .0002 MM- X RAY I 7A2E	X RAY II 7A2E	X RAY III 7A2E	MINERAL CODE	RELATIVE AMOUNT
9 875	0- 20	53.1	0.6	2	2			MT 3	MI 3	KK 1						MT MONTMORT	1 TRACE
9 876	20- 43		1.9	7				MI 3	MT 2	KK 1						MI MICA	2 SMALL
9 877	43- 66	67.7	2.0	7	9											KK KAOLINIT	3 MODERATE
9 878	66-100	69.9	2.3	8	11												4 ABUNDANT
9 879	100-120	71.5	3.2	12	10			MT 3	MI 3	KK 2							5 DOMINANT
9 880	120-150	65.9	2.9	12	8			MT 2	KK 1								6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

GUEST CLAY
S69Ariz-2-24

Location: Cochise County, Arizona. 100 feet south and 500 feet west of the northwest corner of Sec. 32, T. 16 S., R. 26 E. West of Kansas Settlement Road, about 6½ miles east and 7 miles north of Pearce. Date of sampling: October 22, 1969.

Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.

Classification: Anthropic Torrifluvent, fine, mixed (calcareous), thermic.

Vegetation: Tumbleweeds. Use: Idle irrigated cropland. Climate: Precipitation about 11 to 12 inches. Mean annual air temperature 60°F., January 42°F., July 78°F. Parent Material: Alluvium principally from andesite and rhyolite with some limestone. Topography: Nearly level valley plain. Slope, 0.5 percent, west facing. Elevation: 4200 feet. Drainage: Well drained. Runoff is slow to medium. Permeability is slow. Soil Moisture: Dry when sampled.

Remarks: Field determinations of pH by thymol blue indicator in 1:5 dilution. This sample was not paired.

HORIZON	DESCRIPTION
Ap RSL 69875	0 to 20 cm (0 to 8 inches), dark brown (10YR 4/3) clay, dark brown (7.5YR 3/2) moist; weak fine subangular blocky structure; hard to very hard, friable, very sticky, plastic; common very fine and fine roots; about 2 percent by volume of 1 inch rounded rhyolite, andesite and limestone gravel; slightly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
A12 RSL 69876	20 to 43 cm (8 to 17 inches), dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; moderate medium and coarse subangular and angular blocky structure; very hard, friable, very sticky, very plastic; very few very fine roots; few fine and very fine tubular pores; few pressure faces; about 2 percent by volume of 1 inch rounded rhyolite, andesite and limestone gravel; slightly effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
A13 RSL 69877	43 to 66 cm (17 to 26 inches), dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; weak medium and coarse angular and subangular blocky structure; very hard, firm, very sticky, very plastic; very few very fine roots; few very fine tubular pores; common pressure faces and a few slickensides; about 1 to 2 percent by volume of 1 inch rounded rhyolite, andesite and limestone gravel; slightly effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
A14 RSL 69878	66 to 100 cm (26 to 39½ inches), dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; massive; very hard, firm, very sticky, very plastic; very few very fine roots; few very fine tubular pores; common pressure faces and a few slickensides; about 1 to 2 percent by volume of 1 inch rounded rhyolite, andesite and limestone gravel; slightly effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
AC RSL 69879	100 to 120 cm (39½ - 47 inches), reddish brown (5YR 4/3) light clay, dark reddish brown (5YR 3/3) moist; massive; very hard, firm, sticky, plastic; very few very fine roots; few very fine tubular pores; common pressure faces; about 1 to 2 percent by volume of 1 inch rhyolite, andesite and limestone gravel; about 2 to 3 percent by volume of yellowish red medium irregularly shaped soft lime masses, lime coatings on gravel; strongly effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
B2tcab RSL 69880	120 to 150 cm (47 to 59 inches), yellowish red (5YR 5/6) clay, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; very hard, friable, sticky, plastic; common fine and very fine tubular pores; common moderately thick clay films on faces of peds and in pores; common pressure faces; about 1 percent by volume of 1 inch rounded rhyolite, andesite and limestone gravel; about 30 percent by volume of large white irregularly shaped soft lime masses; strongly effervescent, violently effervescent in spots; moderately alkaline (pH 8.0).

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Torriorthent, loamy-skeletal, carbonatic, mesic S62Ariz-3-34
SOIL FAMILY: Aridic Haplustoll, loamy-skeletal, carbonatic, mesic S62 Ariz-3-35

SOIL Winona gravelly fine sandy loam (taxadjunct) LOCATION Coconino County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62357 - 62360

Depth (In.)	Horizon	Size class and particle diameter (mm) Pct of < 2 mm: Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt (0.05–0.02)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: > 2* Pct	Coarse fragments 2A2: 2 – 19 Pct. of < 76 mm	Coarse fragments 2A2: 19 – 76 Pct. of < 76 mm
0-2½	A1	S62Ariz-3-34														24		
2½-9	C1															23		
0- 3	A1	S62Ariz-3-35														18		
3-10	C1															23		

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N		6E1b Carbonate as $CaCO_3$ Pct.		Bulk density g/cc	Bulk density g/cc	Bulk density g/cc		Water content Pct.	Water content Pct.	Water content Pct.			pH 8C1b Sat. Paste	pH 8C1a 1:10
0-2½	1.04	0.099	11		1											7.9	8.2
2½-9	1.22	0.125	10		4											8.0	8.4
0- 3	2.00	0.171	12		1											8.0	8.1
3-10	1.24	0.123	10		3											7.9	8.3

Depth (In.)	Extractable bases meq/100 g: Ca	Mg	Na	K					Water extract from saturated paste meq/liter: Ca	Mg	Na	K		CO_3	HCO_3	Cl	SO_4	Electrical conductivity mmho/cm

Depth (In.)	Water at Saturation Pct.	Exchangeable Na Pct		Gypsum Pct.			

* Percent of <19 mm ; see profile description for estimates of >19 mm.

WINONA GRAVELLY FINE SANDY LOAM (taxadjunct) 1/
S62Ariz-3-34

Supplemental to sample S62Ariz-3-33 as a check on C-N ratio and organic carbon.
Classification: Typic Torriorthent, loamy-skeletal, mixed, mesic.
Location: Central Coconino County Area, Arizona. 30 feet NW of sample site S62Ariz-3-33.
Vegetation: Barren area.
Remarks: Gravels ranging in size from 1/8 to 1/2 inch make up approximately 35 to 40 percent by volume, of the A1 horizon.
The surface 1/4 inch algal crust is noneffervescent but has a pH (Hellige-Truog) of 8.0 and is soft and porous. There are coatings of reprecipitated lime on all rock fragments throughout the profile which range in thickness from 1/8 to 1/2 inch. The depth to the R horizon ranges from 10 to 30 inches.
Examination and sampling done in a hand-dug pit.
The purpose of this sample is to check C-N ratio and organic carbon under sparse vegetative cover. Sample area involves approximately 60 square inches of essentially barren ground.
Percent volume of rock materials greater than 3/4 inch in diameter discarded from laboratory sample is: 2½-9" - 10 percent.

HORIZON	DESCRIPTION
A1 RSL 62357	0 to 2½ inches, brown (7.5YR 5/4) gravelly fine sandy loam, dark brown (7.5YR 3/2) when moist; moderate fine granular structure; loose when dry and moist, nonsticky and slightly plastic when wet; plentiful fine roots; many fine interstitial pores; strongly effervescent; moderately alkaline, pH (Hellige-Truog) 8.0; abrupt smooth boundary.
C1 RSL 62358	2½ to 9 inches, brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/2) when moist; weak fine and medium subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; plentiful fine roots; few fine continuous simple tubular and many fine interstitial pores; violently effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.
C2 and R	Same as described for Sample 3-33.

1/ The Winona series is in a loamy, carbonatic, mesic family of Lithic Torriorthents. This pedon has more than 35 percent gravel and cobbles by volume, lacks a lithic contact within 20 inches, and does not have carbonatic mineralogy.

WINONA GRAVELLY FINE SANDY LOAM (taxadjunct) 1/
S62Ariz-3-35

Supplemental to Sample S62Ariz-3-33 as a check on C-N ratio and organic carbon.
Classification: Aridic Haplustoll, loamy-skeletal, mixed, mesic.
Location: Central Coconino County Area, Arizona. 50 feet southwest of sample site S62Ariz-3-33.
Vegetation: Juniper tree with squirreltail grass understory.
Remarks: Gravels ranging in size from 1/8 to 1/2 inch make up approximately 35 to 40 percent by volume of the A1 horizon.
The surface 1/4 inch algal crust is noneffervescent but has a pH (Hellige-Truog) of 8.0 and is soft and porous. There are coatings of reprecipitated lime on all rock fragments throughout the profile which range in thickness from 1/8 to 1/2 inch. The depth to the R horizon ranges from 10 to 30 inches.
Purpose of this sample is to check C-N ratio and organic carbon under juniper cover. Sample taken approximately 5 feet from base of juniper which is approximately 119 years old. Sample [redacted]

10 percent ground cover density.

HORIZON	DESCRIPTION
O1	1 to 0 inches, needles from juniper tree.
A1 RSL 62359	0 to 3 inches, brown (7.5YR 4/4) gravelly heavy fine sandy loam, dark brown (7.5YR 3/2) when moist; weak fine granular structure; loose when dry and moist, slightly sticky and slightly plastic when wet; few fine roots; common fine interstitial and few fine tubular pores; slight effervescence; moderately alkaline, pH (Hellige-Truog) 8.0; abrupt smooth boundary.
C1 RSL 62360	3 to 10 inches, brown (7.5YR 4/4) gravelly heavy loam, dark brown (7.5YR 3/2) when moist; moderate fine and medium subangular blocky structure; slightly hard when dry, friable when moist, sticky and plastic when wet; plentiful fine roots; common fine interstitial and few fine tubular pores; violently effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Torriorthent, loamy-skeletal, carbonatic, mesic S62Ariz-3-37
SOIL FAMILY: Aridic Haplustoll, loamy-skeletal, carbonatic, mesic S62Ariz-3-38

SOIL **Winona gravelly fine sandy loam** (taxadjunct) LOCATION **Coconino County, Arizona**

SOIL SURVEY LABORATORY **Riverside, California** LAB. Nos. **62361 - 62364**

Depth (In.)	Horizon	Size class and particle diameter (mm) — Total: Sand (2–0.05)	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	Coarse fragments: >2* Pct.	Coarse fragments: 2–19 Pct. of <76 mm	Coarse fragments: 19–76 Pct. of <76 mm
		Pct. of <2 mm														
0- 3	A1	S62Ariz-3-37												29		
3-12	C1													37		
0- 2	A1	S62Ariz-3-38												30		
2-10	C1													34		

Depth (In.)	6A1a Organic carbon Pct	6B1a Nitrogen Pct	C/N	6E1b Carbonate as $CaCO_3$ Pct.	Bulk density g/cc	Bulk density g/cc	Bulk density g/cc	Water content Pct.	Water content Pct	Water content Pct.	pH 8C1b Sat. Paste	pH 8C1a 1:10
0- 3	1.80	0.154	12	3							7.9	8.3
3-12	2.13	0.206	10	14							7.9	8.4
0- 2	2.60	0.212	12	9							8.0	8.2
2-10	1.97	0.186	11	18							7.9	8.1

Depth (In.)	Extractable bases meq/100 g: Ca	Mg	Na	K	Water extract from saturated paste meq/liter: Ca	Mg	Na	K	CO_3	HCO_3	Cl	SO_4	Electrical conductivity mmho/cm

Depth (In.)	Water at Saturation Pct.	Exchangeable Na Pct.	Gypsum Pct.

* Percent of <19 mm ; see profile description for estimates of >19 mm.

WINONA GRAVELLY FINE SANDY LOAM (taxadjunct) 1/
S62Ariz-3-37

Supplemental to Sample S62Ariz-3-36 as a check on C-N ratio and organic carbon.
Classification: Typic Torriorthent, loamy-skeletal, mixed, mesic.
Location: Central Coconino County Area, Arizona. 25 feet east of sample site S62Ariz-3-36.
Vegetation: Area of 432 square inches bare of vegetation.
Remarks: The surface algal crust, approximately 1/4" thick, is noneffervescent, but has a pH (Hellige-Truog) of 8.0. It is soft and porous.
There are coatings of reprecipitated lime on all rock fragments throughout the profile which range in thickness from 1/8 to 1/2 inch.
The depth to the R horizon ranges from approximately 10 to 30 inches.
Soil examined and sampled in a hand-dug pit.
This sample taken for comparison of C-N ratio and organic carbon under sparse vegetative cover.

HORIZON	DESCRIPTION
A1 RSL 62361	0 to 3 inches, light brown (7.5YR 6/4) gravelly fine sandy loam, dark brown (7.5YR 4/2) when moist; weak fine granular structure; loose, dry and moist, nonsticky and slightly plastic when wet; few fine roots; many fine interstitial pores; strongly effervescent; moderately calcareous, pH (Hellige-Truog) 8.0; abrupt smooth boundary. 30 to 40 percent by volume of gravel 1/8 - 1/2 inch in diameter.
C1 RSL 62362	3 to 12 inches, brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/2) when moist; weak fine subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; plentiful fine and few medium roots; few fine continuous simple tubular and many fine interstitial pores; violently effervescent; moderately alkaline, pH 8.0; clear wavy boundary. 40 percent by volume of rock material greater than 3/4 inch in diameter discarded from laboratory sample.
C2 and R	Similar to sample S62Ariz-3-36.

1/ The Winona series is in a loamy, carbonatic, mesic family of Lithic Torriorthents. This pedon does not have a lithic contact within 20 inches, it has less than 40 percent carbonates, and it has more than 35 percent gravel and cobbles by volume.

WINONA GRAVELLY FINE SANDY LOAM (taxadjunct) 1/
S62Ariz-3-38

Supplemental to Sample S62Ariz-3-36 as a check on C-N ratio and organic carbon.
Classification: Aridic Haplustoll, loamy-skeletal, mixed, mesic

[redacted]

Location: Central Coconino County Area, Arizona. 60 feet SE of sample site S62Ariz-3-36.
Vegetation: Juniper tree. Sample site 5 feet from base of tree on north side but still under the canopy. Age of tree is 66 years. 15 percent ground density cover of blue grama and squirreltail grass is present as an understory.
Remarks: Sampled for purpose of comparing C-N ratio and organic carbon under a juniper cover. There are 30 to 40 percent by volume of gravels ranging in size from 1/8 to 1/2 inch in the 0-2" depth.
The surface algal crust, approximately 1/4" thick, is noneffervescent but has a pH (Hellige-Truog) of 8.0. It is soft and porous.
There are coatings of reprecipitated lime on all rock fragments throughout the profile which range in thickness from 1/8 to 1/2 inch.
The depth to the R horizon ranges from approximately 10 to 30 inches.
Soil examined and sampled in a hand-dug pit.

HORIZON	DESCRIPTION
01	1 to 0 inches, juniper needles; abrupt smooth boundary.
A1 RSL 62363	0 to 2 inches, brown (7.5YR 4/2) gravelly fine sandy loam, dark brown (7.5YR 3/2) when moist; weak fine and medium granular structure; loose when dry and moist; slightly sticky and slightly plastic when wet; few fine roots; many fine interstitial pores; strongly effervescent; moderately alkaline, pH (Hellige-Truog) 8.0; abrupt smooth boundary.
C1 RSL 62364	2 to 10 inches, brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/2) when moist; weak fine subangular blocky structure; slightly hard when dry, very friable when moist, slightly sticky and slightly plastic when wet; plentiful fine and few coarse roots; few fine continuous simple tubular and many fine interstitial pores; violently effervescent; moderately alkaline, pH 8.0; clear wavy boundary. 30 percent by volume of rock material greater than 3/4 inch in diameter discarded from laboratory sample.
C2 and R	Similar to sample S62Ariz-3-36.

CONSECUTIVE PEDON NUMBER C 67 47 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES GILMAN TAXADJUNCT SOIL NO. S67 ARIZ. 7- 1 SAMPLE NO. 7 588-7 597 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC TORRIORTHENT,CRS-LMY,MXD(CALC.),HYPRTHRMC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE 20	I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														SOIL	PCT. OF LT 75		
7 588	0- 18	AP1	52.8	37.9	9.3	1.4	2.0	2.2	13.8	33.4	24.1	13.8				67.4	4	TR	4Z	N
7 589	18- 36	AP2	51.2	39.7	9.1	--	1.7	2.2	13.5	33.8	25.5	14.2				69.0	3	TR	3Z	N
7 590	36- 58	C 1	59.6	31.4	9.0	1.9	2.9	3.1	16.8	34.9	21.3	10.1				67.7	4	TR	4Z	N
7 591	58- 81	C 2	49.3	40.7	10.0	2.1	3.3	3.2	13.9	26.8	29.3	11.4				64.9	5	TR	5Z	N
7 592	81-109	C 3	53.4	34.3	12.3	5.1	6.9	4.8	13.4	23.2	24.3	10.0				55.8	14	TR	14Z	N
7 593	109-122	A1 B	48.1	37.7	14.2	3.2	5.2	3.8	12.2	23.7	27.2	10.5				58.4	9	TR	9Z	N
7 594	122-137	A3 B															14	TR	14Z	N
7 595	137-150	B21TB	33.6	26.9	39.5	2.7	5.0	3.3	9.2	13.4	15.7	11.2				34.5	29	TR	29Z	N
7 596	150-170	B22TCAB															22	TR	22Z	N
7 597	170-208	C 4CAB															--	--	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR-BON 6A1A	NITRO-GEN 6B1A	CARBONATE AS CACO3 LT 2	2-20 6E1B	6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L L 4F1	P L 4F2	P I 4A1F	BULK DENSITY 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEE 4D1	LE 4D1
		-PERCENT-		-PERCENT-			PERCENT				PCT.	NO.40		GRAMS PER CC			-PERCENT-			-PERCENT-	
7 588	0- 18	0.23	0.032	2			0.6							1.50	1.53	0.98		17.8	6.9	0.7	0.6
7 589	18- 36	0.20	0.029	2										1.58	1.60	0.98		13.9	7.0	0.4	0.4
7 590	36- 58	0.18		3			0.6							1.46	1.47	0.98		21.9	6.1	0.2	0.2
7 591	58- 81	0.17		3										1.44	1.47	0.97		18.4	6.5	0.7	0.7
7 592	81-109	0.10		3										1.39	1.45	0.92		23.0	6.6	1.4	1.3
7 594	122-137	0.06		1										1.34		0.92			8.3		
7 595	137-150	0.04		7			0.8								1.30	1.41	0.83	22.0	14.5	2.7	2.3
7 596	150-170			15											1.39	1.51	0.87	25.9	12.1	2.8	2.4
7 597	170-208			18										1.45							

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4C	MG 5B3A 6O4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI-DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4-OAC 5A6A	BASE SATURATION SUM+ ACI-DITY	SUM+ AL	NH4-OAC 5C1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	SAT. PASTE 8C1B
		MEQ/100G									PERCENT					
7 588	0- 18			2.1	1.8	3.9			3.9	14.9					9.4	8.2
7 589	18- 36			1.4	1.6	3.0			3.0	14.5					9.2	7.9
7 590	36- 58			1.5	1.7	3.2			3.2	14.1					9.3	8.0
7 591	58- 81			1.5	1.2	2.7			2.7	13.8					9.3	8.1
7 592	81-109			1.6	0.7	2.3			2.3	13.5					9.4	8.1
7 593	109-122			1.7	0.5	2.2			2.2	14.6					9.3	7.9
7 594	122-137			1.9	0.5	2.4			2.4	14.5					9.3	8.0
7 595	137-150			2.4	0.8	3.2			3.2	20.1					9.2	7.7
7 596	150-170															8.0
7 597	170-208															8.0

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2F IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III
7 588	0- 18	MT 4	MI 2	KK 1						
7 589	18- 36									
7 590	36- 58	MT 4	MI 3	KK 2						
7 591	58- 81									
7 592	81-109									
7 593	109-122	MI 4	MT 3	KK 2						
7 594	122-137									
7 595	137-150	MI 4	MT 3	KK 3						
7 596	150-170									
7 597	170-208									

MINERAL CODE		RELATIVE AMOUNT	
MT	MONTMORT	1	TRACE
MI	MICA	2	SMALL
KK	KAOLINIT	3	MODERATE
		4	ABUNDANT
		5	DOMINANT
		6	INDETER.

SAMPLE PREPARATION CODES
N=NOT DETERMINED.

GILMAN VERY FINE SANDY LOAM (taxadjunct) 1/

S-67-Ariz-7-1

Location: Maricopa County, Arizona. 750 feet south and 306 feet west of the NE corner of Section 24, T2N, R9W., 11 miles west of Tonopah. Date of Sampling: October 9, 1967.
Description by: S. Torrance, G. Hartman. Collectors: K. Flach, D. Nettleton, J. Jay, A. DeWall.
Classification: Typic Torriorthent, coarse-loamy, mixed (calcareous), hyperthermic.
Vegetation: Cotton. Use: Farmland. Climate: Mean annual precipitation 7 inches. Mean

CONSECUTIVE PEDON NUMBER C 67 49 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES GILMAN TAXADJUNCT SOIL NO. S67 ARIZ. 7- 6 SAMPLE NO. 7 605-7 610 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC TORRIORTHENT,CRS-LMY,MXD(CALC.),HYPRTHRMC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	SILTS CO. 2-.2U	CLAYS FINE LT .2U	CARBONATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM															PCT. OF LT 75			
7 605	0- 13	AP	34.6	51.6	13.8	0.5	0.7	0.9	6.9	25.6	36.1	15.5				66.9	TR	TR	--	--
7 606	13- 46	B2	29.9	54.1	16.0	1.3	1.4	1.2	6.0	20.0	30.9	23.2				55.2	TR	TR	--	--
7 607	46- 69	B3	35.6	54.9	9.5	0.4	0.7	0.7	8.4	25.4	41.5	13.4				73.5	TR	TR	--	--
7 608	69- 94	C 1	41.7	51.0	7.3	--	0.2	0.8	12.6	28.1	42.2	8.8				79.8	TR	TR	--	--
7 609	94-130	C 2	63.1	30.8	6.1	0.1	0.4	1.4	23.7	37.5	24.7	6.1				80.3	TR	TR	--	--
7 610	130-163	C 3															--	--	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6F1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG LL 4F1	PL 4F2	PI 4A1F	BULK DENSITY EST. 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.NO.40			GRAMS PER CC			PERCENT			PERCENT	
7 605	0- 13	0.22	0.030	2		0.6							1.56	1.63	1.00	20.3	7.2	1.5	1.5	
7 606	13- 46	0.11	0.020	2		0.8							1.51	1.58	1.00	16.1	8.7	1.5	1.5	
7 607	46- 69	0.10		1									1.42	1.49	1.00	17.2	6.4	1.6	1.6	
7 608	69- 94	0.07		1		0.7							1.45	1.49	1.00	23.0	4.8	0.9	0.9	
7 609	94-130	0.04		TR									1.49	1.53	1.00	15.6	4.0	0.9	0.9	
7 610	130-163	0.07											1.49	1.54	1.00	16.8	4.9	1.1	1.1	

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4C	MG 5B3A 6O4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI-DITY 6H2A	KCL EXT. AL 6G1E	CEC SUM 5A3A	CEC NH4-OAC 5A6A	BASE SATURATION SUM+ ACI-DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
7 605	0- 13			0.8	1.1	1.9			1.9	13.5						
7 606	13- 46			0.8	0.6	1.4			1.4	17.3						
7 607	46- 69			0.8	0.4	1.2			1.2	14.0						
7 608	69- 94			0.6	0.3	0.9			0.9	10.9						
7 609	94-130			0.5	0.3	0.8			0.8	8.3						
7 610	130-163															

CLAY MINERALOGY

SAMPLE NO	DEPTH CM.	LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III
						PERCENT				
7 605	0- 13	MI 3	MT 1	KK 2						
7 606	13- 46	MT 4	MI 3	KK 2						
7 607	46- 69									
7 608	69- 94	MT 4	MI 3	KK 2						
7 609	94-130									
7 610	130-163									

CODE	
MI	MICA
MT	MONTMORT
KK	KAOLINIT

RELATIVE AMOUNT	
1	TRACE
2	SMALL
3	MODERATE
4	ABUNDANT
5	DOMINANT
6	INDETER.

GILMAN LOAM (taxadjunct) 1/
S-67-Ariz-7-6

Location: Maricopa County, Arizona. 63 feet west and 213 feet south of the NE corner of the NE¼, SW¼, Section 18, T2N, R1W., 6 miles northwest of Avondale. Date of Sampling: October 9, 1967.
Description by: S. Torrance, G. Hartman, J. Jay. Collectors: K. Flach, D. Nettleton.
Classification: Typic Torriorthent, coarse-loamy, mixed (calcareous), hyperthermic.
Vegetation: Grape vineyard. Use: Cultivated land. Climate: Mean annual precipitation is approximately 7.7 inches. Mean annual air temperature 70°F. January 52° F., July 90° F. Parent Material: Alluvium from a variety of igneous and sedimentary rocks. Topography: Level to nearly level alluvial fan sloping less than 0.5 percent to the southeast. Elevation: 1,105 feet. Drainage: Well drained, moderate permeability and medium runoff. Soil Moisture: Moist.
Remarks: Dr. Flach considered 5-18 inch horizon to be a cambic horizon with evidences of some clay movement. The same in 18-27" zone but less evident. Sampled from backhoe pit.

HORIZON	DESCRIPTION
Ap RSL 67605	0 to 13 cm (0 to 5 inches), yellowish brown (10YR 5/4) loam, dark brown (7.5YR 4/4) when moist; massive; slightly hard, friable, sticky and plastic; many fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
B2 RSL 67606	13 to 46 cm (5 to 18 inches), light yellowish brown (10YR 6/4)loam, dark brown (7.5YR 4/4) when moist; massive; hard, friable, sticky and plastic; few medium and common fine roots; few fine and medium and many very fine tubular pores; strongly effervescent; few fine white lime veins; moderately alkaline (pH 8.0); clear smooth boundary.
B3 RSL 67607	46 to 69 cm (18 to 27 inches), light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, very friable, slightly sticky, slightly plastic; many fine roots; many fine and very fine tubular pores and few medium tubular pores; few fine pinkish white lime veins, strongly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
C1 RSL 67608	69 to 94 cm (27 to 37 inches), light yellowish brown (10YR 6/4) loam, dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; few fine and very fine tubular pores; weakly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
C2 RSL 67609	94 to 130 cm (37 to 51 inches), light yellowish brown (10YR 6/4) very fine sandy loam, dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, slightly sticky and nonplastic; common fine and medium and few large roots; many fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
C3	130 to 163 cm (51 to 64 inches), light [illegible] (10YR 6/4)

[redacted]

RSL 67610	very fine sandy loam, dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common medium and large roots; few very fine tubular pores; strongly effervescent; moderately alkaline (pH 8.0).

1/ The Gilman series is in a coarse-loamy, mixed (calcareous), hyperthermic family of Typic Torrifluvents. This pedon has a regular decrease in

CONSECUTIVE PEDON NUMBER C 67 60 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES PIMER TAXADJUNCT SOIL NO. S67 ARIZ. 7-11 SAMPLE NO. 7 696-7 701 CENTRAL ARIZONA AREA

SOIL FAMILY: TYPIC TORRIORTHENT,FN-SLTY,MXD(CALC.),HYPRTHRMC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	SILTS-- CO. 2- .2U	CLAYS---- FINE LT .2U	CARBONATE 3A1A.02	INT. II .2- .02 WHOLE 20	COARSE FRAGMENTS- PCT. OF SOIL I 75-	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75		
7 696	0- 20	AP1	13.2	58.2	28.6	0.3	0.4	0.5	3.9	8.1	20.2	38.0				31.1	TR	TR	--	--
7 697	20- 38	AP2	12.9	57.6	29.5	0.2	0.3	0.4	2.9	9.1	22.8	34.8				34.3	TR	TR	--	--
7 698	38- 58	C 1	8.8	62.0	29.2	--	0.1	0.2	1.5	7.0	22.3	39.7				30.3	TR	TR	--	--
7 699	58- 76	C 2	5.5	63.1	31.4	--	0.1	0.1	1.0	4.3	17.2	45.9				22.2	TR	TR	--	--
7 700	76-117	C 3	9.3	72.9	17.8	--	0.1	0.1	1.1	8.0	33.9	39.0				42.6	TR	TR	--	--
7 701	117-178	C 4	11.8	62.8	25.4	0.4	0.9	1.2	3.4	5.9	18.1	44.7				26.0	TR	TR	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	I M PL 4F2	I T	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT--		-PERCENT-		PCT.	PCT.	NO.40		GRAMS PER CC				----PERCENT---			-PERCENT--				
7 696	0- 20	0.84	0.090	2						1.36	1.62	1.00		27.8	13.8	6.0	6.0			8.7	
7 697	20- 38	0.51	0.063	2						1.41	1.68	1.00		25.9	15.9	6.0	6.0			8.9	
7 698	38- 58	0.19		4						1.30	1.48	1.00		29.8	15.3	4.4	4.4			9.0	
7 699	58- 76	0.15		4						1.22	1.40	1.00		34.6	23.0	4.7	4.7			9.0	
7 700	76-117	0.10		2						1.29	1.38	1.00		34.7	11.0	2.3	2.3			9.2	
7 701	117-178			1						1.34	1.50	1.00		32.3	18.4	3.8	3.8			9.2	

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES--- CA 6N4C	MG 6B3A 6O4C	NA 6P2A	K 6Q2A	SUM	BASE SAT. PCT.	C E C--- NA- OAC 5A2A	NH4- OAC 5A6A	WATER EXTRACT FROM SATURATED PASTE EC MMHO 8A1A	CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	BA1 B 6T1A PPM	PH SAT. PASTE 8C1B
		MEQ/100G						-MEQ/100G			MEQ/1000 ML									
7 696	0- 20			1.1	2.1	3.2			26.7	1.94	7.5	5.2	6.1	0.8		9.0	3.6			7.6
7 697	20- 38			1.1	1.8	2.9			37.1											7.7
7 698	38- 58			1.3	1.6	2.9			25.7											7.8
7 699	58- 76			1.8	1.2	3.0			30.2	1.39	3.5	2.4	6.4	0.3		3.1	5.2			7.8
7 700	76-117			1.8	0.7	2.5			22.6											7.9
7 701	117-178			2.5	1.0	3.5			28.6	1.75	3.8	2.2	9.4	0.2		2.7	7.2			7.8

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A PCT.	EXCHANGBLE NA 584B MEQ.	NA 5O2 PCT.	SAR 5E	GYPSUM- AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY I 7A2E	II 7A2F	III 7A2E	DTA IV 7A2F	PCT. 7A3	-L.T. .0002 MM- X RAY I 7A2E	II 7A2E	III 7A2E	MINERAL CODE		RELATIVE AMOUNT
7 696	0- 20	58.1	0.7	3	2			MT 4	MI 3	KK 2						MT	MONTMORT	1 TRACE
7 697	20- 38		1.1	3												MI	MICA	2 SMALL
7 698	38- 58		1.3	5				MT 4	MI 3	KK 2						KK	KAOLINIT	3 MODERATE
7 699	58- 76	63.3	1.4	5	4													4 ABUNDANT
7 700	76-117		1.8	8				MT 5	MI 2	KK 2								5 DOMINANT
7 701	117-178	52.8	2.0	7	5													6 INDETER.

PIMER SILTY CLAY LOAM (taxadjunct) 1/
S-67-Ariz-7-11

Location: Maricopa County, Arizona. 902 feet west and 121 feet south of the SE corner of the NE¼ of the NE¼ Section 11 T1N R1E 2 miles east of

Tolleson. Date of Sampling: October 13, 1967.
Description by: G. Hartman, S. Torrance, J. Jay. Collectors: K. Flach, D. Nettleton, A. DeWall.
Classification: Typic Torriorthent, fine-silty, mixed (calcareous), hyperthermic.
Vegetation: Maize. Use: Irrigated cropland. Climate: Mean annual precipitation is approximately 7 inches. Mean annual temperature 68° F.; January 52° F., July 90° F. Parent Material: Alluvium derived from a wide variety of rocks including acid and basic igneous, quartzite, shale and limestone.
Topography: Nearly level low terrace sloping less than 0.5 percent to the south.
Elevation: 1060 feet. Drainage: Well drained with moderately slow permea

CONSECUTIVE PEDON NUMBER C 67 61 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES PIMER TAXADJUNCT SOIL NO. S67 ARIZ. 7-12 SAMPLE NO. 7 702-7 707 CENTRAL ARIZONA ARI

SOIL FAMILY: TYPIC TORRIORTHENT,FN-SLTY,MXD(CALC.),HYPRTHRMC RIVERSIDE SOIL SURVEY LABORATOR

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBONATE 3A1A	INT. COARSE FRAGMENTS- II .2- .02	PCT. OF WHOLE SOIL	I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM															PCT. OF LT 7			
7 702	0- 20	AP	16.5	59.2	24.3	0.3	0.5	0.7	4.5	10.5	21.6	37.6				35.3	TR	TR	--	--
7 703	20- 38	B2 T	16.4	58.7	24.9	0.1	0.5	0.7	4.7	10.4	21.2	37.5				35.1	TR	TR	--	--
7 704	38- 56	B3	19.1	58.8	22.1	0.1	0.2	0.4	7.3	11.1	15.9	42.9				33.1	TR	TR	--	--
7 705	56- 76	C 1	8.8	72.9	18.3	0.1	0.2	0.3	1.9	6.3	32.4	40.5				40.1	TR	TR	--	--
7 706	76- 99	C 2	20.9	50.3	28.8	0.9	2.5	2.8	6.2	8.5	15.2	35.1				27.4	TR	TR	--	--
7 707	99-130	C 3	47.6	34.6	17.8	3.6	7.2	6.9	14.0	15.9	20.0	14.6				43.6	TR	TR	--	--

SAMPLE NO.	DEPTH CM.	ORG. CARBON 6A1A	MATTER NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-19 6E1B	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	I M PL 4F2	I T	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL 8C1
		-PERCENT--		-PERCENT-		PCT.	PCT.	NO.40		GRAMS PER CC				----PERCENT---			-PERCENT--				
7 702	0- 20	0.64	0.076	3		1.1					1.48	1.67	1.00		25.7	12.5	4.1	4.1		8.5	
7 703	20- 38	0.48	0.061	3		1.2					1.56	1.76	1.00		24.2	13.2	4.1	4.1		8.8	
7 704	38- 56	0.17		3							1.32	1.42	1.00		28.6	11.8	2.5	2.5		9.0	
7 705	56- 76			3						1.20			1.00			10.4				9.2	
7 706	76- 99			2		1.1					1.15	1.31	1.00		37.7	13.2	4.4	4.4		9.1	
7 707	99-130			1						1.15			1.00			7.9				9.1	

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES 6N4C	6O4C	6P2A	6Q2A	C E C 5A2A	5A6A	WATER EXTRACT FROM SATURATED PASTE 8A1 8A1A	6N1B	6O1B	6P1A	6Q1A	6I1A	6J1A	6K1A	6L1B	6T1A	PI 8C1F
		----MEQ/100G----				PCT.	-MEQ/100G	MMHO	----MEQ/1000 ML----								PPM	
7 702	0- 20		1.5	1.8	3.3		24.3	4.40	19.1	11.9	11.0	1.2		4.4	20.2		7.6	
7 703	20- 38		1.2	1.6	2.8		25.2	1.43	4.8	3.5	5.0	0.5		4.5	5.6		7.7	
7 704	38- 56		1.9	0.7	2.6		26.4	1.54	3.8	3.0	6.9	0.2		2.6	7.3		7.9	
7 705	56- 76		2.2	0.6	2.8		25.4	1.59	3.4	2.7	2.1	0.1		2.2	7.4		7.9	
7 706	76- 99		2.5	0.5	3.0		28.4	1.76	3.6	2.7	9.4	0.1		2.5	9.0		7.8	
7 707	99-130		1.4	0.4	1.8		15.6	1.35	2.8	1.6	6.8	0.1		2.0	5.2		7.8	

PIMER CLAY LOAM (taxadjunct) 1/
S-67-Ariz-7-I2

Location: Maricopa County, Arizona. 700 feet south, 570 feet west of the NE corner of the NW¼ Section 33, T2N, R1E., 1½ miles north of Tolleson. Date of Sampling: October 14, 1967. Description by: G. Hartman, S. Torrance, J. Jay. Collectors: K. Flach, D. Nettleton.
Classification: Typic Torriorthent, fine-silty, mixed (calcareous), hyperthermic.
Vegetation: Cotton. Use: Cultivated land. Climate: Mean annual precipitation is about 7 inches. Mean annual temperature 68° F; January 52° F., July 90° F. Parent Material: Alluvium from a wide variety of rock materials including acid and basic igneous, quartzite, shale and limestone. Topography: Nearly level low terrace sloping less than 0.5 percent to the southeast. Elevation: 1040 feet. Drainage: Well drained, moderately slow permeability. Slow runoff. Soil Moisture: Moist at time of sampling.

HORIZON	DESCRIPTION
	0 to 20 cm (0 to 8 inches), brown (10YR 5/3) clay loam, dark brown
Ap RSL 67702	(7.5YR 4/3) when moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few fine tubular pores and many fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.0 thymol blue); abrupt smooth boundary.
B2t RSL 67703	20 to 38 cm (8 to 15 inches), brown (10YR 5/3) clay loam, dark brown (7.5YR 4/3) when moist; massive; hard, firm, sticky, plastic; common fine tubular and interstitial pores; few thin clay films on ped faces and thick clay films in pores; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
B3 RSL 67704	38 to 56 cm (15 to 22 inches), brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/3) when moist; massive; hard, friable, sticky and plastic; common fine tubular and few fine interstitial pores; few medium pinkish white lime veins, strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
	56 to 76 cm (22 to 30 inches), light yellowish brown (10YR 6/4)
C1 RSL 67705	heavy loam, dark brown (7.5YR 4/4) when moist; massive; hard, very friable, sticky and plastic; many fine and medium tubular and few fine interstitial pores; very few thin clay films on ped faces and thick clay films in pores; strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C2 RSL 67706	76 to 99 cm (30 to 39 inches), pale brown (10YR 6/3) clay loam, dark brown (7.5YR 4/4) and pink (7.5YR 7/4) when moist; massive; slightly hard, very friable, sticky and plastic; many fine and medium tubular and few fine interstitial pores; very few thin clay films on ped faces and thick clay film in pores; few fine pinkish white lime veins, strongly effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C3 RSL 67707	99 to 130 cm (39 to 51 inches), light brown (7.5YR 6/4) loam, dark brown (7.5YR 4/4) when moist; massive; slightly hard, friable, slightly sticky, plastic; many fine tubular and common fine interstitial pores; few fine faint pinkish white lime veins, strongly effervescent; moderately alkaline (pH 8.0).

1/ The Pimer series is in a fine-silty, mixed (calcareous), hyperthermic family of Anthropic Torrifluvents. This pedon lacks an anthropic epipedon and has a regular decrease in organic carbon to less than 0.2 percent at a depth of 15-22 inches.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Lithic Torriorthent, loamy-skeletal, carbonatic, mesic

SOIL Winona gravelly loam SOIL Nos. S62Ariz-3-27 LOCATION Coconino County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62313 - 62316

Depth (In.)	Horizon	1B1b Size class and particle diameter (mm) 3A1 Total 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)	Silt 0.05–0.02	Int. III (0.02–0.002)	Int II (0.2–0.02)	(2–0.1)	Coarse fragments 2A2 > 2* Pct.	2 – 19 Pct. of < 76 mm	19 – 76 Pct. of < 76 mm
		Pct. of < 2 mm														
0- 2	A	33.9	52.3	13.8	3.8	2.8	1.7	6.3	19.3	32.1	20.2	55.8	14.6	32		
2-12	C1	26.6	47.1	26.3	2.1	2.3	1.5	5.7	15.0	24.2	22.9	43.0	11.6	42		
12-20	C2	32.7	36.5	30.8	4.5	4.0	3.0	8.9	12.3	17.7	18.8	35.7	20.4	64		
20-23+	R	Rock														

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct.	3A1a Carbonate in <0.002 mm Pct.	Atterberg limits Plastic limit	Liquid limit	Plastic index Pct. of <0.4 mm	Water content 4B2 15 bar Pct.	Pct.	pH 8C1b Sat. Paste	8C1a 1:10
0- 2	1.75	0.163	11	0.6	5	-				10.0		7.5	8.0
2-12	1.94	0.203	10	0.5	20	8	22	39	17	15.1		7.6	8.2
12-20	2.21	0.222	10	0.4	45	18				15.2		7.8	8.3
20-23+		Rock											

Depth (In.)	Extractable bases 5B1a 6N2c Ca	6O2c Mg	6P2a Na	6Q2a K	Cation Exch. Capacity 5A2a NaOAc	Water extract from saturated paste 8A1 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity
	meq/100 g					meq/liter								mmho/cm
0- 2	18.3	3.3	0.1	1.4	23.6	7.3	1.1	0.3	0.5	7.7	-	0.2		0.76
2-12	31.7	3.7	0.2	0.6	28.4	4.5	0.9	0.3	0.2	4.6	-	0.2		0.51
12-20	26.6	5.0	0.2	0.2	23.0	4.1	1.9	0.5	0.1	5.0	-	0.4		0.56
20-23+		Rock												

Depth (In.)	8A Water at Saturation Pct	5D1 Exchangeable Na Pct	5B1b Exch. Na meq / 100 g	Gypsum Pct
0- 2	37.4	0.4	0.1	
2-12	52.3	0.7	0.2	
12-20	56.7	0.8	0.2	
20-23+		Rock		

* Percent of <19 mm ; see profile description for estimates of >19 mm.

WINONA GRAVELLY LOAM
S62Ariz-3-27

Location: Central Coconino County Area, Arizona, at center of Sec. 17, T26N, R2E, 32 miles W. and 31 miles N of Flagstaff. Date of Sampling: June 11, 1962.
Collectors: R.E. Nelson, Lothair Grant, R.M. Mitchell, Larry Haverfield, J.E. Jay.
Classification: Lithic Torriorthent, loamy-skeletal, carbonatic, mesic.
Vegetation: The vegetation at the sample site is blue grama and squirreltail with approximately 30 percent ground density. Other vegetation in the general area is ring muhly, snakeweed, chamiza and rabbitbrush. Use: Rangeland. Climate: Precipitation ranges from 12 to 14". The average January temperature is approximately 30° F. and the average July temperature is 70° F. The mean annual temperature is 50° to 55° F. Parent Material: Hard, massive, dense, yellow limestone member of the Kaibab formation. Elevation: 5950 feet. Relief: Gently undulating plains, slightly convex, slope 4 percent to the east. Drainage: Well drained; slow runoff; moderately permeable subsoil.
Remarks: This is probably the most extensive kind of soil developed on this formation. The Kaibab formation is the largest single area of exposed limestone in the United States.

HORIZON	DESCRIPTION
A RSL 62313	0 to 2 inches, pale brown (10YR 6/3) gravelly loam, dark brown (10YR 4/3) when moist; very weak coarse platy breaking to weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; very few very fine roots; few very fine continuous simple tubular and many very fine interstitial pores; violently effervescent; moderately alkaline, pH (Hellige-Truog) 8.0; abrupt smooth boundary. 5 percent by volume of coarse fragments greater than 3/4" discarded from laboratory sample - gravels consist dominantly of irregularly shaped weathered fragments of limestone and a scattering of subangular chert fragments ranging up to 3/4" in diameter.
C1 RSL 62314	2 to 12 inches, brown (10YR 5/3) cobbly loam, dark brown (10YR 3/3) when moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine and fine roots; few very fine and fine continuous vertical simple tubular and many fine interstitial pores; violently effervescent; moderately alkaline, pH 8.0; clear wavy boundary. 25 percent by volume of coarse fragments greater than 3/4" discarded from laboratory sample. 20 percent by volume of rock fragments larger than 3" in diameter discarded from BPR samples. Cobbles are limestone fragments oriented with the solution pitted face upward and lime drips downward. In the upper part of the profile the vertical axis exceeds the horizontal axis. However, with an increase in depth, the cobbles get larger until the horizontal axis exceeds the vertical axis.
C2 RSL 62315	12 to 20 inches, light gray (10YR 7/2) cobbly loam, pale brown (10YR 6/3) when moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; plentiful very fine and fine roots; common very fine continuous simple tubular and many fine interstitial pores; violently effervescent; moderately alkaline, pH 8.0; abrupt irregular boundary. 30 percent by volume of rock material larger than 3/4" in diameter discarded from laboratory sample.
R RSL 62316	20 to 23 inches +, yellow (10YR 8/6) massive, extremely hard dense dolomitic limestone, yellow (10YR 7/8) when moist. This limestone is irregularly jointed and is slightly weathered on its upper surface and along the joint faces. A thin layer of reprecipitated lime (1/16 to 1/8 inch thick) is generally present on the upper surface of this layer.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Lithic Torriorthent, loamy-skeletal, carbonatic, mesic

S62Ariz-3-28

SOIL Winona gravelly loam SOIL Nos. S62Ariz-3-29 LOCATION Coconino County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62353 - 62356

Depth (In.)	Horizon	Size class and particle diameter (mm) — Total: Sand (2–0.05)	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: ≥ 2*	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0–1½	A1	S62Ariz-3-28														45		
1½–9	C1															34		
0– 3	A1	S62Ariz-3-29														31		
3–10	C1															44		

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N		6E1b Carbonate as $CaCO_3$		Bulk density				Water content					pH 8C1b Sat. Paste	pH 8C1a 1:10
	Pct.	Pct.			Pct.		g/cc	g/cc	g/cc		Pct.	Pct.	Pct				
0–1½	1.84	0.186	10		16											8.0	8.9
1½–9	2.43	0.229	11		19											8.0	8.5
0– 3	2.10	0.175	12		15											7.9	8.4
3–10	1.80	0.161	11		20											7.9	8.5

Depth (In.)	Extractable bases: Ca	Mg	Na	K					Water extract from saturated paste: Ca	Mg	Na	K		CO_3	HCO_3	Cl	SO_4	Electrical conductivity
	meq/100 g								meq/liter									mmho/cm

Depth (In.)	Water at Saturation Pct.	Exchangeable Na Pct.		Gypsum Pct.			

* Percent of <19 mm ; see profile description for estimates of >19 mm.

Supplemental to Sample S62Ariz-3-27 as a check on C/N ratio and organic carbon.
Classification: Lithic Torriorthent, loamy-skeletal, carbonatic, mesic.
Location: Central Coconino County Area, Arizona. 75 feet southwest of sample S62Ariz-3-27.
Vegetation: Bare area.
Remarks: Barren area approximately 3 square feet in area. Examination made in hand-excavated pit. 50-60 percent by volume of gravels ranging in size from 1/8 to 1/2"with few up to 3 inches in diameter are present in the surface 0-1½ inches. Gravels are irregularly shaped weathered fragments of limestone and a scattering of somewhat rounded chert fragments. Cobbles consist of limestone fragments oriented with the solution pitted face upward and lime drips downward. In the upper part of the profile the vertical axis exceeds the horizontal axis. However, with an increase in depth, the cobbles get larger until the horizontal axis exceeds the vertical axis.

Percent by volume of rock material greater than 3/4" in diameter discarded from laboratory sample is:
0 - 1½" - 5 percent
1½ - 9" - 25 percent

HORIZON	DESCRIPTION
A1 RSL 62353	0 to 1½ inches, pale brown (10YR 6/3) very gravelly loam, dark brown (10YR 4/3) when moist; weak medium and coarse platy; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; common very fine discontinuous tubular and many very fine interstitial pores; violently effervescent; moderately alkaline, pH (Hellige-Truog) 8.0; abrupt smooth boundary.
C1 RSL 62354	1½ to 9 inches, brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) when moist; weak medium and coarse subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; plentiful very fine and fine roots; few fine and medium tubular and many very fine interstitial pores; violently effervescent; moderately alkaline, pH 8.0; clear wavy boundary.
C2	Similar to number S62Ariz-3-27.
R	Not sampled.

WINONA GRAVELLY LOAM
S62Ariz-3-29

Supplemental to Sample S62Ariz-3-27 as a check on C/N ratio and organic carbon.
Classification: Lithic Torriorthent, loamy-skeletal, carbonatic, mesic.
Location: Central Coconino County Area, Arizona. 700' northeast of sample S62Ariz-3-27.
Vegetation: Approximately 50 percent ground density consisting of sand dropseed, Indian ricegrass, blue grama, ring muhly, squirreltail, snakeweed and rabbitbrush.
Remarks: Examination made in hand-excavated pit. 50-60 percent by volume of gravels ranging in size from 1/8 to 1/2 with few up to 3 inches in diameter are present in the surface 0-3 inches. Gravels are irregularly shaped weathered fragments of limestone and a scattering of somewhat rounded chert fragments. Cobbles consist of limestone fragments oriented with the solution pitted face upward and lime drips downward. In the upper part of the profile the vertical axis exceeds the horizontal axis. However, with an increase in depth, the cobbles get larger until the horizontal axis exceeds the vertical axis.

HORIZON	DESCRIPTION
A1 RSL 62355	0 to 3 inches, pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) when moist; weak medium coarse platy structure; slightly hard when dry, very friable when moist, slightly sticky and slightly plastic when wet; plentiful very fine and fine roots; common very fine continuous simple tubular and many very fine interstitial pores; violently effervescent; moderately alkaline, pH (Hellige-Truog) 8.0; abrupt wavy boundary.
C1 RSL 62356	3 to 10 inches, brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) when moist; weak medium subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; abundant very fine roots; common very fine continuous vertical simple tubular and many very fine interstitial pores; violently effervescent; moderately alkaline; pH 8.0; clear wavy boundary.
C2	Similar to number S62Ariz-3-27.
R	Not sampled.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Lithic Torriorthent, loamy-skeletal, carbonatic, mesic

SOIL Winona very gravelly loam SOIL Nos. S62Ariz-3-30 LOCATION Coconino County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62317 - 62320

Depth (In)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: > 2*	Coarse fragments 2A2: 2 – 19	Coarse fragments 2A2: 19 –76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0- 2	A1	55.4	32.1	12.5	0.7	4.0	7.5	20.6	22.6	17.8	14.3	52.9	32.8			26		
2-12	C1	48.9	29.5	21.6	0.4	3.1	6.4	18.6	20.4	15.1	14.4	46.6	28.5			29		
12-15	C2	44.9	27.1	28.0	0.7	3.1	6.2	18.0	16.9	12.3	14.8	39.9	28.0			49		
15+	R	Rock																

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N		6E1b Carbonate as $CaCO_3$ Pct.	3A1a Carbonate in <0.002 mm Pct.	Atterberg limits: Plastic limit Pct. of <0.4 mm	Atterberg limits: Liquid limit	Atterberg limits: Plastic index		Water content: 4B2 15 bar Pct.	Water content: Pct.			pH: 8C1b Sat. Paste	pH: 8C1a 1:10

WINONA VERY GRAVELLY LOAM
S62Ariz-3-30

Location: Central Coconino County Area, Arizona. 1800 feet south and 500 feet east of the NW corner, Sec. 35, T29N, R1E, 31 miles W. and 45 miles N. of Flagstaff. Date of Sampling: June 11, 1962.
Collectors: R.E. Nelson, Lothair Grant, R.W. Mitchell, Larry Haverfield, J.E. Jay.
Classification: Lithic Torriorthent, loamy-skeletal, carbonatic, mesic.
Vegetation: At the sample site the vegetation consisted of blue grama and squirreltail grasses with approximately 50 percent ground density. Use: Rangeland. Climate: Precipitation is approximately 14". The average January temperature is approximately 30° F. and the average July temperature is approximately 70°F. The mean annual temperature is approximately 50° to 55° F. Parent Material: Hard, massive, yellow limestone member of the Kaibab formation. Elevation: 5900 feet. Relief: Undulating plains, slightly convex, slope 4 percent to the east. Drainage: Well drained, slow runoff, moderately permeable subsoil.
Remarks: Gravels consist dominantly of irregularly shaped weathered fragments of limestone and a scattering of subangular chert fragments ranging up to 3/4 inch with a few ranging up to 3 inches in diameter.
Cobbles and stones consist of limestone fragments oriented with the solution pitted face upward and lime drips downward. In the upper part of the profile the vertical axis exceeds the horizontal axis. However, with an increase in depth the cobbles get larger until the horizontal axis exceeds the vertical axis.

HORIZON	DESCRIPTION
A1 RSL 62317	0 to 2 inches, brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 4/4) when moist; weak very fine subangular blocky structure; loose when dry, very friable when moist, slightly sticky and slightly plastic when wet; few very fine roots; many very fine interstitial pores; strongly effervescent; moderately alkaline, pH (Hellige-Truog) 8.0; abrupt smooth boundary. 5 percent by volume of coarse fragments greater than 3/4 inch in diameter discarded from laboratory sample.
C1 RSL 62318	2 to 12 inches, brown (7.5YR 5/4) cobbly and stony loam, dark brown (7.5YR 4/4) when moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; abundant very fine roots; few fine and medium vertical simple tubular and many fine interstitial pores; violently effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary. 35 percent by volume of coarse fragments over 3 inches discarded from BPR sample. 50 percent by volume of fragments greater than 3/4 inch discarded from laboratory sample.
C2 RSL 62319	12 to 15 inches, light yellowish brown (10YR 6/4) cobbly and stony loam, dark yellowish brown (10YR 4/4) when moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine interstitial and few fine tubular pores; violently effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary. 40 percent by volume coarse fragments greater than 3/4 inch in diameter discarded from laboratory sample.
R RSL 62320	15 to 17 inches +, pale yellow (5Y 7/4) massive dense limestone, light yellowish brown (5YR 6/4) when moist, with irregularly spaced joints and seams, extremely hard, extremely firm, effervescent, moderately alkaline, pH 8.0. A thin layer of reprecipitated lime (1/16 to 1/8 inch thick) is generally present on the upper surface of this layer.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Lithic Torriorthent, loamy-skeletal, carbonatic, mesic

SOIL Winona gravelly loamy fine sand . SOIL Nos. S62Ariz-3-31 LOCATION Coconino County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62321 - 62324

Depth (in.)	Horizon	1B1b Size class and particle diameter (mm) 3A1													Coarse fragments 2A2		
		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)	0.05–0.02	Int. III (0.02–0.002)	Int II (0.2–0.02)	(2–0.1)			>2"	2 – 19	19 –76
		Pct of < 2 mm														Pct	Pct. of < 76 mm	
0- 3	A1	91.9	5.4	2.7	4.3	17.2	17.4	24.1	28.9	4.3	1.1	48.1	63.0			5		
3-12	C1	66.6	21.2	12.2	2.0	7.4	9.6	18.9	28.7	12.2	9.0	54.3	37.9			23		
12-19	C2	49.3	28.1	22.6	2.4	4.9	4.9	12.7	24.4	12.2	15.9	46.2	24.9			45		
19+	R	Rock																

Depth (in.)	6A1a Organic carbon	6B1a Nitrogen	C/N		6E1b Carbonate as $CaCO_3$	3A1a Carbonate in <0.002 mm	Atterberg limits				Water content 4B2 15 bar				pH	
							Plastic limit	Liquid limit	Plastic index						8C1b Sat. Paste	8C1a 1:10
	Pct	Pct			Pct	Pct.	Pct. of <0.4 mm				Pct.	Pct.	Pct			
0- 3	0.31	0.025	12		3	tr.						2.7			7.9	8.5
3-12	0.55	0.061	9		13	4	18	24	6			7.3			7.9	8.6
12-19	1.02	0.109	9		40	15						10.3			8.0	8.5
19+		Rock														

Depth (In.)	Extractable bases 5B1a				Cation Exch. Capacity	Water extract from saturated paste 8A1								
	6N2c Ca	6O2c Mg	6P2a Na	6Q2a K	5A2a NaOAc	6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity
	meq/100 g					meq/liter								mmho/cm

WINONA GRAVELLY LOAMY FINE SAND
S62Ariz-3-31

Location: Central Coconino County Area, Arizona. 133 feet west and 4230 feet south of the NE corner of Sec. 1, R12E, T20N. 33 miles E. of Flagstaff. Date of Sampling: June 12, 1962.
Collectors: Lothair Grant, Larry Haverfield, Daryl Cox and James E. Jay.
Classification: Lithic Torriorthent, loamy-skeletal, carbonatic, mesic.
Vegetation: The vegetation at the sample site consisted of black grama, New Mexico needle and thread grass and snakeweed. Ground density is approximately 35 percent. Use: Rangeland. Climate:

[redacted]

approximately 50° to 55°F. Parent Material: Dense, hard, white, fine grained calcareous sandstone member of the Kaibab formation. Elevation: 5450 feet. Relief: Gently undulating plains, slightly convex, slope 2 percent to the north. Drainage: Well drained, slow runoff, moderately permeable subsoil.

Remarks: Gravels consist of irregularly shaped fragments of sandstone and caliche ranging in size from 1/8 to 3/4" in diameter. Stones cover approximately 5 percent of the area at the sample site. At blowout sites stones occupy approximately 40 percent of the area. The average stone cover for the soil surface is approximately 20 percent.
The calcareous sandstone bedrock is more highly weathered in some localities than in others and can be dug into with a spade and bar at these points.

HORIZON	DESCRIPTION
	Thin layer of very dark brown (10YR 2/2) volcanic cinders, black (10YR 2/1) when moist cover approximately 60 percent of the surface of the soil.
A1 RSL 62321	0 to 3 inches, brown (7.5YR 5/4) gravelly loamy fine sand, dark brown (7.5YR 4/4) when moist; single grained, loose when dry and moist, nonsticky and nonplastic when wet; few very fine roots; many very fine interstitial pores; strongly effervescent; moderately

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Lithic Torriorthent, loamy-skeletal, carbonatic, mesic

SOIL Winona gravelly loamy fine sand SOIL Nos. S62Ariz-3-32 LOCATION Coconino County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62325 - 62328

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Size class and particle diameter (mm) 3A1 Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: ≥ 2* Pct.	2 – 19 Pct of < 76 mm	19 – 76 Pct of < 76 mm
		Pct. of < 2 mm																
0- 3	A1	85.5	9.8	4.7	3.1	15.0	12.7	21.7	33.0	6.7	3.1	55.2	52.5			7		
3-10	C1	70.0	17.5	12.5	1.7	7.9	7.6	20.6	32.2	7.3	10.2	55.5	37.8			30		
10-18	C2	57.8	24.2	18.0	1.3	4.3	4.0	17.9	30.3	12.5	11.7	56.8	27.5			55		
18-24+	R	Rock																

Depth (In.)	6A1a Organic carbon Pct	6B1a Nitrogen Pct.	C/N		6E1b Carbonate as $CaCO_3$ Pct	3A1a Carbonate in <0.002 mm Pct.	Atterberg limits Plastic limit	Liquid limit	Plastic index Pct. of <0.4 mm		Water content: Pct.	4B2 15 bar Pct	Pct.			pH: 8C1b Sat. Paste	8C1a 1:10
0- 3	0.51	0.047	11		5	1						3.3				8.0	8.5
3-10	0.79	0.086	9		11	3	19	22	3			5.0				8.0	8.6
10-18	1.25	0.125	10		39	11						11.3				7.9	8.5
18-24+		Rock															

Depth (In.)	Extractable bases: 6N2c Ca	6O2c Mg	6P2a Na	6Q2a K		Cation Exch. Capacity 5A2a NaOAc			Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K		6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter									mmho/cm
0- 3	15.9	1.3	0.1	0.6		9.1			5.2	0.9	0.3	0.5		-	5.4	0.2		0.57
3-10	24.1	2.4	0.1	0.7		16.9			2.9	0.9	0.4	0.2		-	3.6	0.1		0.39
10-18	22.0	3.4	0.1	0.5		14.5			3.3	1.3	0.6	0.4		-	4.2	0.1		0.50
18-24+		Rock																

Depth (In.)	8A Water at Saturation Pct.	5D1 Exchangeable Na Pct.	5B1b Exch. Na meq / 100 g	Gypsum Pct.
0- 3	27.1	1.1	0.1	
3-10	33.9	0.6	0.1	
10-18	44.3	0.7	0.1	
18-24+		Rock		

* Percent of <19 mm ; see profile description for estimates of >19 mm.

WINONA GRAVELLY LOAMY FINE SAND
S62Ariz-3-32

Location: Central Coconino County Area, Arizona. 2120 feet west and 1584 feet south of the NE corner of Sec. 2, T20N, R12E, 12 miles E of Flagstaff. Date of Sampling: June 12, 1962

Vegetation: 40 percent ground density cover of black grama and snakeweed. Use: Rangeland. Climate:

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Lithic Torriorthent, loamy-skeletal, mixed, nonacid, thermic
SOIL Cellar very stony and gravelly sandy loam SOIL Nos. S65Ariz-13-21 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65393 - 65394

Depth (In.)	Horizon	1B1b Total Sand (2–0 05)	Total Silt (0 05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0 5)	Sand: Medium (0.5–0 25)	Sand: Fine (0 25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0 02	Silt: Int. III (0.02–0 002)	Int. II (0.2–0.02)	(2–0.1)			* Coarse fragments 1A2a ≥ 2 Pct.	2 – 19 Pct. of < 2 mm	19 – 76 Pct. of < 76mm
		Pct. of < 2 mm										3A1						
0-1	A1	68.8	22.8	8.4	19.6	18.6	7.8	13.0	9.8	16.8	6.0	33.2	59.0	0	8	18	18	0
1-8	C1	77.9	12.8	9.3	17.9	21.1	10.9	18.4	9.6	8.5	4.3	27.3	68.3	0	9	51	22	29

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct	Bulk density: 4A1f 1/3 bar g/cc	Bulk density: 4A1h Oven dry g/cc	Bulk density: g/cc	Water content: Pct.	Water content: 4B1c 1/3 bar Pct.	Water content: 4B2 15 bar Pct.	4D1 Extensibility COLEF in./in.	4D1 Extensibility COLE in./in.	pH: 8C1a H_2O 1:1	
0-1	1.69	0.128	13	0.3	-						5.2			7.2	
1-8	0.35	0.032	11	0.3	-						3.7			7.4	

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	Cation Exch. Capacity: 5A3a Sum	6G1d KCl Ext. Al^{+++}	Base saturation: 5C1 NH_4OAc Pct.	Base saturation: Pct
	meq/100 g										
0-1	10.5	2.2	0.1	0.7	13.5		12.0			100+	
1-8	7.1	2.2	0.1	0.5	9.9		9.1			100+	

Depth (In.)	Clay mineralogy (<0.002 mm) 7A: Mont.	Verm.	Mica	Kaolin	
	X-ray				
0-1	xxxx		xx	x	
1-8	xxxx		xx	t	

* All values from characterization sample.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

CELLAR VERY STONY AND GRAVELLY SANDY LOAM
S65Ariz-13-21

Location: Western Yavapai County Area, Arizona. About 9 miles southwest of Congress Junction, Arizona, to Merritt Pass then 1/2 mile northwest. 1/4 mile west of southeast corner of Sec. 20, T8N, R7W. Photo #1161. AMS Project 134, Lot FA. Date of Sampling: May 26, 1965.
Collectors: Havens, Buol, Wiesner, Wendt
Vegetation: Desert shrub-grass. Creosotebush, ocotillo, saguaro, palo verde, tobosa, big galleta, three-awn, and buckwheat. Climate: Mean annual precipitation 11 inches. Mean annual temperature 64°F. Parent Material: Granite and granite gneiss. Relief: Moderately steep hills on a 30 percent convex east facing, midslope. Elevation: 3000 feet. Drainage: Medium runoff, moderately permeable and well drained.
Remarks: This soil is on granite and granite gneiss in desert areas under a desert shrub-grass cover. It is on moderately steep and steep hills or mountains. Rock outcrops range from few to many and stones and cobbles are common. About 30-40 percent of the sampled area was covered by stones and about 30-40 percent of the adjacent area is rock outcrop. Hellige-Truog field kit was used to determine the pH. This soil was sampled to compare with the Barkerville samples numbered S65 Ariz-13-2, S-65 Ariz-13-3 and S65 Ariz-13-15.
Classification: Lithic Torriorthent, loamy-skeletal, mixed, nonacid, thermic.

HORIZON	DESCRIPTION
A1 RSL No. 65393	0 to 1 inch, pale brown (10YR 6/6) very stony and gravelly sandy loam, dark brown (10YR 4/3) when moist; weak fine and medium platy structure; slightly hard, friable, nonsticky and nonplastic; plentiful fine roots; few fine tubular and common fine interstitial pores, 30-40 percent stones; 40 percent fine gravels; noneffervescent; neutral (pH 7.0); abrupt wavy boundary.
C1 RSL No. 65394	1 to 8 inches, brown (7.5YR 5/4) stony very gravelly sandy loam, brown (7.5YR 4/4) when moist; rock controlled and weak fine subangular blocky structure; hard, friable, nonsticky and nonplastic; abundant fine and very fine roots; common fine tubular and many fine interstitial pores; very few thin, oriented clay as bridges, in pores and on gravel faces; 80 percent gravel and highly weathered granite; noneffervescent; neutral (pH 7.0); abrupt irregular boundary.
R No sample.	8 to 9 inches plus, white (5YR N8/) granite bedrock with yellowish red (5YR 4/6) stains in rock fractures; extremely hard, extremely firm; few very fine roots along fractures; very few fine interstitial pores; noneffervescent to slightly effervescent; mildly alkaline (pH 7.5).

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Ustorthent, sandy-skeletal, mixed, mesic, shallow
Barkerville cobbly and gravelly sandy

SOIL loam SOIL Nos. S65Ariz-13-2 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65210 - 65213

Depth (In.)	Horizon	1B1b Total Sand (2–0 05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand Very coarse (2–1)	Sand Coarse (1–0.5)	Sand Medium (0.5–0.25)	Sand Fine (0.25–0.1)	Sand Very fine (0.1–0.05)	Silt (0 05–0 02)	Silt Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	* Coarse fragments 1A2a > 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct of < 76mm	
0-3	A1	81.2	10.6	8.2	21.5	21.7	12.4	18.8	6.8	5.2	5.4	21.3	74.4	0	8	32	32	0
3-8	C1	82.4	10.3	7.3	14.6	21.5	13.4	23.5	9.4	5.2	5.1	26.1	73.0	0	7	18	18	0
8-25	C2	86.8	8.6	4.6	19.7	24.6	17.5	22.2	7.8	4.8	3.8	23.4	79.0	0	5	24	24	0
Composite A																27	27	0

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct.	Bulk density 4A1f 1/3 bar g/cc	4A1h Oven dry g/cc		Water content Pct.	4B1c 1/3 bar Pct.	4B2 15 bar Pct	4D1 Extensibility COLE in./in.	4D1 Extensibility COLE in./in.	pH 8C1a H_2O 1:1		
0-3	0.45	0.036	13	0.5	-						3.8			7.0		
3-8	0.25			0.7	-						4.6			6.7		
8-25	0.04			0.8	-						2.9			6.7		
Composite A	1.29	0.100	13	0.7	-						5.6			6.2		

Depth (In.)	Extractable bases 5B1a 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity 5A1a NH_4OAc	5A3a Sum		6G1d KCl Ext. Al^{+++}						Base saturation 5C1 NH_4OAc Pct.	Pct
	meq/100 g																
0-3	6.6	2.3	0.1	0.2	9.2		9.9									93	
3-8	12.5	3.1	0.1	0.1	15.8		15.4									100+	
8-25	9.4	1.9	0.2	0.1	11.6		11.3									100+	
Composite A	10.5	3.2	0.2	0.4	14.3		14.9									96	

Depth (In.)	Clay mineralogy (<0.002 mm) 7A Mont.	Verm.	Mica	Kaolin	
	X-ray				
0-3	xxx	-	-	t	
3-8	xxxx	-	-	t	
8-25	xxxx	-	xx	t	

* All values from characterization sample.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

BARKERVILLE COBBLY AND GRAVELLY SANDY LOAM
S65Ariz-13-2

Location: Western Yavapai County Area, Arizona. About 5½ miles southeast of Wagoner, Arizona on the road to Crown King, then ½ mile north of the road. 2/10 mile south of the northeast corner of Sec. 5, T9N, R2W. Photo #1170, AMS-Project 134, Lot FA. Date of Sampling: May 4, 1965.
Collectors: Dr. Nettleton, Bob Muerisse.
Vegetation: Grassland: Sideoats grama, Arizona cottontop, three-awn, snakeweed, false mesquite, catclaw, prickly pear cactus, and annuals. Climate: Mean annual precipitation 14 to 15". Mean annual temperature 57°F. Soil temperature at time of sampling 70°F. at 20". Parent Material: Granite and closely related rocks. Relief: Steep mountain. Sample located midway on south facing, 35 percent, convex. Elevation: 4150 feet. Drainage: Medium runoff, moderately permeable and well drained.
Remarks: This soil is found on granite under a grass cover. It occurs on moderately steep to steep mountains at elevations of 3500 to 6000 feet. 5 to 10 percent of the surface is covered by stones and rock outcrop. Hellige-Truog field kit was used to determine pH. Paired samples are S65 Ariz-13-3 and S65 Ariz-13-15.
Classification: Typic Ustorthent, sandy-skeletal, mixed, mesic, shallow.

HORIZON	DESCRIPTION
A1 RSL No. 65210	0 to 3 inches, reddish brown (5YR 5/3) gravelly sandy loam, dark reddish brown (5YR 3/3) when moist; single grain and weak fine and medium granular structure; loose and slightly hard, very friable nonsticky and nonplastic; very few, very fine and fine roots; many micro and very fine interstitial pores; 40 percent fine gravel; 25 percent of surface covered by cobble; noneffervescent; neutral (pH 6.8); clear wavy boundary.
C1 RSL No. 65211	3 to 8 inches, dark reddish brown (5YR 3/4) dry and moist, highly weathered granite rock which breaks to a very gravelly sandy loam; massive structure; very hard, firm, nonsticky and nonplastic; very few, very fine, fine and medium roots; many micro and very fine interstitial pores; 50 percent gravel; noneffervescent; neutral (pH 7.0); gradual wavy boundary.
C2 RSL No. 65212	8 to 25 inches plus, strong brown (7.5YR 5/6) very gravelly highly weathered granite (grus), yellowish red (5YR 5/6) when moist; massive structure; very hard, very firm; nonsticky and nonplastic; very few, very fine, fine, medium and coarse roots; many micro and very fine interstitial pores; noneffervescent; neutral (pH 7.0); roots penetrate to about 3 feet.

RSL
65213 Composite A sampled for checking.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Ustorthent, sandy-skeletal, mixed, mesic, shallow

SOIL Barkerville cobbly and gravelly sandy loam SOIL Nos. S65Ariz-13-3 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65214 - 65217

Depth (In)	Horizon	1B1b Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05)	Total: Silt (0.05–0.002)	Total: Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			★ Coarse fragments 1A2a: > 2 Pct.	2 – 19 Pct. of < 76mm	19 – 76 Pct. of < 76mm
		Pct. of < 2 mm																
0-4	A1															17	17	0
4-10	C1															15	15	0
10-26+	C2															13	13	0
Composite	A															17	17	0

Depth (In)	6A1a Organic carbon Pct	6B1a Nitrogen Pct.	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct	Bulk density: 4A1f 1/3 bar g/cc	4A1h Oven dry g/cc	g/cc	Water content: Pct.	4B1c 1/3 bar Pct.	4B2 15 bar Pct.	4D1 Extensibility COLEF in./in.	4D1 Extensibility COLE in./in.	pH: 8C1a H_2O 1:1		
0-4	1.77	0.113	16		-						7.8			7.2		
4-10	0.14	0.013	11		-						3.2			7.4		
10-26+	0.05				-						3.3			7.2		
Composite A	1.03	0.068	15		-						7.1			7.1		

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum	6G1d KCl Ext.	Base saturation: 5C1 $N\ H_4OAc$

BARKERVILLE COBBLY AND GRAVELLY SANDY LOAM
S65Ariz-13-3

Location: Western Yavapai County Area, Arizona. About 6 miles southeast of Wagoner, Arizona on the road to Crown King, then 1/10 mile north of the road. 4/10 mile east and 4/10 mile south of northeast corner Sec. 5, T9N, R2W. Photo #1170, AMS, Project 134, Lot FA. Date of Sampling: May 4, 1965.
Collectors: Nettleton and Meurisse
Vegetation: Brush. Shrub live oak, skunkbush, mountain mahogany, desert ceanothus, catclaw, sideoats grama, Arizona cottontop, Snakeweed and annuals. Climate: Mean annual precipitation 14 to 15". Mean annual temperature 57°F. Temperature at time of sampling 66°F. at 20". Parent Material:

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Ustorthent, loamy-skeletal, mixed, acid, frigid, shallow

SOIL Mirabal gravelly sandy loam(taxadjunct) SOIL Nos. S65Ariz-13-14 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65218 - 65220

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	3A1 Int. II (0.2–0.02)	3A1 (2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	* Coarse fragments 1A2a > 2	2 - 19	19–76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-3	A1	75.2	18.0	6.8	15.7	21.0	11.7	18.8	8.0	8.2	9.8	25.7	67.2	0	7	26**	15	3
3-9	C1	69.5	21.2	9.3	14.3	20.4	10.8	16.6	7.4	7.5	13.7	23.1	62.1	0	9	25**	13	5
9-26	C2	57.1	25.2	17.7	18.7	19.3	7.0	8.3	3.8	4.1	21.1	11.9	53.3	0	18	52**	21	9

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$	Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry	Bulk density	3B2	Water content	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH: 8C1a H_2O 1:1		
	Pct.	Pct.		Pct.	Pct.	g/cc	g/cc	g/cc	Cm	Pct.	Pct.	Pct.	in./in.	in./in.			
0-3	1.66	0.066	25	0.7	-	1.13	1.16		0.87		11.9	5.1	0.008	0.007	5.0		
3-9	0.58	0.028	21	0.8	-	1.40	1.42		0.85		9.3	5.3	0.004	0.003	4.5		
9-26	0.39			0.5	-	1.67	1.70		0.59		13.2	7.2	0.005	0.003	4.9		

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum	6G1d KCl Ext. Al^{+++}	Base saturation: 5C1 NH_4OAc	5C3 Sum
	meq/100 g									Pct	Pct.
0-3	3.6	1.2	0.1	0.8	5.7	8.8	12.2	14.5	1.1	47	39
3-9	1.2	1.1	0.1	0.6	3.0	8.4	9.2	11.4	3.0	33	26
9-26	6.3	1.9	0.2	0.4	8.8	3.8	11.6	12.6	0.8	76	70

Depth (In.)	Clay mineralogy (<0.002 mm) 7A: Mont.	Verm.	Mica	KaoHn
	X-ray			
0-3	xxx	-	x	xx
3-9	xx	-	x	xxx
9-26	xxx	-	t	xxx

* All values from characterization sample (5Kg)(except as noted).

** >2 mm includes field volume estimate of >76 mm.

\- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

MIRABAL GRAVELLY SANDY LOAM (taxadjunct) 1/
S65Ariz-13-14

Location: Western Yavapai County Area, Arizona. About 5.2 miles northwest of Crown King, Arizona or 2.3 miles southeast of the Wagoner turnoff on the Senator Highway in a pit on the east side of the highway. In the SE¼ NW¼, Sec. 9, T10N, R1W. EGE 1959. Photo 25-172. Date of Sampling: May 10, 1965.
Collectors: Nettleton, Meurisse, Wendt
Vegetation: Pine - Brush. Ponderosa pine, Gambel oak, Manzanita, Fendlers ceanothus and deergrass.
Climate: Mean annual precipitation 25". Mean annual temperature 45°F. Soil temperature at time of sampling 47°F. at 18". Parent Material: Highly weathered granite and closely related materials. Relief: Moderately steep mountains. Sampled on a 27 percent convex, midslope of mountain with a southern exposure. Elevation: 6150 feet. Drainage: Medium runoff, moderately permeable

Remarks: This soil is on granite under a pine-chaparral vegetation. It is on moderately steep to steep mountains above 6000 feet in elevation. A few cobbles (about 5 percent) are in the A1 and C1 horizons. Pockets (20-30 percent) of less weathered, extremely hard rock occur in the C2 horizon. The C2 horizon is dominantly hard rock. Hellige-Truog field kit was used to determine pH. Paired sample is S65 Ariz-13-1.
Classification: Typic Ustorthent, loamy-skeletal, mixed, acid, frigid, shallow.

HORIZON	DESCRIPTION
O1	2 to 0 inches, partially decomposed pine needles. Noneffervescent abrupt smooth boundary. A few stones and cobbles. Occasional outcrops of granite in vicinity.
A1 RSL No. 65218	0 to 3 inches, gray (10YR 5/1) finely gravelly sandy loam, very dark gray (10YR 3/1) when moist; strong fine and medium granular structure; slightly hard, friable, nonsticky and nonplastic; abundant very fine and few medium and coarse roots; many fine interstitial pores; 5 percent cobbles; 30 percent fine gravel; noneffervescent; slightly acid (pH 6.3); clear, smooth boundary.
C1 RSL No. 65219	3 to 9 inches, pale brown (10YR 6/3) finely gravelly sandy loam, dark brown (10YR 4/3) when moist; massive; slightly hard, friable, nonsticky and slightly plastic; plentiful very fine, fine and medium roots; common fine tubular and many interstitial pores: 5 percent cobbles, about 25 percent fine gravel; noneffervescent; very strongly acid (pH 5.0); clear wavy boundary.
C2 RSL No. 65220	9 to 26 inches, pale brown (10YR 6/3) very gravelly highly weathered granite (grus), yellowish brown (10YR 5/4) when moist; massive; hard to very hard, friable to very firm; plentiful medium and coarse roots; few common interstitial pores; very few thin clay films in cracks of rock; pockets of extremely hard, less weathered rock are 20 to 30 percent of the profile; noneffervescent; very strongly acid (pH 5.0); clear irregular boundary.
C-R	26 inches, plus, less weathered granite similar to C2 horizon but is dominantly extremely hard granite rock.

1/ The Mirabal series is in a loamy-skeletal, mixed, nonacid, frigid family of Typic Ustorthents

U S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic ustortnent, loamy-skeletal, mixed, nonacid, frigid, shallow

SOIL Mirabal gravelly sandy loam (taxadjunct) SOIL Nos. S65Ariz-13-1 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65207 - 65209

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand (Pct. of < 2 mm) Very coarse (2–1)	Sand Coarse (1–0 5)	Sand Medium (0.5–0.25)	Sand Fine (0 25–0.1)	Sand Very fine (0.1–0.05)	Silt 0.05–0.02	Silt Int. III (0.02–0.002)	3A1 Int. II (0.2–0 02)	(2–0.1)			* Coarse fragments 1A2a ≥ 2 Pct	2 - 19 Pct of < 76mm	19 - 76 Pct of < 76mm
0-5	A1															32	32	0
5-14	C1															18	18	0
14-29+	C2															24	24	0

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct.		Bulk density 4A1f 1/3 bar g/cc	4A1h Oven dry g/cc	g/cc		Water content Pct.	4B1c 1/3 bar Pct.	4B2 15 bar Pct.	4D1 Extensibility COLEF in./in.	4D1 Extensibility COLE in./in.	pH 8C1a H_2O 1:1		
0-5	1.46	0.069	21	0.4	-								4.0			5.9		
5-14	0.39	0.021	19	0.5	-								3.5			5.9		
14-29+	0.35			0.5	-								3.3			6.1		

Depth (In)	Extractable bases 5B1a 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity 5A1a NH_4OAc	5A3a Sum		6G1d KCl Ext. Al^{+++}						Base saturation 5C1 NH_4OAc Pct.	5C3 Sum Pct.
	meq/100 g																
0-5	5.4	1.2	0.1	0.4	7.1	4.4	9.7	11.5		-						73	62
5-14	4.6	1.1	0.1	0.2	6.0	2.5	8.0	8.5		0.1						75	71
14-29+	6.0	1.6	0.2	0.2	8.0	2.0	9.4	10.0		0.1						85	80

Depth (In.)	Clay mineralogy (<0.002 mm) 7A Mont.	Verm.	Mica	Kaolin	
	X-ray				
0-5	-	xx	xx	xx	
5-14					
14-29+					

* Percent <19 mm; see profile description for estimates >19 mm.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

MIRABAL GRAVELLY SANDY LOAM (taxadjunct) 1/
S65Ariz-13-1

Location: Western Yavapai County Area, Arizona. About 3.5 miles south of Crown King, Arizona on road to Horsethief recreation area, then 200 feet north of road on a northwest slope in the NW¼ of Sec. 36, T9½N, R1W. EGE 1960 photo: 45-143. Date of sampling: May 3, 1965.
Collectors: Flach, Alexander, Nettleton, Tay, Mourisse, and Wandt.

[redacted]

annual precipitation 25". Mean annual temperature 45°F. Soil temperature at time of sampling: 49°F. at 12", 49°F. at 20", 45°F. at 12" in shade. Parent Material: Highly weathered granite and closely related materials. Relief: Moderately steep mountains. Sampled about 100 feet from top of ridge on 28 percent convex, northwest slope. Elevation: 6,700 feet. Drainage: Medium runoff, moderate permeability and well drained.

Remarks: This soil is on moderately steep to steep mountains above 6000 feet in elevation. A few granite outcrops are throughout the area. Hellige-Truog field kit was used to determine pH. Paired sample is S65 Ariz-13-14.

Classification: Typic Ustorthent, loamy-skeletal, mixed, nonacid, frigid, shallow.

[redacted]

O1	1 to 0 inch, partially decomposed pine needles. Noneffervescent; abrupt smooth boundary. Few stones and cobbles.
A1 RSL No. 65207	0 to 5 inches, grayish brown (10YR 5/2) finely gravelly sandy loam, dark brown (10YR 3/3) when moist; massive breaking to weak fine and medium granular structure; slightly hard, very friable, nonsticky and slightly plastic; plentiful fine, medium and coarse roots; many fine and medium interstitial pores; 20 percent very hard rock fragments 3-10" in diameter; noneffervescent; slightly acid (pH 6.5); clear smooth boundary.
C1 RSL No. 65208	5 to 14 inches, light gray (10YR 7/2) finely gravelly sandy loam with common to many cobbles, dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, nonsticky and slightly plastic; abundant fine, medium and coarse roots; many fine and medium interstitial pores; 40 percent by volume very hard rock fragments 3-10" in diameter, and 20 percent very hard gravel size rock fragments; noneffervescent; slightly acid (pH 6.5); clear wavy boundary.
C2 RSL No. 65209	14 to 29 inches plus, white (10YR 8/0) and yellowish brown (10YR 5/8) dry and moist, highly weathered granite (grus); massive; very hard, very firm; (weathered rock is slightly hard and friable); noneffervescent; medium acid; (pH 6.0).

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Ustorthent, sandy, mixed, mesic, shallow
Barkerville gravelly sandy
SOIL loam (taxadiunct) SOIL Nos. S65Ariz-13-15 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65221 - 65224

Depth (In.)	Horizon	1B1b Total Sand (2–0.05) Pct. of < 2 mm	Total Silt (0.05–0.002) Pct. of < 2 mm	Total Clay (< 0.002) Pct. of < 2 mm	Sand Very coarse (2–1) Pct. of < 2 mm	Sand Coarse (1–0.5) Pct. of < 2 mm	Sand Medium (0.5–0.25) Pct. of < 2 mm	Sand Fine (0.25–0.1) Pct. of < 2 mm	Sand Very fine (0.1–0.05) Pct. of < 2 mm	Silt 0.05–0.02 Pct. of < 2 mm	Silt Int. III (0.02–0.002) Pct. of < 2 mm	3A1 Int. II (0.2–0.02) Pct. of < 2 mm	(2–0.1) Pct. of < 2 mm			* Coarse fragments 1A2a > 2 Pct. of whole soil	2 - 19 Pct. of < 76mm	19–76 Pct. of < 76mm
0-3	A1															11	11	0
3-19	C1															11	11	0
19-27+	C2															14	14	0
Composite	A															10	10	0

Depth (In.)	6A1a Organic carbon Pct	6B1a Nitrogen Pct	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct.	Bulk density 4A1f 1/3 bar g/cc	4A1h Oven dry g/cc	g/cc	Water content Pct.	4B1c 1/3 bar Pct.	4B2 15 bar Pct.	4D1 Extensibility COLEF in./in.	4D1 Extensibility COLE in./in.	pH 8C1a H_2O 1:1		
0-3	1.25	0.085	15		-						4.3			6.7		
3-19	0.19				-						3.8			6.1		
19-27+	0.14				-						3.9			6.1		
Composite A	1.52	0.109	14		-						5.0			7.0		

Depth (In.)	Extractable bases 5B1a 6N2a Ca meq/100 g	6O2a Mg meq/100 g	6P2a Na meq/100 g	6Q2a K meq/100 g	Sum of bases meq/100 g	6H2a Ext. Acidity meq/100 g	Cation Exch. Capacity 5A1a NH_4OAc meq/100 g	5A3a Sum meq/100 g	6G1d KCl Ext. Al^{+++} meq/100 g	Base saturation 5C1 NH_4OAc Pct.	5C3 Sum Pct.
0-3	7.5	1.1	0.1	0.2	8.9	2.3	9.9	11.2		90	79
3-19	6.7	1.3	0.2	0.1	8.3	2.2	9.0	10.5		92	79
19-27+	6.1	1.9	0.1	0.1	8.2	2.0	9.1	10.2		90	80
Composite A	9.2	1.4	0.1	0.2	10.9	2.7	11.8	13.6		92	80

Depth (In.)	Clay mineralogy (<0.002 mm) 7A Mont. (X-ray)	Verm. (X-ray)	Mica (X-ray)	Kaolin (X-ray)
0-3				
3-19		x	x	xxx
19-27+				
Composite A				

* All values from characterization sample.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

BARKERVILLE GRAVELLY SANDY LOAM (taxadjunct) 1/
S65Ariz-13-15

Location: Western Yavapai County Area, Arizona. 5.3 miles from Crown King, Arizona toward Prescott and 75 feet on the right side of the Senator Highway, or about 2 miles toward Crown King from the Wagoner turnoff on Senator Highway and 75 feet to left of road. NW¼ Sec. 9, T10N, R1W. EGE Photo #25-172. Date of Sampling: May 10, 1965.
Collectors: Nettleton, Meurisse, Wendt
Vegetation: Brush - mountain mahogany, silk tassel and oakbrush (65 percent crown cover). Climate: Mean annual precipitation 25". Mean annual temperature 49°F. Soil temperature at time of sampling 58°F. at 20". Parent Material: Granite and closely related rocks. Relief: Steep mountains. Sample located on a south facing, 33 percent convex midslope. Elevation: 6150 feet. Drainage: Medium runoff, moderately permeable and well drained.
Remarks: This soil is on granite under a chaparral cover. It is at elevations of 3500 to 6200 feet on moderately steep to steep mountains; rock outcrops and stones are common (5-10 percent of surface area). Roots penetrate 3 to 6 feet into the granite in fractures. Hellige-Truog field kit was used to determine pH. Paired sample is S65 Ariz-13-2 and S65 Ariz-13-3.
Classification: Typic Ustorthent, sandy, mixed, mesic, shallow.

HORIZON	DESCRIPTION
O1	½ to 0 inch, undecomposed chaparral litter.
A1 RSL No. 65221	0 to 3 inches, dark grayish brown (10YR 4/2) finely gravelly sandy loam, very dark brown (10YR 2/2) when moist; moderate fine granular structure; slightly hard, very friable, non-sticky and nonplastic; abundant very fine and few fine roots; many interstitial and moderate very fine tubular pores; 30-40 percent fine gravels; noneffervescent; neutral (pH 7.0); clear wavy boundary. This horizon is 6-8 inches thick under shrubs.
C1 RSL No. 65222	3 to 19 inches, light brown (7.5YR 6/4) decomposed granite (grus), brown (7.5YR 4/4) when moist; massive; hard, very firm, nonsticky and nonplastic; abundant fine and few medium and coarse roots; common fine tubular and few interstitial pores; few thin patchy clay films or coatings in seams and on faces of less weathered rock; noneffervescent; slightly acid (pH 6.5); clear wavy boundary.
C2 RSL No. 65223	19 to 27 inches plus, pink (7.5YR 7/4) grus, brown (7.5YR 4/4) when moist; massive, very hard, very firm, nonsticky and nonplastic; few very fine, fine and medium roots; common fine tubular and fine interstitial pores; very few thin, patchy clay films or coatings in seams and on faces of less weathered rock; noneffervescent; medium acid (pH 6.0).
RSL No. 65224	Composite of A - supplemental sample.

1/ The Barkerville series is in a sandy-skeletal, mixed, mesic, shallow family of Typic Ustorthents. This pedon has fewer coarse fragments than the Barkerville series.

CONSECUTIVE PEDON NUMBER C 67 46 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES ANTHO TAXADJUNCT SOIL NO. S67 ARIZ. 7-15 SAMPLE NO. 7 583-7 587 CENTRAL ARIZONA ARI

SOIL FAMILY: TYPIC TORRIPSAMMENT,MIXED, HYPERTHERMIC RIVERSIDE SOIL SURVEY LABORATOR

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION <2	SANDS 2-.05	SILTS .05-.002	CLAYS .002 LT	VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	CO. CLAYS 2-.2U	FINE CLAYS LT .2U	CARBONATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM															PCT. OF LT 75			
7 583	0- 18	AP	72.2	20.3	7.5		12.0	15.8	10.7	18.5	15.2	15.0	5.3				40.6	13	TR	13Z	N
7 584	18- 46	C 1	72.7	19.8	7.5		12.4	17.0	11.1	17.3	14.9	15.1	4.7				39.5	14	TR	14Z	N
7 585	46- 61	C 2	77.0	16.9	6.1		15.1	20.2	12.6	17.1	12.0	12.8	4.1				33.5	20	TR	20Z	N
7 586	61- 91	C 3	80.0	13.9	6.1		16.6	25.1	14.2	15.7	8.4	10.2	3.7				26.1	32	5	27Z	N
7 587	91-127	C 4	82.8	12.0	5.2		18.1	26.3	14.2	15.5	8.7	9.1	2.9				25.3	23	TR	23Z	N

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-19 6E1B	EXT. IRON FE 6C2B	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL
		-PERCENT-		-PERCENT-		PCT.	PCT.	NO.40	GRAMS PER CC				----PERCENT---			-PERCENT--				
7 583	0- 18	0.14	0.019	TR		0.6			1.55	1.55	0.92		10.7	3.5					8.7	
7 584	18- 46	0.12	0.012	TR		0.5			1.75	1.75	0.90		10.7	3.6					8.5	
7 585	46- 61	0.07		TR		0.5			1.72	1.72	0.86		7.2	2.9					9.3	
7 586	61- 91	0.04		TR					1.42	1.44	0.80		12.7	2.9		0.5	0.4		9.4	
7 587	91-127	0.04		TR					1.68	1.68	0.84		6.4	2.6					9.3	

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A 6N4C	MG 5B3A 6O4C	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A MMHO	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT PAST 8C1B
		MEQ/100G					PCT.	-MEQ/100G		MMHO	MEQ/1000 ML								PPM	
7 583	0- 18			0.8	0.5	1.3			7.0	2.29	7.6	2.0	12.8	0.4		3.1	0.5			7.7
7 584	18- 46			0.6	0.4	1.0			6.6											7.5
7 585	46- 61			0.4	0.3	0.7			5.8											8.1
7 586	61- 91			0.3	0.3	0.6			5.1	0.53	1.2	0.3	3.3	0.1		2.3	1.5			8.1
7 587	91-127			0.3	0.3	0.6			5.4											8.1

SAMPLE NO.	DEPTH CM.	WATER AT 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY I 7A2E	II 7A2E	III 7A2E	DTA IV 7A2E	DTA 7A3 PCT.	-L.T. .0002 MM- X RAY I 7A2E	II 7A2E	III 7A2E	MINERAL CODE
7 583	0- 18	23.3	0.5	7	6											
7 584	18- 46		0.6	9												
7 585	46- 61		0.4	7												
7 586	61- 91	20.6	0.2	5	4											
7 587	91-127		0.3	6												

RELATIVE AMOUNT
1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
N=NOT DETERMINED.
Z=NOT ALL FRACTIONS SEPERATED. ADJACENT FRACTIONS INCLUDED HERE.

ANTHO SANDY LOAM (taxadjunct) 1/

S-67-Ariz-7-15

Location: Maricopa County, Arizona. 150 feet north, 450 feet west of the E¼ corner of Section 33, T2S, R7E., 2½ miles east of Chandler Heights. Description by: E. Adams, E. Chamberlin. Collectors: K. Flach, D. Nettleton, D. Hendricks, J. Jay.

Classification: Typic Torripsamment, mixed, hyperthermic.

Vegetation: Citrus trees. Use: Cropland, irrigated. Climate: Mean annual precipitation 8 inches (est.). Mean annual temperature 70° F., January 50° F., July 90° F. Parent Material: Alluvium from acid igneous and some basalt rocks. Topography: Simple lower slopes of alluvial fans. Slope of 1 ss than 1 percent facing north. Elevation: 1,300 feet. Drainage: Well drained, moderately rapid permeability. Medium runoff. Soil moisture: Moist at time of sampling.

Remarks: pH delineations by thymol blue indicator in 1:5 dilution. This profile is slightly coarser textured below 24 inches than is modal for the series. Soil temperature at 20 inches approximately 80° F.

HORIZON	DESCRIPTION
Ap RSL 67583	0 to 18 cm (0 to 7 inches), light brown (7.5YR 6/4), sandy loam, brown (7.5YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and slightly plastic; few fine and medium roots; few fine tubular and many fine interstitial pores; noneffervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
C1 RSL 67584	18 to 46 cm (7 to 18 inches), light brown (7.5YR 6/4), sandy loam, brown, (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and slightly plastic; few fine roots; few fine tubular and many fine interstitial pores; noneffervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C2 RSL 67585	46 to 61 cm (18 to 24 inches), light brown (7.5YR 6/4) gravelly sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and slightly plastic; few fine tubular and many fine interstitial pores; about 20 percent fine gravel; effervescent; moderately alkaline (pH 8.0); clear smooth boundary.
C3 RSL 67586	61 to 91 cm (24 to 36 inches), light brown (7.5YR 6/4) light gravelly sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and slightly plastic; few fine tubular and many fine interstitial; about 25 percent fine gravel; effervescent; moderately alkaline (pH 8.0); diffuse boundary.
C4 RSL 67587	91 to 127 cm (36 to 50 inches), light brown (7.5YR 6/4) light gravelly sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and slightly plastic; few fine tubular and many fine interstitial pores; about 20 percent fine gravel; effervescent; moderately alkaline (pH 8.0).

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Torripsamment, mixed, mesic

SOIL Sheppard loamy sand SOIL Nos. S65Ariz-1-13 LOCATION Apache County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65700 - 65703

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	1/ Coarse fragments: ≥ 2 Pct.	1A2a Coarse fragments: 2 – 19 Pct. of < 76mm	1A2a Coarse fragments: 19 – 76 Pct. of < 76mm
		Pct. of < 2 mm																
0-10	A1	96.2	2.1	1.7	0.1	11.2	33.6	44.7	6.6	1.7	0.4	26.6	89.6	0	2	-	-	-
10-25	C1	96.0	1.3	2.7	0.4	14.9	36.5	39.8	4.4	1.0	0.3	20.3	91.6	0	3	-	-	-
25-40	C2	95.9	1.5	2.6	0.4	13.7	34.8	43.5	3.5	1.2	0.3	19.6	92.4	0	3	-	-	-
40-70+	C3	93.5	2.0	4.5	0.5	2.2	21.0	62.5	7.3	1.5	0.5	35.2	86.2	0	5	-	-	-

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct.	Bulk density: 4A1f 1/3 bar g/cc	Bulk density: 4A1h Oven dry g/cc	Bulk density: g/cc	Water content: Pct.	Water content: 4B1c 1/3 bar Pct.	Water content: 4B2 15 bar Pct	4D1 Extensibility COLEF in./in.	4D1 Extensibility COLE in./in.	pH: 8C1a H_2O 1:1	pH	pH
0-10	0.23	0.014	16		-						1.6			6.9		
10-25	0.21				-						1.7			7.0		
25-40	0.14				-						1.6			7.1		
40-70+	0.11				-						2.1			7.3		

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum		6G1d KCl Ext. Al^{+++}					Base saturation: 5C1 NH_4OAc Pct	Base saturation Pct.
	meq/100 g															
0-10	2.0	0.7	0.2	0.3	3.2		2.3								100+	
10-25	2.5	0.6	0.3	0.3	3.7		3.0								100+	
25-40	2.2	0.4	0.2	0.2	3.0		2.8								100+	
40-70+	3.5	0.6	0.2	0.2	4.5		4.0								100+	

Depth (In.)	Clay mineralogy (<0.002 mm) 7A: Mont.	Verm.	Mica	Kaolin	
	X-ray				

1/ From characterization sample (5kg) except as noted.

SHEPPARD LOAMY SAND
S65Ariz-1-13

Location: Apache County, Arizona. A pit located 100 feet north of the south quarter corner of Section 22, T. 17 N., R. 29 E., approximately 23 miles north of Saint Johns on the Witch Well Ranch. Date of Sampling: September 22, 1965.
Collectors: M.L. Miller, K.N. Larson, J.E. Jay, R.E. Nelson and B. Brasher.
Vegetation: Never cultivated. Grass-juniper aspect. 20 percent basal cover; 15 percent juniper crown cover. Indian rice grass, sand dropseed, blue grama, sand sage, one-seed juniper, Mormon tea, spike muhly. Climate: 13 inches ppt. 50°F. approximate M.A.T. Parent Material: Eolian sands of Tertiary age. Relief: Dunes on undulating plains. Convex-complex 7 percent slope with a slight southwest aspect at pit site. Near top of low dune. Elevation: 6300 feet. Drainage: Runoff is slow. Soil is somewhat excessively drained. Ground water is very deep. Permeability is moderately rapid to rapid.
Remarks: Wind erosion activity and deposition at pit site is moderate. Determination of pH was made with a Hellige-Truog field kit. Measure of free carbonate obtained by observing reaction to dilute HCl. In this pit there are some spots between 10 and 70 inches that effervesce.
Classification: Typic Torripsamment, mixed, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 65700	0 to 10 inches, brown (10YR 5/3) loamy sand, dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; plentiful fine and medium roots; many fine interstitial pores; nonefferves-cent; neutral (pH 7.0); clear smooth boundary.
C1 RSL No. 65701	10 to 25 inches, brown (7.5YR 5/4) loamy sand, dark brown (7.5YR 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine, medium and large roots; many fine interstitial pores; noneffervescent; moderately alkaline (pH 8.0); diffuse boundary.
C2 RSL No. 65702	25 to 40 inches, brown (7.5YR 5/4) loamy sand, dark brown (7.5YR 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine, medium and large roots; many fine interstitial pores; noneffervescent; moderately alkaline (pH 8.0); diffuse boundary.
C3 RSL No. 65703	40 to 70 inches +, brown (7.5YR 5/4) loamy sand, dark brown (7.5YR 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine, medium and large roots; many fine interstitial pores; noneffervescent; moderately alkaline (pH 8.0).

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Argic Cryoboroll, fine-loamy, mixed

SOIL Cambern sandy loam (taxadjunct) SOIL Nos. S65Ariz-1-17 LOCATION Apache County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65687 - 65692

Depth (In.)	Horizon	1B1b Total Sand (2-0.05)	Total Silt (0.05-0.002)	Total Clay (< 0.002)	Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Silt: 0.05-0.02	Silt: Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	1/ Coarse fragments 1A2a: ≥ 2	2 - 19	19 - 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0- 3	A11	49.3	34.6	16.1	4.7	7.4	7.8	19.0	10.4	15.5	19.1	36.1	38.9	0	16			
3- 8	A12	50.8	30.8	18.4	5.7	7.8	7.9	19.3	10.1	12.3	18.5	32.4	40.7	0	18			
8-13	B21t	45.1	24.5	30.4	3.8	6.4	7.5	18.6	8.8	8.4	16.1	27.2	36.3	0	30			
13-19	B22t	36.0	22.2	41.8	2.9	5.2	5.9	14.6	7.4	7.7	14.5	22.8	28.6	0	42			
19-28	B3	46.0	23.4	30.6	5.6	9.2	7.6	14.8	8.8	8.9	14.5	26.2	37.2	0	31			
28-34+	R																	

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$		Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry		3B2	Water content	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH: 8C1a H_2O 1:1		
	Pct	Pct.		Pct.	Pct.		g/cc	g/cc	g/cc	Cm	Pct	Pct.	Pct.	in./in.	in./in.			
0- 3	1.11	0.078	14	1.0	-		1.42	1.50		1.00		19.0	10.7	0.019	0.019	6.6		
3- 8	0.97	0.070	14	1.0	-		1.54	1.65		1.00 1/		18.1	10.0	0.021	0.021	6.6		
8-13	0.59			0.5	tr.		1.41	1.75		1.00 1/		28.4	14.8	0.076	0.076	6.7		
13-19	0.36			0.5	tr.		1.37	1.79		1.00 1/		31.6	20.5	0.093	0.093	6.9		
19-28	0.19			0.8	-		1.48	1.69		1.00 1/		25.9	17.4	0.044	0.044	7.2		
28-34+					-		1.75	1.84		1.00 1/		14.6	14.2	0.016	0.016			

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum	6G1d KCl Ext. Al^{+++}	Base saturation: 5C1 NH_4OAc	5C3 Sum
	meq/100 g									Pct.	Pct.
0- 3	11.2	3.8	0.4	0.6	16.0	4.0	17.8	20.0		90	80
3- 8	12.6	4.2	0.5	0.4	17.7	3.6	19.5	21.3		91	83
8-13	16.3	7.1	0.8	0.4	24.6	4.0	27.2	28.6		90	86
13-19	21.2	10.6	1.1	0.5	33.4	3.7	36.2	37.1		92	90
19-28	22.1	10.2	1.4	0.4	34.1		36.2			94	
28-34+											

Depth (In.)	Clay mineralogy (≤0.002 mm) 7A: Mont.	Verm.	Mica	KaolHn.
	X-ray			
0- 3	xx		x	
3- 8				
8-13				
13-19	xxxx			t
19-28				
28-34+				

1/ >2 mm not determined; data based on crushed samples of the whole soil.
Some of the >2 mm particles do not slake in water but they cannot be separated consistently in sample preparation. All >2 mm fragments resemble the fine earth (<2 mm) fraction in water retention and chemical properties.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

Micromorphology

65687 Weathered basic tuff fragments and mineral grains.
65690 Stress oriented clay on ped faces and within the matrix, a few clay skins in pores.
65691 Weathered basic tuff with many clay skins in fracture planes and in pores.
65692 Weathered basic tuff.

CAMBERN SANDY LOAM (taxadjunct) 1/
S65Ariz-1-17

Location: Apache County, Arizona. A pit located 1320 feet west and 396 feet south of the east quarter corner of Section 18, T. 5 N., R. 31 E. About 2 miles southeast of Alpine. About 3/4 of a mile southwest of the matched pedon. Date of Sampling: September 23, 1965.
Collectors: M.L. Miller, K.N. Larson, J.E. Jay, R.E. Nelson and B. Brasher.
Vegetation: Cultivated field that was seeded to grass less than 5 years ago. Present vegetation is a 32 percent basal cover of ryegrass, alta fescue and smooth brome. Climate: 22 inches ppt. 43.4°F. approximate M.A.T. Parent Material: Basic tuff. Relief: Side slope of low ridge, smooth convex 4 percent slope with east aspect at pit site. Elevation: 8000 feet. Drainage: Runoff is medium. Soil is well drained.
Remarks: Depth to the R horizon ranges from 20 to 30 inches in this area. Determination of pH was made with a Hellige-Truog field kit. Measure of free carbonate was obtained by observing reaction to dilute HCl. Paired pedon is Sample No. S65 Ariz-1-16. This pedon has a mollic epipedon, and an argillic horizon. The mean summer soil temperature at a 20-inch depth is probably less than 60° F.
Classification: Argic Cryoboroll, fine-loamy, mixed.

HORIZON	DESCRIPTION
A11 RSL No. 65687	0 to 3 inches, dark gray (10YR 4/1) heavy sandy loam, very dark brown (10YR 2/2) when moist; moderate medium and coarse platy structure that breaks to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; plentiful fine roots; many fine tubular and interstitial pores; 10 percent of surface covered with tuff gravels; noneffervescent; slightly acid (pH 6.5); clear smooth boundary.
A12 RSL No. 65688	3 to 8 inches, dark gray (10YR 4/1) clay loam, very dark brown (10YR 2/2) when moist; weak medium and coarse angular and subangular blocky structure that breaks to moderate fine granular; hard, friable, sticky and plastic; plentiful fine roots; common fine tubular and many fine interstitial pores; noneffervescent; slightly acid (pH 6.5); clear smooth boundary.
B21t	8 to 13 inches, brown (10YR 5/3) clay, dark brown (10YR 4/3) when moist, organic
65689	coarse prismatic structure that breaks to strong medium angular blocky; very hard, firm, sticky and very plastic; few fine roots; few fine tubular and common fine interstitial pores; continuous thick clay films on ped faces; noneffervescent; neutral (pH 7.0); clear wavy boundary.
B22t RSL No. 65690	13 to 19 inches, dark grayish brown (10YR 4/2) gravelly clay, dark grayish brown (10YR 4/2) when moist, organic stain on surface of peds is very dark brown (10YR 2/2) both dry and moist; massive breaking to strong medium and coarse angular blocky structure; very hard, firm, sticky and very plastic; few fine roots; few fine tubular and common fine interstitial pores; continuous thick clay films on ped faces; noneffervescent; moderately alkaline (pH 8.0); clear wavy boundary.
B3 RSL No. 65691	19 to 28 inches, dark brown (10YR 3/3) very gravelly clay, yellowish brown (10YR 5/4) when moist; massive; very hard, firm, sticky and plastic; few fine roots; many fine interstitial pores; common moderately thick clay film in pores; gravel is pale brown (10YR 6/3) dry or moist, weathered tuff; noneffervescent; moderately alkaline (pH 8.0) abrupt wavy boundary.
R RSL No. 65692	28 to 34 inches +, very pale brown (10YR 7/3) tuff that is slightly weathered on the surface, dark brown (10YR 4/3) when moist; massive; extremely hard, extremely firm; filaments of lime on the underside of interfaces.

1/ The Cambern series is in a fine-loamy, mixed family of Argic Pachic Cryoborolls. This pedon has a mollic epipedon that is only 10 inches thick.

SOIL SURVEY LABORATORY Beltsville, Maryland

Brolliar clay

SOIL TYPE loam **LOCATION** Coconino County, Arizona

SOIL FAMILY: Argic Cryoboroll, fine, montmorillonitic

SOIL NOS. S56Ariz-3-8 **LAB. NOS.** 561103-561110

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1										TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	1/ > 2	
1½-0	02	Did not run - Organic Matter										
0-1	A11	1.0	3.6	2.6	2.5	6.8	63.2	20.3	39.9	31.4	0	sil
1-4	A12	0.7	3.2	2.5	2.4	5.7	59.3	26.2	34.4	31.8	4	sil

BROLLIAR CLAY LOAM*
S56Ariz-3-8

Location: Coconino County, Arizona. In the SE ¼ SE ¼ Sec. 16, T. 17 N., R. 9 E. 105 feet west of the gravelled highway, 4.1 miles south of the southern tip of Mormon Lake. About 21 miles south southeast of Flagstaff. Date of Sampling: September 22, 1956.
Collectors: W. M. Johnson, J. G. Cady, M. S. James and Reuben Nelson.
Vegetation: Open stand of ponderosa pine, with sparse understory of pine reproduction, mountain muhly, fescue, few annual weeds. Has been logged, at least partly, at some time in the past. Site index of 59 for ponderosa pine. No evidence of burning. Climate: Estimated 22 to 23 inches percipitation per year. Nearest weather station (Flagstaff): Mean annual temperature 44° F.; January average 24° F.; July average 56° F.; mean annual precipitation 20.27 inches. Parent Material: Residium from weathering of olivine basalt, probably with some weathered cinders and ash. Relief: Rolling and hilly upland (old volcano field). 4 percent slope, slightly convex, toward the northwest. Elevation: About 7,400 feet. Drainage: Well drained (well aerated). Medium runoff. Very slow or slow permeability.
Remarks: Pebbles and stones of basalt are scattered through the profile. A moderate number of basalt cobbles, stones and boulders lie on the surface at this site; in some nearby spots the soil is very stony. Intended to pair with profile S56Ariz-3-9 but the correspondence is not good.
Classification: Argic Cryoboroll, fine, montmorillonitic.

HORIZON	DESCRIPTION
O1 (Not Sampled)	3-1½" -- Pine needles, twigs and branches. Abrupt, smooth boundary.
O2 BSL No. 561103	1½-0" -- Mor humus layer that is nearly black (10YR 2/1.5) when moist. Abrupt, smooth lower boundary.
A11 BSL No. 561104	0-1" -- Brown (9YR 5/3) clay loam, dark brown (9YR 3/3) when moist; moderate fine platy structure; hard, friable, plastic, sticky; common roots; common medium, fine and very fine tubular pores; many black hard spherical concretions ¼ to 1 mm in diameter; abrupt, smooth lower boundary.
A12 BSL No. 561105	1-4" -- Dark brown (9YR 4/3) clay loam, very dark brown (9YR 2/2) when moist; with common faint grayish patches on ped surfaces; weak coarse prismatic, breaking to weak coarse subangular blocky and finally to moderate medium and fine platy structure; very hard, firm, plastic, sticky; many roots; no clay skins; common medium, fine and very fine tubular pores; many hard black and dark reddish brown spherical concretions ¼ to 1 mm in diameter; clear, wavy lower boundary.
B1t BSL No. 561106	4-10" -- Dark brown (7.5YR 4/3) heavy clay loam, very dark brown (7.5YR 2.5/3) when moist; weak coarse prismatic, breaking to moderate coarse and medium subangular blocky structure; very hard, firm, very plastic, sticky; has faint grayish patches and threads on and in the peds; many roots (moist) of any horizon; few thin patchy clay skins on vertical surfaces and in pores; many medium, fine and very fine tubular pores; many hard black and dark reddish brown spherical concretions ¼ to 1 mm in diameter; clear, wavy lower boundary.
B21t BSL No. 561107	10-18" -- Reddish brown (6YR 4/3) clay, dark reddish brown (6YR 3.5/3) when moist; weak very coarse prismatic, breaking to weak coarse and medium, angular and subangular blocky structure; few small slickensides; extremely hard, very firm, very plastic, very sticky; common roots; thin patchy clay skins on all surfaces and in pores; few fine and very fine tubular pores; common roots; very few pieces of charcoal 1 to 2 mm in diameter; few hard black and dark reddish brown spherical concretions 1/4 to 3/4 mm in diameter; gradual wavy lower boundary.
B22t BSL No. 561108	18-32" -- Dark brown (7.5YR 4/2.5 dry, 4/3, moist) clay; many moderately large intersecting slickensides produce an imbricated mass of overlapping, crude, thick lozenge-shaped aggregates; extremely hard, very firm, very plastic, very sticky; many moderately thick patches of clay skins on all surfaces and in pores; few fine and very fine tubular pores; few black spherical concretions 1/4 to 3/4 mm in diameter; few roots; gradual wavy lower boundary.
C + R BSL No. 561109	32-35" -- Coarsely mottled dark reddish gray (5YR 4.5/2) and dark brown (7.5YR 4/2) clay, reddish brown (5YR 4/3) and dark brown (7.5YR 3/2) when moist, with numerous pebbles and cobbles of hard weathered basalt; common small slickensides produce imbricated mass; extremely hard, very firm, very plastic, very sticky; common patchy clay skins on all surfaces and in pores; very few roots; few hard black spherical concretions less than ½ mm in diameter; abrupt, irregular lower boundary.
Dr(?) BSL No. 561110	35"+ -- Hard, weathered, dark gray olivine basalt.

*Identified in original notes as Unnamed Podzolic Soil

SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Brolliar clay loam **LOCATION** Coconino County, Arizona

SOIL FAMILY: Argic Cryoboroll, fine, montmorillonitic

SOIL NOS. S56Ariz-3-9 **LAB. NOS.** 561111-561119

[redacted]

BROLLIAR CLAY LOAM*
S56Ariz-3-9

Location: Coconino County, Arizona. 275 feet east of Mormon Lake highway, in the SW ¼ SW ¼ Sec. 22, T. 17 N., R. 9 E. 5.1 miles south of the southern tip of Mormon Lake. 22 miles south southeast of Flagstaff. Date of Sampling: September 22, 1956.
Collectors: W. M. Johnson, J. G. Cady, M. S. James and Reuben Nelson.
Vegetation: Ponderosa pine, open stands in places, rather dense stand in others; sparse understory of pine reproduction, mountain muhly, bromegrass and locust (Robinia sp.). Climate: Estimated 22 to 23 inches precipitation per year. Nearest weather station (Flagstaff): Mean annual temperature 44° F.; January average 24° F.; July average 56° F.; mean annual precipitation 20.27

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Aridic Cryoboroll, fine, montmorillonitic

SOIL Friana loam (taxadjunct) SOIL Nos. S62Ariz-3-19 LOCATION Coconino County, Arizona

FRIANA LOAM (taxadjunct) 1/
S62Ariz-3-19

Location: Beaver Creek Area, Arizona. NE 1/4 of SW 1/4, Sec. 12, T16N, R9E, Coconino County, Arizona, Photo DGJ-9-86. 18 miles E. and 27 miles S. of Flagstaff, Arizona. Date of Sampling: June 5, 1962.
Collectors: M.S. James, Y.H. Havens, Stanley Buol, L.H. Grant, Truman Anderson, R.E. Nelson and J.E. Jay.
Classification: Argic Cryoboroll, fine, montmorillonitic.
Vegetation: Western wheatgrass, pussytoes, Arizona bluegrass and dandelion. Use: Rangeland. Climate: 20-22" precipitation - subhumid, mean annual temperature 45°F. Parent Material: Ash, cinders and tuff. Elevation: 7200 feet. Relief: Nearly level, 0-1 percent slope. Drainage: Well (?) drained, slow permeability.
Remarks: Modal profile.

HORIZON	DESCRIPTION
A11 RSL 62265	0 to 3 inches, brown-dark brown (10YR 4/3) loam, dark brown (7.5YR 3/2) moist; moderate medium and coarse platy structure breaking to moderate fine granular structure; hard, friable, slightly sticky and plastic; plentiful fine and few medium roots; few fine tubular and many fine interstitial pores; few fine gravel; slightly acid (pH 6.5); abrupt wavy boundary.
A12 RSL 62266	3 to 11 inches, brown-dark brown (7.5YR 4/2) loam, dark reddish brown (5YR 3/2) moist; weak fine and medium subangular blocky structure breaking to moderate fine granular structure; hard, friable, sticky and plastic; plentiful fine and few medium roots; few fine tubular and many fine interstitial pores; slightly acid (pH 6.5); gradual wavy boundary.
B1 RSL 62267	11 to 20 inches, reddish brown (5YR 4/3) clay loam or light clay, dark reddish brown (5YR 3/4) moist; weak coarse prismatic structure breaking to moderate medium and coarse subangular blocky structure; thin patchy clay films; hard, friable, slightly sticky and plastic; plentiful fine and few medium roots; few fine tubular and many fine interstitial pores; common fine gravel; few fine manganese shots; slightly acid (pH 6.5); noneffervescent; gradual wavy boundary.
B21t RSL 62268	20 to 38 inches, reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/4) moist; weak coarse prismatic structure in upper B2 and strong medium to coarse angular blocky structure which breaks to strong fine angular blocky structure; very hard, friable, very sticky and very plastic; continuous clay films; common slickensides 3" across; few fine roots; few fine tubular and common fine interstitial pores; common fine manganese shots; moderately alkaline (pH 8.0); noneffervescent; clear irregular boundary.
B22	38 to 55 inches, same as above horizon. This horizon was divided 20-38" and
RSL 62269	38-55" for characterization samples.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Argic Cryoboroll, fine, montmorillonitic
SOIL Luna sandy loam (taxadjunct) SOIL Nos. S65Ariz-1-16 LOCATION Apache County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65693 - 65699

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	1/ Coarse fragments 1A2a: > 2 Pct.	2 – 19 Pct. of < 76mm	19 – 76 Pct. of < 76mm
		Pct. of < 2 mm																
0- 3	A11	58.9	24.4	16.7	3.9	5.4	10.2	29.8	9.6	11.6	12.8	37.3	49.3	0	17			
3- 7	A12	57.1	22.6	20.3	3.9	4.7	9.8	29.8	8.9	10.5	12.1	35.5	48.2	0	20			
7-14	B21t	34.3	20.9	44.8	0.9	1.9	5.5	18.7	7.3	8.6	12.3	26.7	27.0	0	45			
14-21	B22t	35.3	24.5	40.2	0.6	1.6	4.4	19.2	9.5	10.6	13.9	31.9	25.8	0	40			
21-28	B3	50.3	17.6	32.1	4.9	5.4	8.3	23.9	7.8	7.3	10.3	28.0	42.5	0	32			
28-41	R1																	
41-54	R2																	

Depth (In.)	6A1a Organic carbon Pct	6B1a Nitrogen Pct.	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct	Bulk density: 4A1f 1/3 bar g/cc	Bulk density: 4A1h Oven dry g/cc	Bulk density: g/cc	3B2 1/ Cm	Water content: Pct.	Water content: 4B1c 1/3 bar Pct.	Water content: 4B2 15 bar Pct.	4D1 Extensibility COLEF in./in.	4D1 Extensibility COLE in./in.	pH: 8C1a H_2O 1:1		
0- 3	1.40	0.098	14	1.0	-	1.54	1.66		1.00		17.8	8.8	0.025	0.025	6.2		
3- 7	1.01	0.088	11	0.9	-							10.1			6.0		
7-14	0.68			0.8	-							21.2			6.4		
14-21	0.36			0.2	-	1.45	1.81		1.00		27.1	20.3	0.078	0.078	7.0		
21-28	0.19			0.3	-							15.6			7.6		
28-41				0.4	-	1.52	1.60		1.00		20.4	12.5	0.017	0.017			
41-54				1.2	-	1.68	1.78		1.00		17.6	11.7	0.020	0.020			

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum	6G1d KCl Ext. Al^{+++}	Base saturation: 5C1 NH_4OAc Pct	5C3 Sum Pct.
	meq/100 g										
0- 3	8.6	3.5	0.3	0.6	13.0	4.8	15.9	17.8		82	73
3- 7	9.6	3.9	0.4	0.3	14.2	4.6	18.1	18.8		78	76
7-14	20.6	10.5	0.9	0.5	32.5	5.0	37.0	37.5		88	87
14-21	21.2	11.0	1.1	0.4	33.7		35.5			95	
21-28	19.4	9.6	1.4	0.4	30.8		28.7			100+	
28-41											
41-54											

Depth (In.)	Clay mineralogy (<0.002 mm) 7A: Mont.	Verm.	Mica	Kaolin	
	X-ray				
0- 3	xxx			t	
3- 7					
7-14					
14-21	xxxx			t	
21-28					
28-41					
41-54					

1/ >2 mm not determined; data based on crushed samples of the whole soil.
Some of the >2 mm particles do not slake in water but they cannot be separated consistently in sample preparation. All >2 mm fragments resemble the fine earth (<2 mm) fraction in water retention and chemical properties.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

LUNA SANDY LOAM (taxadjunct) 1/
S65Ariz-1-16

Location: Apache County, Arizona. A pit located 924 feet east and 20 feet north of the east quarter corner of Section 18, T. 5 N., R. 31 E. About 2½ miles southeast of Alpine, south of U. S. Highway 180. Date of Sampling: September 23, 1965.
Collectors: M.L. Miller, K.N. Larson, J.E. Jay, R.E. Nelson, and B. Brasher.
Vegetation: Cultivated field that was seeded to grass more than 5 years ago. Present vegetation is a 32 percent basal cover of smooth brome, ryegrass, and alta fescue. Climate: 22 inches ppt. 43.4° F. approximate M.A.T. Parent Material: Basic ash-flow tuff. Relief: Low ridges, smooth convex 2 percent slope with north aspect at pit site. Elevation: 8000 feet. Drainage: Runoff is medium. Soil is well drained. Ground water is deep. Permeability is slow to very slow.
Remarks: Depth to the R horizon ranges from 20 to 30 inches in this area. Determination of pH was made with a Hellige-Truog field kit. Measure of free carbonate was obtained by observing reaction to dilute HCl. Paired pedon is sample No. S65 Ariz-1-17. This pedon has a mollic epipedon and an argillic horizon. The mean summer soil temperature at 20-inch depth is probably less than 60° F.
Classification: Argic Cryoboroll, fine, montmorillonitic.

HORIZON	DESCRIPTION
A11 RSL No. 65693	0 to 3 inches, very dark grayish brown (10YR 3/2) heavy fine sandy loam, very dark brown (10YR 2/2) when moist; weak fine and medium platy structure that breaks to moderate and strong fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; abundant fine roots; few fine tubular pores; 10 percent cover of gravel on surface; noneffervescent; slightly acid (pH 6.5); clear smooth boundary.
A12 RSL No. 65694	3 to 7 inches, very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2) when moist; weak medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and plastic; abundant fine roots; few fine tubular pores; noneffervescent; medium acid (pH 6.0); abrupt wavy boundary.
B21t RSL No. 65695	7 to 14 inches, dark brown (10YR 3/3) clay, dark brown (10YR 3/3) when moist; organic stain on surfaces of peds is brown (10YR 4/3) both dry and moist; moderate coarse prismatic structure, breaking to strong medium and coarse angular blocky; very hard, firm, sticky and very plastic; plentiful fine roots; common fine interstitial, and few fine and medium tubular pores; thick continuous clay film on ped faces; noneffervescent; neutral (pH 7.0); clear wavy boundary.
B22t RSL No. 65696	14 to 21 inches, brown (10YR 5/3) clay, brown (10YR 5/3) when moist; organic stain on surfaces of peds is brown (10YR 5/3), brown (10YR 4/3) when moist; weak coarse prismatic structure breaking to strong fine, medium and coarse angular blocky; very hard, firm, sticky and very plastic; plentiful fine roots; few fine tubular and common fine interstitial pores; many thick clay films on ped faces and in [illegible]

[redacted]

B3 RSL No. 65697	21 to 28 inches, weathered tuff, crushes to brown (7.5YR 4/4) sandy clay loam, brown (10YR 5/3) when moist; surfaces of peds are dark brown (7.5YR 3/2) dry or moist, massive to weak very coarse angular blocky (rock structure), very hard, firm, sticky and plastic; few fine roots; common fine interstitial and few fine tubular pores; common thick clay films on ped faces; noneffervescent; moderately alkaline (pH 8.0); abrupt wavy boundary.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Argic Pachic Cryoboroll, fine-loamy, mixed
SOIL Cambern sandy loam SOIL Nos. S65Ariz-1-18 LOCATION Apache County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65666 - 65671

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	1/ Coarse fragments 1A2a: > 2 Pct.	2 – 19 Pct. of < 2 mm	19 – 76 Pct. of < 76mm
		Pct. of < 2 mm																
0- 3	A11	55.5	30.8	13.7	3.2	7.8	7.0	18.5	19.0	17.1	13.7	46.8	36.5	0	14			
3-10	A12	57.3	29.1	13.6	2.2	7.2	7.0	20.7	20.2	16.5	12.6	49.8	37.1	0	14			
10-14	B1	46.5	32.4	21.1	3.3	7.0	5.8	14.8	15.6	17.9	14.5	42.6	30.9	0	21			
14-20	B21t	37.8	35.0	27.2	2.7	6.0	4.8	11.9	12.4	16.8	18.2	36.4	25.4	0	27			
20-22	B22t	40.0	33.6	26.4	3.5	6.9	5.2	12.5	11.9	13.3	20.3	32.6	28.1	0	26			
22-34	R																	

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct.	Bulk density: 4A1f 1/3 bar g/cc	Bulk density: 4A1h Oven dry g/cc	Bulk density: g/cc	3B2 1/ Cm	Water content: Pct.	Water content: 4B1c 1/3 bar Pct.	Water content: 4B2 15 bar Pct.	4D1 Extensibility COLEF in./in.	4D1 Extensibility COLE in./in.	pH: 8C1a H_2O 1:1		
0- 3	2.63	0.162	16	0.9	-	1.20	1.25		1.00		16.2	10.8	0.015	0.015	6.2		
3-10	1.53	0.092	17	0.9	-	1.33	1.41		1.00		16.9	9.9	0.018	0.018	6.4		
10-14	1.14			0.9	-	1.32	1.45		1.00		21.4	12.9	0.033	0.033	6.7		
14-20	1.05			1.0	-	1.36	1.55		1.00		25.9	15.8	0.045	0.045	6.8		
20-22	0.80			1.2	-	1.38	1.56		1.00		26.4	16.4	0.042	0.042	6.8		
22-34				0.4													

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum	6G1d KCl Ext. Al^{+++}	Base saturation: 5C1 NH_4OAc Pct.	5C3 Sum Pct
	meq/100 g										
0- 3	13.1	4.4	0.3	3.3	21.1	6.4	23.9	27.5		88	77
3-10	12.5	4.3	0.4	2.4	19.6	4.4	22.1	24.0		89	82
10-14	15.8	6.4	0.4	1.5	24.1	3.6	26.4	27.7		91	87
14-20	19.5	8.6	0.5	1.1	29.7	3.8	31.3	33.5		95	89
20-22	20.2	9.4	0.6	1.0	31.2	4.3	33.1	35.5		94	88
22-34											

Depth (In.)	Clay mineralogy (<0.002 mm) 7A: Mont.	Verm.	Mica	Kaolin
	X-ray			
0- 3	xx			
3-10				
10-14				
14-20				
20-22	xxxx			
22-34				

1/ >2 mm not determined; data based on crushed samples of the whole soil.

Some of the >2 mm particles do not slake in water but they cannot be separated consistently in sample preparation. All >2 mm fragments resemble the fine earth (<2 mm) fraction in water retention and chemical properties.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

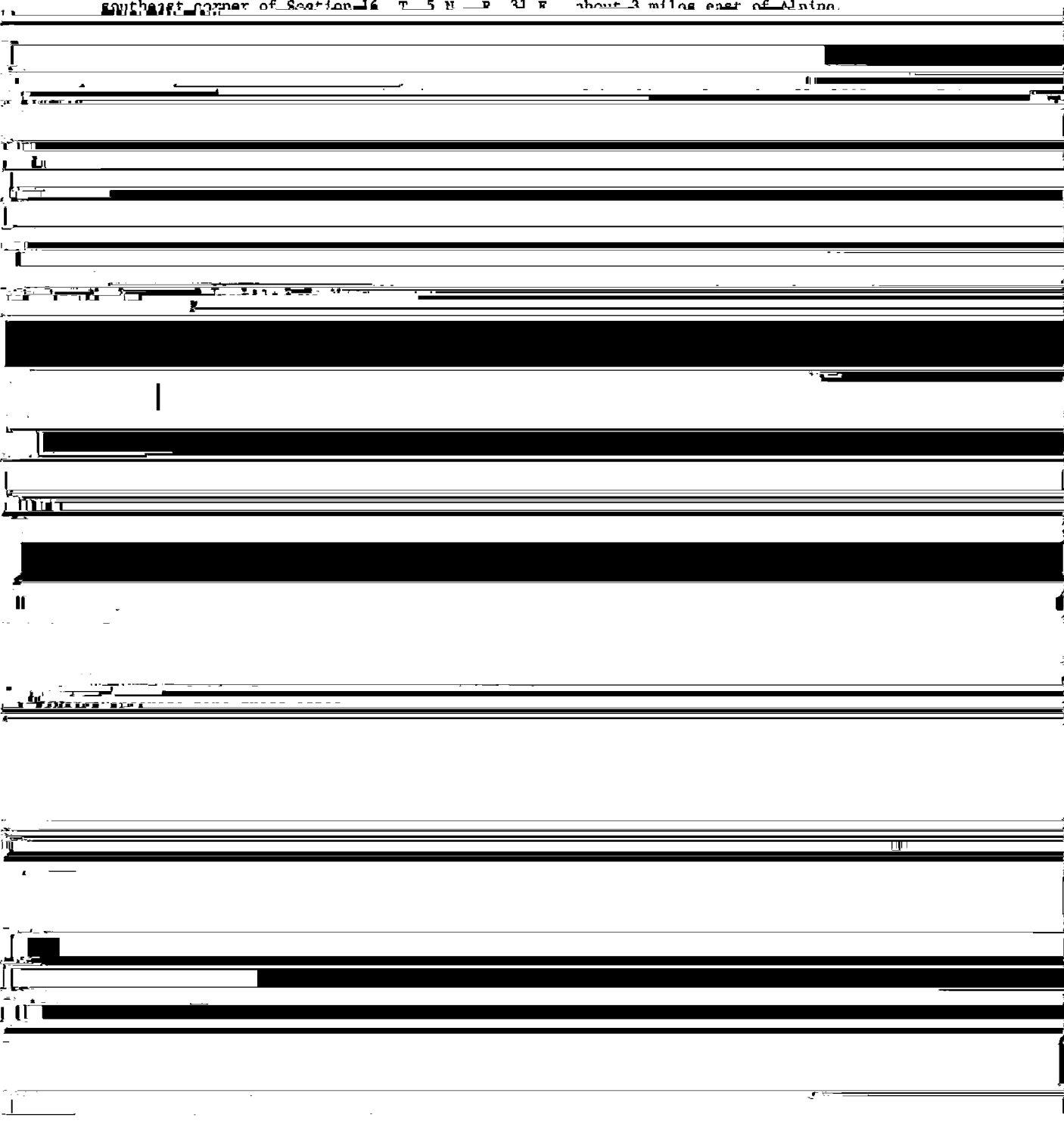
Micromorphology

65666 Weathered basic tuff fragments.

65670 Many thin to moderately thick clay skins in pores.

CAMBERN SANDY LOAM
S65Ariz-1-18

Location: Apache County, Arizona. A pit located 300 feet south and 50 feet west of the southeast corner of Section 16 T 5 N R 31 E about 3 miles east of Alpine.



crown cover and 27 percent grass basal cover. Mountain muhly, squirreltail. annual weeds, Ponderosa pine. Climate: 22 inches ppt. 43.4° F. approximate M.A.T. Parent Material: Shallow local colluvial and alluvial material from and on Tertiary age basic ash-flow tuff. Relief: Side slope of mountain valley, smooth convex 11 percent slope with northeast aspect at pit site. Elevation: 8000 feet. Drainage: Runoff is medium. Soil is well drained. Ground water is deep. Permeability is moderately slow.
Remarks: 1/4 inch thick O1 horizon of pine needles was present at the time of sampling. Determination of pH was made with a Hellige-Truog field kit. Measure of free carbonate was

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Argic Pachic Cryoboroll, fine-loamy, mixed
SOIL Cambern sandy loam SOIL Nos. S65Ariz-1-21 LOCATION Apache County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65672 - 65678

Depth (In.)	Horizon	1B1b Size class and particle diameter (mm) 3A1												3A1a	3A1a	1/ Coarse fragments 1A2a		
		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)	0 05–0 02	Int. III (0 02–0.002)	Int. II (0.2–0.02)	(2–0.1)	Carbonate clay	Non-carbonate clay	> 2	2 - 19	19 - 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0- 3	A11	59.6	28.6	11.8	2.4	6.8	7.1	26.3	17.0	15.4	13.2	48.3	42.6	0	12			
3- 8	A12	55.6	30.9	13.5	3.9	7.8	7.1	21.5	15.3	15.0	15.9	44.1	40.3	0	14			
8-11	B1	55.3	30.4	14.3	3.2	7.0	6.9	21.6	16.6	14.4	16.0	44.9	38.7	0	14			
11-20	B21t	51.8	28.4	19.8	3.7	7.9	6.8	18.8	14.6	14.1	14.3	40.6	37.2	0	20			
20-23	B22t	47.4	29.8	22.8	3.6	7.3	6.1	16.0	14.4	14.5	15.3	39.0	33.0	0	23			
23-34+	R																	

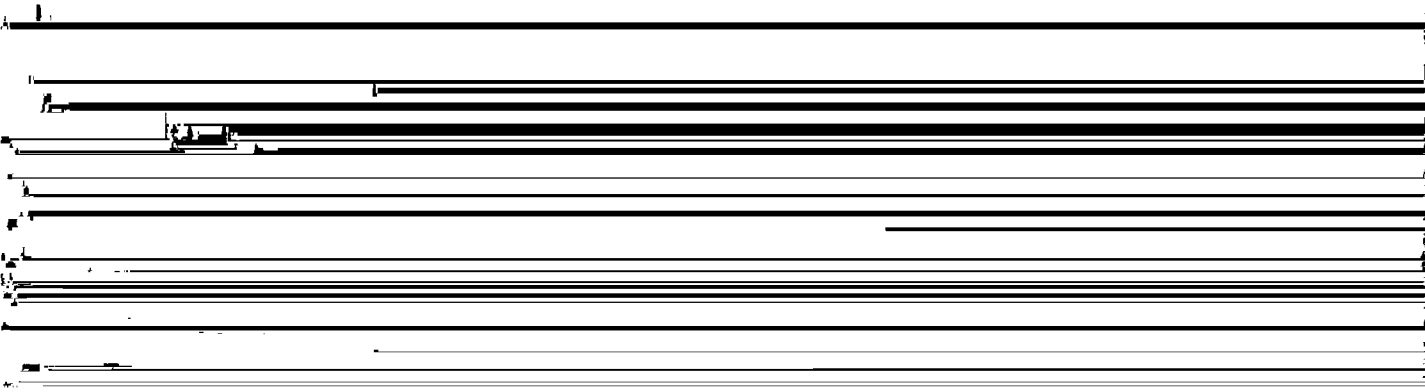
Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$	Bulk density 4A1f 1/3 bar	4A1h Oven dry		Water content 4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH 8C1a H_2O 1:1	
	Pct.	Pct		Pct.	Pct.	g/cc	g/cc	g/cc	Pct.	Pct.	Pct.	in./in.	in./in.	
0- 3	3.88	0.174	22	0.8	-					13.0			6.3	
3- 8	1.73	0.089	19	0.8	-					10.4			6.3	
8-11	1.62			0.9	-					10.8			6.3	
11-20	1.21			0.9	-					13.4			6.3	
20-23	0.98			0.8	-					14.9			6.3	
23-34+				0.4	-									
Partially weathered tuff				0.4										

Depth (In.)	Extractable bases 5B1a 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity 5A1a NH_4OAc	5A3a Sum	6G1d KCl Ext. Al^{+++}	Base saturation 5C1 NH_4OAc	5C3 Sum
	meq/100 g									Pct.	Pct.
0- 3	14.1	5.0	0.3	2.0	21.4	7.4	24.7	28.8		87	74
3- 8	12.9	5.1	0.5	1.7	20.2	5.8	23.4	26.0		86	78
8-11	13.1	5.7	0.5	1.6	20.9	4.9	24.1	25.8		87	81
11-20	16.4	8.4	0.6	1.5	26.9	5.1	29.7	32.0		91	84
20-23	18.1	10.5	0.6	1.4	30.6	4.9	34.4	35.5		89	86
23-34+											

Clay mineralogy (<0.002 mm) 7A 1/ >2 mm not determined; data based on crushed samples of the

CAMBERN SANDY LOAM
S65Ariz-1-21

Location: Apache County, Arizona. A pit located 1320 feet south of the center of Section [illegible] about 4 miles southeast of Alpine. Date of Sampling: September



22, 1965.
Collectors: M.L. Miller, K.N. Larson, J.E. Jay, R.E. Nelson, and B. Brasher.
Vegetation: Never cultivated. Ponderosa pine-grass aspect with 55 percent pine crown cover and 24 percent grass basal cover. Squirreltail, mountain muhly, annual weeds, Ponderosa pine. Climate: 22 inches ppt. 43.4° F. approximate M.A.T. Parent Material: Shallow local colluvial and alluvial material from and on Tertiary age basic and ash-flow tuff. Relief: Side slope of mountain, smooth convex 6 percent slope with north aspect at pit site. Elevation: 8000 feet. Drainage: Runoff is medium. Soil is well drained. Ground water is deep. Permeability is moderately slow.
Remarks: A 1/4 inch thick O1 horizon of pine needles was present at the time of sampling. Determination of pH was made with a Hellige-Truog field kit. Measure of free carbonate was obtained by observing reaction to dilute ECl. Paired pedon is sample No. S65Ariz-1-18. This pedon has a mollic epipedon, an argillic horizon and a mean summer soil temperature at a 20-inch depth that is probably less than 60° F. When pit was opened September 22 at 2:30 P.M. air temperature was 62° F. and soil temperature was 55° F. Depth to R ranges from 20 to 50 inches.
Classification: Argic Pachic Cryoboroll, fine-loamy, mixed.

HORIZON	DESCRIPTION
A11 RSL No. 65672	0 to 3 inches, dark gray (10YR 4/1) fine sandy loam, very dark brown (10YR 2/2) when moist; moderate medium and fine granular structure; slightly hard, very friable, nonsticky and slightly plastic; abundant fine and medium roots; many fine interstitial pores; noneffervescent; slightly acid (pH 6.5); clear smooth boundary.
A12 RSL No. 65673	3 to 8 inches, dark gray (10YR 4/1) light loam or sandy loam, very dark brown (10YR 2/2) when moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and plastic; abundant fine and medium roots; many fine interstitial and few fine tubular pores; noneffervescent; medium acid (pH 6.0); gradual smooth boundary.
B1 RSL No. 65674	8 to 11 inches, dark gray (10YR 4/1) clay loam, very dark brown (10YR 2/2) when moist; weak and medium subangular blocky structure; hard, friable, sticky and plastic; plentiful fine and medium and few large roots; abundant fine interstitial and few fine tubular pores; few rounded pebbles; noneffervescent; slightly acid (pH 6.5); clear smooth boundary.
B21t RSL No. 65675	11 to 20 inches, dark gray (10YR 4/1) clay loam, very dark brown (10YR 2/2) when moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; plentiful fine and medium and few large roots; common fine tubular and many fine interstitial pores; common thin clay films on ped faces and in pores; noneffervescent; slightly acid (pH 6.5); clear smooth boundary.
B22t RSL No. 65676	20 to 23 inches, dark gray (10YR 4/1) light clay, very dark brown (10YR 2/2) when moist; massive, breaking to moderate medium subangular blocky structure; hard, firm, sticky and very plastic; few medium and large roots; many fine interstitial and common fine tubular pores; common thin clay film on ped faces and in pores, common thin clay bridges; noneffervescent; slightly acid (pH 6.5); abrupt irregular boundary.
R RSL No. 65677	23 to 34 inches +, pinkish white (7.5YR 8/2) tuff, pink (7.5YR 7/4) when moist, with tongues 3 mm to 1 inch thick of the B22t horizon extending approximately 12 inches into the seams and fractures; massive; extremely hard, extremely firm; few fine roots in fractures; common fine interstitial pores in interfaces; many thin clay films in seams; noneffervescent; slightly acid (pH 6.5).

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Argic Pachic Cryoboroll, fine, montmorillonitic
SOIL Friana loam SOIL Nos. S62Ariz-3-20 LOCATION Coconino County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62272 - 62279

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: > 2*	Coarse fragments: 2 – 19	Coarse fragments: 19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0- 2	A11	3.8	74.7	21.5	0.2	0.3	0.2	0.6	2.5	38.8	35.9	41.7	1.3			1		
2- 8	A12	2.8	67.3	29.9	0.1	0.1	0.1	0.4	2.1	27.4	39.9	29.7	0.7			4		
8-17	A13	4.5	65.9	29.6	0.2	0.5	0.4	0.7	2.7	32.1	33.8	35.2	1.8			3		
17-31	B21t	5.4	56.1	38.5	0.2	0.6	0.7	1.4	2.5	22.5	33.6	25.8	2.9			3		
31-44	B22t	12.7	44.4	42.9	0.2	1.4	2.2	3.7	5.2	24.5	19.9	31.9	7.5			3		
44-56	B3	23.8	40.1	36.1	0.7	2.7	3.6	9.2	7.6	20.3	19.8	33.2	16.2			4		
56-68	C1	39.5	34.6	25.9	7.8	8.7	8.6	8.7	5.7	17.1	17.5	26.5	33.8			8		
68-90+	C2	26.7	33.5	39.8	0.2	1.4	3.1	10.8	11.2	14.0	19.5	31.9	15.5			18		

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N		Carbonate as $CaCO_3$		Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry			Water content: 4B1c 1/3 bar	Water content: 4B2 15 bar		4D1 Extensibility		pH: 8C1b Sat. Paste	pH: 8C1a 1:10
	Pct.	Pct.			Pct.		g/cc	g/cc	g/cc		Pct.	Pct.	Pct.	in./in.			
0- 2	3.80	0.256	15				1.17	1.29			31.0	14.1		0.031		6.2	6.5
2- 8	2.79	0.190	15				1.20	1.40			28.3	16.3		0.049		6.1	6.6
8-17	1.31	0.096	14				1.40	1.82			27.0	15.1		0.084		6.2	6.8
17-31	1.14	0.084	14									20.0				6.6	7.3
31-44	0.42	0.041	10				1.40	1.83			28.9	22.3		0.088		6.8	7.4
44-56	0.22						1.47	1.84			25.9	21.1		0.072		7.1	7.5
56-68	0.10						1.52	1.74			21.9	16.1		0.045		7.2	7.6
68-90+	0.04						1.24	1.64			37.1	34.0		0.088		7.0	7.4

Depth (In.)	Extractable bases 5B1a: 6N2c Ca	6O2c Mg	6P2a Na	6Q2a K	6H2a Ext. Acidity	Cation Exch. Capacity 5A2a NaOAc	Water extract from saturated paste: Ca	Mg	Na	K		CO_3	HCO_3	Cl	SO_4	Electrical conductivity
	meq/100 g						meq/liter									mmho/cm

FRIANA LOAM

S62Ariz-3-20

Location: Long Valley Area, Arizona. Center of Sec. 22, T15N, R9E, Coconino County, Arizona, photo DGJ-9-24. 29 miles S. and 15 miles E. of Flagstaff. Date of Sampling: June 5, 1962.
Collectors: M.S. James, Stanley Buol, R.E. Nelson, J.E. Jay, Truman Anderson, L.H. Grant and Y.H. Havens.
Classification: Argic Pachic Cryoboroll, fine, montmorillonitic.
Vegetation: Western wheatgrass, bluegrass, iris, cheatgrass, dandelion. Use: Rangeland.
Climate: 20-22" precipitation, subhumid, mean annual temperature 45°F. Parent Material: Cinder, ash and alluvium from basalt. Elevation: 6725 feet. Relief: Nearly level.
Drainage: Well drained (?), slow permeability.
Remarks: Modal profile.

HORIZON	DESCRIPTION
A11 RSL 62272	0 to 2 inches, dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium platy structure breaking to strong fine granular structure; slightly hard, very friable, nonsticky and plastic; abundant fine roots; many fine interstitial pores; medium acid (pH 6.0); abrupt smooth boundary.
RSL 62273	moist; weak medium prismatic breaking to moderate fine subangular blocky and strong fine granular structure; hard, friable, sticky and plastic; abundant fine roots; few fine tubular and many fine interstitial pores; slightly acid (pH 6.5); clear wavy boundary.
A13 RSL 62274	8 to 17 inches, dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; weak medium prismatic breaking to moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; plentiful fine roots; many fine interstitial pores; slightly acid (pH 6.5); clear wavy boundary.
B21t RSL 62275	17 to 31 inches, grayish brown (10YR 5/2) heavy clay loam, very dark brown (10YR 2/2) moist; moderate medium angular and subangular blocky structure; very hard, friable, sticky and very plastic; plentiful fine roots; few fine tubular and common fine interstitial pores; neutral (pH 7.0) noneffervescent; gradual irregular boundary.
B22t RSL 62276	31 to 44 inches, brown-dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; weak medium and coarse subangular and angular blocky structure; common small and large slickensides; very hard, firm, very sticky and very plastic; few fine roots; few fine tubular and many fine interstitial pores; many fine manganese shots; mildly alkaline (pH 7.5); noneffervescent; gradual smooth boundary.
B3 RSL 62277	44 to 56 inches, brown (7.5YR 5/4) clay, brown-dark brown (7.5YR 4/4) moist; weak medium angular blocky structure; very hard, firm, sticky and plastic; few small slickensides; few manganese coatings and stains; few fine manganese shots; common fine tubular and interstitial pores; moderately alkaline (pH 8.0); noneffervescent; abrupt wavy boundary.
C1 RSL 62278	56 to 68 inches, brown (7.5YR 5/4) clay loam or sandy clay loam, brown-dark brown (7.5YR 4/4) moist; massive; (stratified and horizontally bedded weathered ash and cinders); hard, friable, slightly sticky and plastic; few fine tubular and common fine interstitial pores; common fine manganese shots; moderately alkaline (pH 8.0); noneffervescent; abrupt wavy boundary.
C2 RSL 62279	68 to 90 inches +, mottled light brown (7.5YR 6/4) and strong brown (7.5YR 5/6) loam, reddish brown (5YR 4/4) moist; massive and rock structure; extremely hard, friable, slightly sticky and slightly plastic; few fine tubular and interstitial pores; few fine manganese shots; ped faces have clay films; moderately alkaline (pH 8.0); noneffervescent.

* Sampled for BPR.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Lithic Cryoboroll, loamy-skeletal, mixed
SOIL Bushvalley cobbly fine sandy loam SOIL Nos. S65Ariz-1-22 LOCATION Apache County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65663 - 65665

Depth (In)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: (0.05–0.02)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	1/ Coarse fragments 1A2a >2	2–19	19–76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0- 4	A1	59.4	26.6	14.0	5.0	8.4	6.9	21.7	17.4	14.1	12.5	45.2	42.0	0	14	-	-	-
4- 8	B2															-	-	-
8-14+	R															-	-	-

Depth (In)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$		Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry		3B2	Water content	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH: 8C1a H_2O 1:1		
	Pct	Pct		Pct.	Pct.		g/cc	g/cc	g/cc	Cm	Pct	Pct.	Pct.	in./in.	in./in.			
0- 4	1.26	0.080	16	1.1	-		1.39	1.45		1.00		20.7	11.3	0.015	0.015	6.7		
4- 8							1.73	1.80		1.00		13.4	10.5	0.012	0.012			
8-14+							1.73	1.75		1.00		13.1	9.7	0.005	0.005			

Depth (In)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum		6G1d KCl Ext. Al^{+++}	Base saturation: 5C1 NH_4Oac	5C3 Sum
	meq/100 g										Pct.	Pct.
0- 4	18.7	7.6	1.4	0.9	28.6	3.6	31.2	32.2			92	89
4- 8												
8-14+												

Depth (In.)	Clay mineralogy (<0.002 mm) 7A: Mont.	Verm.	Mica	Kaolin.	
	X-ray				
0- 4	xx			-	
4- 8					
8-14+					

1/ >2 mm not determined; data based on crushed samples of the whole soil.
Some of the >2 mm particles do not slake in water and cannot be separated consistently in sample preparation. All >2 mm fragments resemble the fine earth (<2 mm) fraction in water retention and chemical properties.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

BUSHVALLEY COBBLY FINE SANDY LOAM
S65Ariz-1-22

Location: Apache County, Arizona. A pit located 1452 feet north and 396 feet east of the south quarter corner of Section 2, T. 5 N., R. 30 E. About 1/4 mile northwest of Alpine. Date of Sampling: September 24, 1965.
Collectors: M.L. Miller, K.N. Larson, J.E. Jay, R.E. Nelson, and B. Brasher.
Vegetation: Never cultivated. Ponderosa pine-grass aspect with 60 percent pine crown cover and 12 percent grass basal cover. Blue grama, squirrel tail, mountain muhly, annual weeds, Ponderosa pine. Climate: 22 inches ppt. 43.4° F. approximate M.A.T. Parent Material: Ash-flow tuff. Relief: Smooth convex 17 percent slope on mountainside with southwest aspect at pit site. Elevation: 8000 feet. Drainage: Runoff is rapid. Soil is well drained. Ground water is deep. Permeability is moderate.
Remarks: Depth to R horizon ranges from 6 to 18 inches in this series. This soil is found on slopes of from 1 to 40 percent. Determination of pH was made with a Hellige-Truog field kit. Measure of free carbonate was obtained by observing reaction to dilute HCl. This pedon has a mollic epipedon, a lithic contact at less than 20 inches and a mean summer soil temperature that is probably less than 60° F.
Classification: Lithic Cryoboroll, loamy-skeletal, mixed.

HORIZON	DESCRIPTION
O1	½ to 0 inches, pine needles.
A1	0 to 4 inches, dark brown (7.5YR 4/2) flaggy fine sandy loam, dark brown (7.5YR
RSL No.	3/2) when moist; moderate medium subangular blocky structure; slightly hard, very
65663	friable, slightly sticky and slightly plastic; abundant fine and medium roots; many fine interstitial and few fine tubular pores; noneffervescent; neutral (pH 7.0); abrupt smooth boundary.
B2	4 to 8 inches, dark brown (7.5YR 4/2) very flaggy clay loam, dark brown (7.5YR
RSL No.	3/2) when moist; broken cobbles are light brown (7.5YR 6/4) dry, and brown (7.5YR
65664	5/4) when moist; rock controlled structure; slightly hard, very friable, sticky and plastic; abundant fine and plentiful medium roots; many fine interstitial pores; 90 percent by volume, flagstones; noneffervescent; slightly acid (pH 6.5); abrupt smooth boundary.
R	8 to 14 inches +, light brown (7.5YR 6/4) tuff, brown (7.5YR 5/4) when moist;
RSL No.	massive; extremely hard, extremely firm; abundant fine and plentiful medium roots
65665	in cracks; common fine and medium interstitial pores; many thin clay films on rock interfaces; noneffervescent; slightly acid (pH 6.5).

Stones in the B2 horizon are 1/4 to 1/2 inch thick and 3 to 10 inches long.

R horizon has been described by a geologist as Consolidated ash-flow tuff.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Torrifluventic Haploboroll, cindery
Bandera gravelly (cindery)
SOIL loam (taxadiunct) SOIL Nos. S65Ariz-1-19 LOCATION Apache County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB Nos. 65657 - 65662

Depth (In.)	Horizon	1B1b Total: Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	1/ Coarse fragments: > 2	2 – 19	19 – 76	1A2a
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm		
0- 2	A11	41.9	44.8	13.3	8.8	9.1	5.1	10.2	8.7	20.3	24.5	34.5	33.2	0	13	32	32	0	
2- 9	A12	35.3	47.9	16.8	8.0	7.9	4.1	8.4	6.9	17.0	30.9	28.6	28.4	0	17	34	33	1	2/
9-19	C1	47.0	41.9	11.1	11.7	12.7	5.6	9.9	7.1	16.1	25.8	28.3	39.9	1	10	51	39	7	3/
19-36	IIC2ca															100			
36-60+	IIC3							Whole soil basis			4/					100			
0- 2	A11															32	32	0	
2- 9	A12															34	33	1	
9-19	C1															51	39	7	
19-36	IIC2ca															100			
36-60+	IIC3															100			
Cinder mulch 4-0 inches																100			

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$		Bulk density: 4A1f 1/3 bar	4A1h Oven dry		3B2 Cm	Water content:	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLE	4D1 Extensibility COLE	pH: 8C1b Saturated Paste	8C1a H_2O 1:1	8C1a H_2O 1:10
	Pct.	Pct.		Pct.	Pct.		g/cc	g/cc	g/cc		Pct.	Pct.	Pct.	in./in.	in./in.			
0- 2	2.23	0.167	13	2.1	-								12.8				7.2	
2- 9	3.03	0.261	12	2.7	-		0.96 5/	0.98 5/				25.4	16.7		0.006		7.5	
9-19	2.13			2.2	6								16.0			7.4	8.4	
19-36																		
36-60+								Whole soil basis			4/							
0- 2													9.4					
2- 9													13.1					
9-19							1.01 6/	1.01 6/				17.1 6/	12.6		0.000 6/			
19-36	0.30			0.4	2		1.10	1.10				13.3	6.4		0.001			
36-60+	0.41			0.3	1		1.13	1.13				14.9	5.8		0.000			
Cinder mulch 4-0 inches				0.6														

Depth (In.)	Extractable bases: 6N2a Ca	6O2a Mg	6P2a Na	5B1a 6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A2a NaOAc	5A1a NH_4OAc	Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K		6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter									mmho/cm
0- 2	19.6	6.3	0.4	0.4	26.7			28.9										
2- 9	31.5	10.4	0.5	0.7	43.1			44.7										
9-19	29.4	16.8	3.2	0.6	50.0			37.1	4.3	5.2	9.2	0.8		-	5.5	5.2		1.83
19-36																		
36-60+								Whole soil basis			4/							
0- 2	13.0 7/	4.8 7/	0.2	1.4	18.0 7/			21.5										
2- 9	23.7	8.1	0.3	1.0	32.1			38.2										
9-19	17.5	11.1	2.3	3.2	30.9			37.1										
19-36	7.5	3.8	6.4	2.1	17.7			15.1										
36-60+	8.3	2.6	2.1	0.9	13.0			14.4										
Mulch	4.8	1.5	0.3	0.7	6.6			8.3										

Depth (In.)	8A Water at Saturation	5D2 Exchangeable Na	5B1b Exch. Na meq / 100g	Base Sat.: 5C1 NH_4OAc	5C1 NH_4OAc 4/, 7/	Clay mineralogy (<0.002 mm) 7A: Mont.	Verm.	Mica	Kaolin	Calcite
	Pct.	Pct.		Pct	Pct.	< X-ray >				
0- 2				92						
2- 9				96		t			-	-
9-19	64.1	7	2.6	100+		-			-	-
19-36										
36-60+				Whole soil basis 4/						
0- 2					84		- = looked for but not found			
2- 9					84		t = trace			
9-19					83		v = small			
19-36					100+		xx = moderate			
36-60+					90		xxx = abundant			
Mulch					80		xxxx = dominant			

1/ From characterization sample (5 kg) except as noted.
2/ 19-76 mm from field measurements (>50 kg).
3/ 19-76 mm from field measurements (>50 kg); >2 mm includes volume estimate of >76 mm.
4/ Determined on ground whole soil samples except as noted in footnotes 5 and 6.
5/ Bulk density of <2 mm ; the weight and volume of >2 mm material are excluded from values.
6/ Cinder only; the bulk density of the whole soil is probably lower and 1/3 bar water is probably higher.
7/ Ca and Mg extracted with 1 N KCl in 0.2 N triethanolamine; Ca and Mg determined by EDTA.

BANDERA GRAVELLY (CINDERY) LOAM (taxadjunct) 1/

S65Ariz-1-19

Location: Apache County, Arizona. A pit located 100 feet east and 100 feet south of the center of Sec. 28, T. 10 N., R. 29 E. Approximately 9 miles northwest of Springerville, on Photo No. 4642. Date of Sampling: September 21, 1965.
Collectors: M.L. Miller, J.E. Jay, R.E. Nelson and B. Brasher.
Vegetation: Never cultivated. Grass with basal density of 30 percent. Blue grama and a few annuals. Few scattered cholla cactus. Climate: 12 inches ppt. 46° F. approximate M.A.T. Parent Material: Basaltic cinders. Relief: Lower slope of cinder cone. Smooth-convex 8 percent slope facing northeast at pit site. Elevation: 6600 feet. Drainage: Run-off is slow. Soil is well drained. Ground water is very deep. Permeability is moderately rapid.
Classification: Torrifluventic Haploboroll, cindery.
Remarks: Determination of pH was made with a Hellige-Truog field kit. Measure of free carbonate obtained by observing reaction to dilute HCl.

HORIZON	DESCRIPTION
A11 RSL No. 65657	0 to 2 inches, brown (10YR 5/3) gravelly (cindery) loam, dark brown (10YR 3/3) when moist; weak medium and coarse platy breaking to weak fine granular structure; slightly hard, very friable, nonsticky and slightly plastic; plentiful fine roots; many fine interstitial and few fine tubular pores; surface covered with cinders ranging from 2 mm to 3/4-inch in diameter; noneffervescent; slightly acid (pH 6.5); clear smooth boundary.
A12 RSL No. 65658	2 to 9 inches, dark brown (10YR 4/3) very gravelly (cindery) loam, very dark grayish brown (10YR 3/2) when moist; massive breaking to weak very fine granular structure; soft, very friable, nonsticky and slightly plastic; abundant fine roots; many fine interstitial pores; noneffervescent ; moderately alkaline (pH 8.0); gradual smooth boundary.
C1 RSL No. 65659	9 to 19 inches, dark grayish brown (10YR 4/2) very gravelly (cindery) loam, very dark grayish brown (10YR 3/2) when moist; massive breaking to weak very fine granular structure; soft, very friable, nonsticky and slightly plastic; abundant fine roots; many fine interstitial pores; slightly to strongly effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
IIC2ca RSL No. 65660	19 to 36 inches, very dark gray (5YR 3/1) and gray (5YR 5/1)* cinders, dark reddish brown (5YR 2/2) and (5YR 3/3) when moist, with many light gray (5YR 7/1) medium to large lime mottles or coatings, dark reddish brown (5YR 3/3) when moist; massive; loose, loose, nonsticky and nonplastic; few fine roots; many fine interstitial pores; strongly effervescent to noneffervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
IIC3 RSL No. 65661	36 to 60 inches, black cinders, (N 2/) dry or moist, with common fine distinct white (N 8/) mottles; thin coating on surface of cinders is brown (7.5YR 5/4), dark brown (7.5YR 3/2) when moist; single grain; loose, nonsticky and nonplastic; few fine roots; many fine interstitial pores; strongly effervescent to noneffervescent; moderately alkaline (pH 8.0); cinders have abundant fine and medium vesicular pores, some tubular pores.

1/ The Bandera series is in a cindery family of Torriorthentic Haploborolls. This pedon has more than 0.3 percent organic carbon to a depth of 60 inches.

* 8 mm to 3 inches - 5 percent greater than 3 inches, 30 percent of surface is lime mottles, grading to common fine mottles at 36 inches.

IIC3 - Cinders are brittle - 5 percent are greater than 3 inches.

SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Springerville clay (taxadjunct) **LOCATION** Coconino County, Arizona

SOIL FAMILY: Vertic Haploboroll, fine, montmorillonitic

SOIL NOS. S56Ariz-3-3 **LAB. NOS.** 561063-561069

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 > 2 1/	TEXTURAL CLASS
0-1	A_{11}	0.2	0.3	0.3	1.2	3.6	36.6	57.8	16.9	24.1	0	c
1-4	A_{12}	0.2	0.2	0.2	1.1	3.6	37.5	57.2	16.5	25.3	0	c
4-8	A_{13}	0.3	0.2	0.2	1.1	3.3	37.7	57.2	16.6	25.2	0	c
8-13	A_{14}	0.2	0.2	0.2	1.1	3.3	38.0	57.0	16.1	25.9	0	c
13-22	C_1	0.1	0.2	0.2	1.0	3.2	37.7	57.6	16.0	25.6	2	c
22-28	C_2	0.2	0.2	0.2	0.7	2.5	41.8	54.4	33.2	31.7	1	sic
28+	R	not analyzed										

pH 8C1a 1:1	1:5	1:10	ORGANIC MATTER 6A1b ORGANIC CARBON %	6B2a NITROGEN %	C/N	6C1a Free Iron % Fe_2O_3	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM @25°C.	2/ H_2O %	Bulk Density 4A2a g/cc	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
6.7			1.16	0.089	13.0	1.6			--			
6.7			0.86	0.068	12.6	1.5		4.2	1.76			
6.8			0.75	0.038	19.7	1.6		5.8	1.89			
7.1			0.77	0.062	12.4	1.7		7.0	1.84			
7.4			0.74	0.060	12.3	1.6		6.6	1.88			
7.6			0.66	0.054	12.2	1.6		7.2	1.88			

5A3a CATION EXCHANGE CAPACITY (Sum)	EXTRACTABLE CATIONS 6N2b 5B1a Ca	6O2b 5B1a Mg	6H2a H	6P2a 5B1a Na	6Q2a 5B1a K	BASE SAT. % 5C3	SATURATION EXTRACT SOLUBLE Na	K	MOISTURE AT SATURATION %
	milliequivalents per 100g. soil						milliequivalents per liter		
51.2	29.0	15.4	5.0	0.15	1.63	90			
52.2	31.9	14.4	4.7	0.19	1.00	91			
52.4	32.4	14.7	4.2	0.27	0.90	92			
53.2	32.3	15.3	4.2	0.42	0.95	92			
55.0	33.1	17.6	2.8	0.58	0.93	95			

1/ Percent of <1-inch material

2/ H_2O content at corresponding bulk density

SPRINGERVILLE CLAY* (taxadjunct) 1/

S56Ariz-3-3

Location: Coconino County, Arizona. In NW ¼ Sec. 15, T. 19 N., R. 9 E. 1½ miles east of Mormon Lake highway, along road to Ashurst Lake. About 14 miles southeast of Flagstaff. Date of Sampling: September 19, 1956.
Collectors: W. M. Johnson, J. G. Cady, M. S. James and Reuben Nelson.
Vegetation: Sparse cover of western wheatgrass, thistles, dandelion, pricklypear cactus, snakeweed, annual and perennial weeds. Climate: Estimated 21 to 22 inches precipitation per year. Nearest weather station (Flagstaff): Mean annual temperature 45.6° F.; January average 27.2° F.; July average 65.2° F.; mean annual precipitation 20.27 inches. Parent Material: Weathered basalt (Tertiary?), with admixture of some weathered cinders and ash. Relief: Gently sloping shoulder or terrace-like slope ringing a shallow depression in a large basalt plateau. Lies some 8 or 10 feet above the floor of the depression and about 15 feet below the higher portions of the local landscape. About 2 percent plane, slope toward northwest. No gilgai at this site, but some parts of the soil area have weak (4-6") gilgai. Elevation: About 7,140 feet. Drainage: Well or moderately well drained. Runoff, medium. Permeability, very slow. Water never ponds on this soil.
Classification: Vertic Haploboroll, fine, montmorillonitic.
Remarks: Paired with S56Ariz-3-6. Surface is slightly to very stony. Stones are basalt, from a few inches to 2 feet in diameter. A very few hard, rounded lime concretions ¼ to 1/8 inch in diameter on the surface and in the soil.

HORIZON	DESCRIPTION
A11 BSL No. 561063	0-1" -- Dark grayish brown (9YR 3.5/2) clay, very dark grayish brown (9YR 3/2) when moist; strong very fine granular except for ¼-inch soft surface crust, which is weak medium platy, breaking to strong very fine granular; very hard, firm, very plastic, very sticky; many roots; many fine and very fine interstitial pores; very slightly calcareous; abrupt, slightly wavy lower boundary.
A12 BSL No. 561064	1-4" -- Clay of same color as the A11; moderate coarse prismatic, breaking to weak thick platy, and in turn to moderate very fine granular structure; extremely hard, very firm, very plastic, very sticky; many roots; few fine tubular pores; noncalcareous; clear, wavy lower boundary.
A13 BSL No. 561065	4-8" -- Very dark grayish brown (9YR 3/2) clay, very dark brown (9YR 2/2) when moist; strong very coarse prismatic structure; few slickensides produce lozenge-shaped very coarse peds; extremely hard, very firm, very plastic, very sticky; many roots; few fine and very fine tubular pores; few black spherical concretions 1 to 2 mm. in diameter; noncalcareous; gradual, wavy lower boundary.
A14 BSL No. 561066	8-13" -- Clay of the same color as the A13; moderate very coarse prismatic structure; many slickensides produce lozenge-shaped very coarse peds that break to moderate coarse and medium blocks; extremely hard, very firm, very plastic, very sticky; common roots; few black spherical concretions 1 to 2 mm in diameter; few fine and very fine tubular pores; noncalcareous; gradual, wavy lower boundary.
C1 BSL No. 561067	13-22" -- Clay of the same color as the A13; weak very coarse prismatic structure; numerous slickensides produce lozenge-shaped peds that break to moderate coarse and medium irregular blocks; extremely hard, very firm, very plastic, very sticky; few roots; few black spherical concretions 1 to 2 mm in diameter; few fine and very fine tubular pores; noncalcareous; gradual, wavy lower boundary.
C2 BSL No. 561068	22-28" -- Clay of the same color as the A13; massive with many slickensides that produce weak coarse lozenge-shaped peds; few tiny white hard spots that effervesce, otherwise noncalcareous; extremely hard, very firm, very plastic, very sticky; few roots; few black spherical concretions 1 to 2 mm in diameter; few fine and very fine tubular pores; abrupt, irregular lower boundary.
R BSL No. 561069	28"+ -- Dark gray, hard, porous, weathered olivine basalt. Many of the olivine crystals have weathered to ochreous colors. Slightly magnetic. Flecked with white calcium carbonate.

*This profile was identified as Unnamed Grayish Brown Grumusol in original notes

1/ The Springerville series is in a fine, montmorillonitic, mesic family of Typic Chromusterts. This pedon has a mean annual temperature of less than 47° F.

SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Springerville clay (taxadjunct) **LOCATION** Coconino County, Arizona

SOIL FAMILY: Vertic Haploboroll, fine, montmorillonitic

SOIL NOS. S56Ariz-3-4 **LAB. NOS.** 561070-561077

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1									2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 1/	
0-1	A_{11}	0.1	0.4	0.5	2.6	9.0	41.2	46.2	30.7	21.5	5	sic
1-4	A_{12}	0.4	0.3	0.4	2.1	6.8	38.7	51.3	25.9	21.0	0	c
4-10	C_1	0.4	1.4	0.2	1.3	4.8	32.9	59.0	21.3	17.4	0	c
10-22	C_2	0.7	1.1	0.3	1.4	5.2	36.3	55.0	22.6	19.9	0	c
22-29	C_3	0.4	0.7	0.3	1.6	5.1	42.4	49.5	23.6	25.1	0	sic
29-32	C_{ca}	0.4	0.6	0.3	1.1	3.0	41.7	52.9	19.0	26.4	20	sic
32-35	R	not analyzed										
35-37	C'ca	5.4	5.0	2.5	3.4	3.2	27.5	53.0	10.1	22.5	45	c

	pH		ORGANIC MATTER			6C1a Free Iron	6E1b	2/	4A2a	MOISTURE TENSIONS		
8C1a	1:5	1:10	6A1b ORGANIC CARBON	6B2a NITROGEN	C/N	% Fe_2O_3	$CaCO_3$ equivalent	H_2O	Bulk Density	1/10 ATMOS.	1/3 ATMOS.	15 ATMOS.
1:1			%	%			%	%	g/cc	%	%	%
7.0			1.29	0.103	12.5	1.8			--			
6.8			0.93	0.078	11.9	2.0		5.4	1.76			
6.9			0.66	0.047	14.0	1.9		5.6	1.85			
7.2			0.63	0.057	11.0	1.9		5.6	1.88			
7.7			0.54	0.043	12.6	1.8	3	7.9	1.86			
7.6			0.60	0.043	14.0	1.8	4		--			
7.8			0.26			1.2	26					

5A3a CATION EXCHANGE CAPACITY	EXTRACTABLE CATIONS 6N2b 5B1a Ca	6O2b 5B1a Mg	6H2a H	6P2a 5B1a Na	6Q2a 5B1a K	BASE SAT. % 5C3	SATURATION EXTRACT SOLUBLE Na	K	MOISTURE AT SATURATION
(Sum)	milliequivalents per 100g. soil						milliequivalents per liter		%
44.4	28.0	11.3	3.6	0.07	1.45	92			
48.6	32.1	11.9	3.8	0.11	0.70	92			
56.1	38.4	13.0	3.7	0.21	0.84	93			
51.1	34.2	12.8	3.0	0.26	0.80	94			

1/ Percent of <1-inch fraction

2/ H_2O content at corresponding bulk density

SPRINGERVILLE CLAY* (taxadjunct) 1/
S56Ariz-3-4

Location: Coconino County, Arizona. In SE ¼ Sec. 15, T. 19 N., R. 9 E., 1.8 miles east of Mormon Lake Highway along road to Ashurst Lake. About 14 miles southeast of Flagstaff. Date of Sampling: September 20, 1956.
Collectors: W. M. Johnson, J. G. Cady, M. S. James and Reuben Nelson.
Vegetation: Fair to sparse cover of western wheatgrass, ring muhly, blue grama, snakeweed (G. lucida), thistle, dandelion and other weeds, vetch. A few junipers and pines. Climate: Estimated about 21 to 22 inches precipitation per year. Nearest weather station (Flagstaff): Mean annual temperature 45.6° F.; January average 27.2° F.; July average 65.2° F.; mean annual precipitation 20.2 inches. Parent Material: Weathered basalt (Tertiary?), with some admixture of weathered cinders and ash. Relief: Near crest of low, gentle ridge between two dry lakes (Pickett and Post lakes) on a large, undulating basalt plateau. About 20 feet higher in elevation than site of S56Ariz-3-3. About 1½ percent convex, slope toward the north. No microrelief at this site, but there is faint gilgai in a few places in the area. Elevation: About 7,150 feet. Drainage: Well drained (well aerated). Runoff, medium. Permeability, very slow.
Remarks: Pair with S56Ariz-3-5. There are scattered basalt stones and boulders on the surface. There are a few hard, irregularly rounded lime concretions on the soil surface.
Classification: Vertic Haploboroll, fine, montmorillonitic.

A11 BSL No. 561070 — 0-1" -- Brown (7.5YR 4/3) clay or silty clay, dark brown (7.5YR 3/2) when moist; strong very fine granular except for 1/8 to 1/4 inch soft surface crust, which breaks to granules; hard, friable, very plastic, very sticky; matrix very slightly calcareous to noncalcareous; common lime concretions on soil surface, from 1/8 to 3/4 inch in diameter; common small hard basalt pebbles; porous; abrupt, slightly wavy lower boundary.

A12 BSL No. 561071 — 1-4" -- Brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) when moist; moderate coarse and medium prismatic, breaking to moderate coarse and medium subangular blocky, and finally to strong fine and very fine granular structure; very hard, firm, very plastic, very sticky; many roots; common fine and very fine tubular pores; noncalcareous except for a very few hard lime concretions; clear, wavy lower boundary.

C1 BSL No. 561072 — 4-10" -- Clay of the same color as the A12; moderate very coarse prismatic, breaking to moderate coarse and medium subangular blocky, and finally to weak fine and very fine granular structure; extremely hard, very firm, very plastic, very sticky; common roots; few fine and very fine tubular pores; noncalcareous matrix; in a few spots there are hard, rounded lime concretions from 1/8 to 1/4 inch in diameter; gradual, wavy lower boundary.

C2 BSL No. 561073 — 10-22" -- Clay of the same color as the A12; moderate very coarse prismatic, breaking to strong coarse and medium blocky structure; extremely hard, very firm, very plastic, very sticky; common roots; very few black spherical concretions about 1 mm in diameter; few fine and very fine tubular pores; noncalcareous matrix; in places there are a few hard, rounded, white lime concretions 1/8 to 1/4 inch in diameter; gradual, wavy lower boundary.

C3 BSL No. 561074 — 22-29" -- Clay of the same color as the A12; massive with numerous slickensides that produce 3/4 to 2 inch thick plates that break to weak or moderate coarse and medium blocks; extremely hard, very firm, very plastic, very sticky; very few pebbles of hard, weathered basalt; common roots; few fine and very fine tubular pores; very few black spherical concretions about 1 mm in diameter; matrix moderately calcareous; few soft, white lime concretions from 1/8 to 1/2 inch in diameter; gradual, wavy lower boundary.

Cca BSL No. 561075 — 29-32" -- Clay of the same color as the A12, with common fine and medium white mottles and a few medium mottles of dark reddish brown (moist); numerous intersecting slickensides produce thick platy structure; extremely hard, very firm, very plastic, very sticky; few roots, forming a thin mat on the upper surface of the underlying rock; nearly nonporous; few thin, patchy clay skins; moderately calcareous, with common soft lime concretions 1/8 to 1/2 inch in diameter; abrupt, irregular lower boundary.

R BSL No. 561076 — 32-35" -- Dark gray, hard, weathered, olivine basalt, flecked with white calcium carbonate. Slightly magnetic. Under surfaces of rock fragments have 1/8 to 1/4 inch thick lime crust. Abrupt, irregular lower boundary.

C'ca BSL No. 561077 — 35-37" -- Upper 1/4 to 1/2 inch is pinkish white (7.5YR 8/2) caliche, pinkish gray when moist; below is mottled reddish brown (5YR 5/3 and 4/3) clay, darker (5YR 4/4 and 3/3) when moist; clay is gritty; many slickensides intersect to produce weak, crude fine and very blocky; extremely hard, very firm, very plastic, very sticky; no roots; many black spherical concretions less than 1/2 mm in diameter; matrix of clay is noncalcareous; abrupt, irregular lower boundary.

R (Not sampled). — 37"+ -- Dark gray, hard, weathered, olivine basalt.

*Identified in original notes as Unnamed Brown Grumusol

SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Springerville stony silty clay (taxadjunct) **LOCATION** Coconino County, Arizona

SOIL FAMILY: Vertic Haploboroll, fine, montmorillonitic

SOIL NOS. S56Ariz-3-5 **LAB. NOS.** 561078-561084

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 >2 1/	TEXTURAL CLASS
0-1	A_{11}	0.2	0.8	0.7	3.5	7.3	38.4	49.1	25.1	23.0	0	c
1-3	A_{12}	0.2	0.9	0.7	3.2	7.0	35.7	52.3	23.0	22.0	0	c
3-9	A_{13}	0.2	0.8	0.8	3.1	7.0	35.6	52.5	23.0	21.9	0	c
9-17	C_1	0.4	0.8	0.6	3.0	6.9	35.3	52.5	22.8	22.2	2	c
17-26	C_2	0.4	0.7	0.6	2.7	6.5	38.9	50.2	22.6	24.7	0	c
26-31	C_{ca}	0.7	1.2	0.9	2.6	5.8	39.1	49.7	20.4	26.2	3	c/sic
31+	R	not analyzed										

pH 8C1a 1:1	1:5	1:10	ORGANIC MATTER 6A1b ORGANIC CARBON %	6B2a NITROGEN %	C/N	6C1a Free Iron % Fe_2O_3	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM @25°C.	2/ H_2O %	4A2a Bulk Density g/cc	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
6.8			1.22	0.079	15.4	1.7			---			
6.7			0.91	0.066	13.8	1.7		5.1	1.70			
6.9			0.63	0.055	11.4	1.6		5.2	1.84			
7.5			0.55	0.045	12.2	1.7		7.0	1.88			
7.7			0.45	0.040	11.2	1.6	2	8.1	1.84			
7.8			0.43	0.041	10.5	1.6	4	7.2	1.87			

5A3a CATION EXCHANGE CAPACITY (Sum)	EXTRACTABLE CATIONS 6N2b 5B1a Ca	6Q2b 5B1a Mg	6H2a H	6P2a 5B1a Na	6Q2a 5B1a K	BASE SAT. % 5C3	SATURATION EXTRACT SOLUBLE Na	K	MOISTURE AT SATURATION %
	milliequivalents per 100g. soil						milliequivalents per liter		
41.9	22.0	14.7	3.4	0.12	1.65	92			
44.1	24.6	13.4	4.6	0.18	1.36	90			
47.1	27.2	15.2	3.7	0.25	0.78	92			
47.4	28.7	15.5	2.0	0.45	0.76	96			

1/ Percent of <1-inch material

2/ H_2O content at corresponding bulk density

SPRINGERVILLE STONY SILTY CLAY* (taxadjunct) 1/
S56Ariz-3-5

Location: Coconino County, Arizona. In the NW ¼ NE ¼ Sec. 25, T. 19 N., R. 9 E. About 1 mile southeast of Ashurst Lake. About 15 miles southeast of Flagstaff. Date of Sampling: September 20, 1956.
Collectors: W. M. Johnson, J. G. Cady, M. S. James and Reuben Nelson.
Vegetation: Sparse cover of ring muhly, blue grama, western wheatgrass, wolftail (Hordeum sp.), snakeweed, thistle; very little stunted juniper. Climate: Estimated about 21 to 22 inches precipitation per year. Nearest weather station (Flagstaff): Mean annual temperature 45.6° F.; January average 27.2° F.; July average 65.2° F.; mean annual precipitation 20.2 inches. Parent Material: Weathered olivine basalt (Tertiary?) that is coarser grained and more porous than that under S56Ariz-3-4. Probably some admixture of weathered cinders and ash. Relief: Near crest of a low, gently sloping ridge in a large, rolling basalt plateau. About 1½ percent slope, convex, toward the south. Very slight microrelief, probably due to wind erosion and deposition. The high spots of the microrelief are around tufts of muhly and other grasses. Elevation: About 7,200 feet. Drainage: Well drained (well aerated). Runoff, medium. Permeability,
Classification: Vertic Haploboroll, fine, montmorillonitic.
Remarks: Pair with S56Ariz-3-4, although S56Ariz-3-5 has a stonier surface. Surface of soil is stony to very stony. The stones are subrounded basalt, from ½ to 14 inches in diameter. Bits of hard, weathered basalt from ¼ to 2 inches in diameter are scattered throughout the profile. Hard, irregularly rounded lime concretions may be found in places on the soil surface.

HORIZON	DESCRIPTION
A11 BSL No. 561078	0-1" -- Brown (7.5YR 4/2) stony silty clay, dark brown (7.5YR 3.5/2) when moist; strong very fine granular, except for a soft surface crust 1/8 to 1/4 inch in diameter, that breaks to granules; hard, friable, very plastic, very sticky; few roots; very porous; noncalcareous; abrupt, slightly wavy lower boundary.
A12 BSL No. 561079	1-3" -- Brown (7.5YR 4/2) stony silty clay, dark brown (7.5YR 3/2) when moist; moderate medium and coarse prismatic, breaking to moderate coarse and medium subangular blocky and finally to strong very fine granular structure; very hard, firm, very plastic, very sticky; many roots; few black spherical concretions less than 1 mm in diameter; common fine and very fine tubular pores; clear, wavy lower boundary.
A13 BSL No. 561080	3-9" -- Silty clay or clay of the same color as the A12; strong very coarse prismatic, breaking to moderate coarse and medium subangular blocky, and finally to weak fine and very fine granular structure; extremely hard, very firm, very plastic, very sticky; common roots; concretions and pores as in A12; noncalcareous; gradual, wavy lower boundary.
C1 BSL No. 561081	9-17" -- Silty clay or clay of the same color as the A12; moderate very coarse prismatic, breaking to moderate coarse and medium angular blocky structure; many slickensides, oriented at angles of 25 to 45° to the horizontal; few black spherical concretions from 1 to 2 mm. in diameter; few hard white lime concretions 1/8 to 1/4 inch in diameter; few fine and very fine tubular pores; matrix is noncalcareous; gradual, wavy lower boundary.
C2 BSL No. 561082	17-26" -- Silty clay or clay of the same color as the A12; many intersecting slickensides produced thick lozenge-shaped peds that break to moderate coarse and medium irregular angular blocks; slickensides oriented at angles of 20 to 35° with the horizontal; few roots; common black spherical concretions 1 to 2 mm in diameter; few fine and very fine tubular pores; matrix noncalcareous; few to common hard white lime concretions 1/8 to 1/4 inch in diameter; gradual, wavy lower boundary.
Cca BSL No. 561083	26-31" -- Silty clay or clay of same basic color as the A12, with common fine and medium white mottles due to lime concretions; many intersecting slickensides produce thick lozenge-shaped aggregates that break to weak coarse and medium irregular angular blocks; few thin patchy clay skins; few block spherical concretions less than 1 mm in diameter; few fine and very fine tubular pores; matrix slightly to moderately calcareous; common soft and semihard lime concretions 1/4 to 3/4 inch in diameter; few roots, forming a mat on the upper surface of the underlying rock; abrupt, irregular lower boundary.
R BSL No. 561084	31"+ -- Hard, weathered, dark gray olivine basalt; slightly magnetic.

*This profile was identified in original notes as Unnamed Brown Grumusol

1/ The Springerville series is in a fine, montmorillonitic, mesic family of Typic Chromusterts. This pedon has a mean annual temperature of less than 47° F.

SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Springerville stony silty clay (taxadjunct) **LOCATION** Coconino County, Arizona

SOIL FAMILY: Vertic Haploboroll, fine, montmorillonitic

SOIL NOS. S56Ariz-3-6 **LAB. NOS.** 561085-561093

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 1/	TEXTURAL CLASS
0-1	A_{11}	0.6	0.9	0.8	2.4	4.6	38.5	52.2	21.8	22.8	0	c
1-3	A_{12}	0.6	1.2	0.9	2.1	4.1	34.9	56.2	18.9	21.5	1	c
3-11	A_{13}	0.8	1.3	0.8	2.1	4.3	34.0	56.7	18.8	20.8	0	c
11-23	A_{14}	1.1	1.5	1.0	2.3	4.2	35.1	54.8	19.1	21.7	<1	c
23-32	AC	1.4	1.4	0.8	2.1	3.9	35.6	54.8	18.8	22.1	0	c
32-40	C1ca	1.0	1.2	0.7	1.8	3.7	34.4	57.2	16.6	22.6	0	c
40-51	C2ca	0.6	0.8	0.6	1.4	3.4	35.9	57.3	15.6	24.8	3	c
51-60	C_1	0.6	0.9	0.7	1.5	3.5	32.7	60.1	15.1	22.1	4	c
60	R	not analyzed										

pH 8C1a			ORGANIC MATTER 6A1b ORGANIC CARBON	6B2a NITROGEN		6C1a Free Iron	6E1b	2/	4A2a	MOISTURE TENSIONS		
1:1	1:5	1:10	%	%	C/N	%Fe_2O_3	$CaCO_3$ equivalent %	H_2O %	Bulk Density g/cc	1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
6.5			1.64	0.123	13.3	1.9			--			
6.7			1.09	0.093	11.7	2.0		4.1	1.69			
6.9			0.78	0.068	11.5	2.1		4.5	1.84			
7.3			0.68	0.066	10.3	2.1		6.9	1.91			
7.7			0.53	0.048	11.0	2.0	2	6.0	1.93			
7.7			0.34	0.036	9.4	1.7	2	7.8	1.89			
7.6			0.12	0.018	6.7	1.3	2	8.5	1.90			
7.6			0.08	0.018	4.4	1.4	1	10.2	1.80			

5A3a CATION EXCHANGE CAPACITY	EXTRACTABLE CATIONS 6N2b 5B1a Ca	6O2b 5B1a Mg	6H2a H	6P2a 5B1a Na	6Q2a 5B1a K	BASE SAT. % 5C3	SATURATION EXTRACT SOLUBLE Na	K	MOISTURE AT SATURATION
(Sum)	milliequivalents per 100g. soil						milliequivalents per liter		%
48.5	24.2	16.7	5.8	0.20	1.57	88			
50.4	27.9	16.0	5.2	0.30	1.03	90			
53.0	30.1	17.5	4.2	0.56	0.66	92			
52.2	29.4	18.1	3.0	1.02	0.68	94			

1/ Percent of <1-inch fraction

2/ H_2O content at corresponding bulk density

SPRINGERVILLE STONY SILTY CLAY* (taxadjunct) 1/
S56Ariz-3-6

Location: Coconino County, Arizona. In the NW ¼ SE ¼ Sec. 25, T. 19 N., R. 9 E. About 16 miles southeast of Flagstaff. Date of Sampling: September 21, 1956.
Collectors: W. M. Johnson, J. G. Cady, M. S. James and Reuben Nelson.
Vegetation: Fairly good cover of western wheatgrass, blue grama, muhly, snakeweed, pricklypear cactus, few annual weeds. Climate: Estimated 21 to 22 inches precipitation per year. Nearest weather station (Flagstaff): Mean annual temperature 45.6° F.; January average 27.2° F.; July average 65.2° F.; mean annual precipitation 20.27 inches. Parent Material: Weathered olivine basalt (Tertiary?), plus some local slope wash, and probably some residium from weathering of cinders and ash. Relief: Low, gently sloping fan or fan-terrace around an intermittent lake which is located on a large, rolling basalt plateau. Three or four feet above the floor of the intermittent lake. Subdued (3 to 6 inches) gilgai microrelief at this site. In some spots the gilgai is pronounced. About 1 percent slope, very slightly convex, toward the east. Elevation:

OIL SURVEY LABORATORY Beltsville, Maryland

OIL TYPE Springerville clay (taxadjunct) **LOCATION** Coconino County, Arizona

SOIL FAMILY: Vertic Haploboroll, very-fine, montmorillonitic

SOIL NOS. S56Ariz-3-2 **LAB. NOS.** 561056-561062

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2	TEXTURAL CLASS
0-1	A_{11}	0.0	0.0	0.0	0.2	1.1	29.9	68.8	9.5	21.5	0	c
1-7	A_{12}	0.0	0.0	0.0	0.2	1.0	29.3	69.5	8.0	22.4	0	c
7-15	C_{g1}	0.0	0.0	0.0	0.2	1.5	31.5	66.8	10.8	22.3	0	c
15-23	C_{g2}	0.0	0.0	0.0	0.1	1.1	31.6	67.2	10.5	22.2	0	c
23-34	C_{g3}	0.0	0.1	0.1	0.2	1.2	31.6	66.8	10.3	22.6	0	c
34-49	C_{g4}	0.0	0.1	0.0	0.1	1.1	33.0	65.7	10.7	23.4	0	c
49-58	C	0.0	0.1	0.1	0.5	2.2	38.3	58.8	15.2	25.7	0	c

8C1a pH 1:1	pH 1:5	pH 1:10	ORGANIC MATTER 6A1b ORGANIC CARBON %	6B2a NITROGEN %	C/N	6C1a Free Iron % Fe_2O_3	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM @25°C	1/ H_2O %	4A2a Bulk Density g/cc	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
6.0			2.11	0.179	11.8	1.0			--			
5.9			1.67	0.142	11.7	1.2		10.0	1.72			
6.2			0.86	0.092	9.4	1.5		6.9	1.84			
6.5			0.68	0.061	11.1	1.3		8.1	1.89			
6.8			0.54	0.058	9.3	1.1		9.5	1.87			
7.2			0.43	0.046	9.3	1.2		10.1	1.61			
7.5			0.23	0.030	7.7	2.2		12.6	1.78			

5A3a CATION EXCHANGE CAPACITY (Sum)	EXTRACTABLE CATIONS 6N2b 5B1a Ca	6O2b 5B1a Mg	6H2a H	6P2a 5B1a Na	6Q2a 5B1a K	BASE SAT. % 5C3	SATURATION EXTRACT SOLUBLE Na	K	MOISTURE AT SATURATION %
	milliequivalents per 100g. soil →						← milliequivalents per liter →		
58.8	28.1	16.0	11.8	0.24	2.62	80			
62.6	31.6	16.6	11.8	0.36	2.24	81			
58.6	30.2	16.9	9.0	0.48	2.05	85			
55.7	29.1	17.9	6.1	0.62	1.96	89			
55.8	29.5	19.2	4.4	0.69	2.06	92			
54.6	29.4	19.4	3.3	0.96	1.58	94			
51.2	28.4	18.4	2.0	1.13	1.25	96			

1/ H_2O content at corresponding bulk density

SPRINGERVILLE CLAY (taxadjunct) 1/

S56Ariz-3-2

Location: Coconino County, Arizona. Near the center of Pickett Lake, an intermittent lake basin in the NW ¼ Section 15, Twp. 19 N., R. 9 E. About 20 miles southeast of Flagstaff. Date of Sampling: September 19, 1956.
Collectors: W. M. Johnson, J. G. Cady, Milo James and Reuben Nelson.
Vegetation: Sparse cover of sedges, with trace of prostrate pigweed (Amaranthus sp.), rabbitbrush (Chrysothamnus sp.) and mallow. Nearly barren. Climate: Estimated 21 to 22 inches rainfall per year. Nearest weather station (Flagstaff): Mean annual temperature 45.6° F.; January average 27.2° F.; July average 65.2° F.; mean annual precipitation 20.27 inches.
Parent Material: Local alluvium washed from surrounding Grumusols that have developed in residium from olivine basalt. Relief: Level floor of a small intermittent lake (12 - 15 acres) in a rolling basalt plateau. Smooth, level. No gilgai at this point, but there is subdued gilgai around the margin of the lake floor. Elevation: About 7,130 feet. Drainage: Poorly drained. Water may stand for 6 to 8 months at a time. No runoff. Permeability very slow.
Remarks: There are helical gastropod shells scattered over the soil surface. There is a network of cracks 2 to 4 inches in width on the surface; these cracks are spaced 3 to 5 feet apart, making a crude polygonal pattern; they extend to a depth of 3½ feet. A paper envelope of concretions was taken for separate analysis.
Classification: Vertic Haploboroll, very-fine, montmorillonitic.

HORIZON	DESCRIPTION
A11 BSL No. 561056	0-1" -- Very dark gray (10YR 3/1) clay, black (2.5/1) when moist; the surface ¼ inch is a hard crust with many cracks; the remainder is strong very fine granular structure; very hard, firm, very plastic, very sticky; many roots; noncalcareous; abrupt, slightly wavy lower boundary.
A12 BSL No. 561057	1-7" -- Very dark gray (10YR 3/1) clay, black (2/1) when moist; moderate very coarse prismatic, breaking to moderate coarse and medium subangular blocky structure; extremely hard, very firm, very plastic, very sticky; has few fine and medium mottles of dark yellowish brown (moist) around roots and root channels; many roots; no clay films; noncalcareous; clear, wavy lower boundary.
Cg1 BSL No. 561058	7-15" -- Dark gray (2.5Y 4/1) clay mottled with reddish yellow (7.5YR 5/6, dry), very dark gray (2.5Y 3/1) when moist; with common fine and medium mottles of dark yellowish brown (10YR 3/4); mottles most common in interiors of peds; many slickensides, mostly horizontal to about 30° angle, produce plates and lenticular peds 1 to 2 inches thick, and these break to moderate fine blocks; extremely hard, extremely firm, very plastic, very sticky; common roots; may have a few thin patches of clay films on some vertical surfaces; few hard spherical black and reddish brown concretions, ½ to 5 mm in diameter; noncalcareous; arbitrary boundary for sampling.
Cg2 BSL No.	15-23" -- Clay, very slightly lighter colored than horizon above when moist, otherwise similar to Cg1. Common roots. Noncalcareous. Gradual, [illegible] boundary.
Cg3 BSL No. 561060	23-34" -- Dark gray (5Y 4/1) clay with few medium and fine mottles of dark yellowish brown, about same color when moist; very many slickensides produce thick plates and lenticular peds that break to weak medium and fine blocks; extremely hard, very firm, very plastic, very sticky; few spherical black shot as in horizon above (but fewer here); few roots; noncalcareous; may have few thin patchy clay films on some vertical surfaces; gradual, wavy lower boundary.
Cg4 BSL No. 561061	34-49" -- Dark gray (5Y 4/1) clay with many fine and medium mottles of dark yellowish brown, about same color when moist; common slickensides produce thick plates and lenticular peds that do not break down to smaller peds; extremely hard, very

SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Springerville clay (taxadjunct) **LOCATION** Coconino County, Arizona

SOIL FAMILY: Vertic Haploboroll, very-fine, montmorillonitic

SOIL NOS. S56Ariz-3-7 **LAB. NOS.** 561094-561102

1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1

[redacted]

SPRINGERVILLE CLAY (taxadjunct) 1/

S56Ariz-3-7

Location: Coconino County, Arizona. In the NW ¼ SW ¼ Sec. 30, T. 19 N., R. 10 E. About 18 miles southeast of Flagstaff. Date of Sampling: September 21, 1956.
Collectors: W. M. Johnson, J. G. Cady, M. S. James and Reuben Nelson.
Vegetation: Sparse cover of annual weeds, with a few small patches of western wheatgrass. Most of the surface is bare. Climate: Estimated 21 to 22 inches precipitation per year. Nearest weather station (Flagstaff): Mean annual temperature 45.6° F.; January average 27.2° F.; July average 65.2° F.; mean annual precipitation 20.27 inches. Parent Material: Local alluvium derived from adjacent alluvial fans and low hills, from soils derived from olivine basalt, cinders and ash. Relief: Level floor of unnamed intermittent lake. Slight microrelief caused by sloughing of loose surface soil into deep, wide cracks. Level slope. Elevation: About 7,125 feet. Drainage: Poorly drained. Well aerated when dry, poorly aerated when moist or wet. No runoff. Very slow permeability. May be ponded for months at a time.
Remarks: Pair with profile S56Ariz-3-2. There are a few hard, white, rounded lime concretions in all horizons, and, in spots, a few lying on the soil surface.
Classification: Vertic Haploboroll, very-fine, montmorillonitic.

HORIZON	DESCRIPTION
A11	0-1" -- Dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) when moist; the surface 1/8
561094	and very fine granular structure; hard, firm, very plastic, very sticky; many roots, most of them oriented horizontally; noncalcareous; abrupt, slightly wavy lower boundary.
A12	1-3½" -- Dark gray (10YR 4.5/1) clay, very dark gray (10YR 3/1) when moist; weak coarse
BSL No.	prismatic, breaking to weak medium and thick platy, and finally to moderate fine and
561095	very fine granular structure; extremely hard, very firm, very plastic, very sticky; common roots; few black spherical concretions less than 1 mm. in diameter; noncalcareous; clear, slightly wavy lower boundary.
A13	3½-7" -- Very dark gray (10YR 3.5/0.5) clay, black (10YR 2/1) when moist, with few faint

CONSECUTIVE PEDON NUMBER C 69163 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES BARKERVILLE VARIANT SOIL NO. S69 ARIZ. 2-17 SAMPLE NO. 9 849-9 851 WILLCOX AREA

SOIL FAMILY: TYPIC ARGIUSTOLL,LOAMY,MIXED,THERMIC,SHALLOW RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1818,3A1 1A2A

TOTAL FRACTION ----------SANDS---------- --SILTS-- ----CLAYS---- INT. -COARSE FRAGMENTS-

SAMPLE NO.	DEPTH CM.		2-.05	.05-.002	LT .002	2-1	1-.5	.5-.25	.25-.10	.1-.05	.05-.02	.02-.002	2-.2U	LT .2U	NATE 3A1A	.2-.02	OF WHOLE SOIL	75-20 PCT.	20-5 OF	5-2 LT 75
			PERCENT OF LESS THAN 2MM																	
9 849	0- 8	A1	70.3	20.3	9.4	13.4	14.4	11.9	20.6	10.0	11.4	8.9				32.3	31A	4	13	14
9 850	8- 23	B2T	65.9	21.2	12.9	11.7	18.0	10.9	16.0	9.3	11.1	10.1				28.9	27A	3	8	16
9 851	23- 97	C	79.6	13.5	6.9	28.1	23.1	10.2	12.5	5.7	7.0	6.5				19.1	--G	--	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR-BON 6A1A	NITRO-GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	DI-CIT AL 6G7A	EXT PYROP FE 6C5A	EXT PYROP AL 6G5A	ATTERBERG LIMIT LL 4F1	LIMIT PL 4F2	LIMIT 1/3 BAR 4A1F	EST. 1/3 BAR 4A1F	DRY BAR 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.		NO.40 GRAMS PER CC				PERCENT			PERCENT	
9 849	0- 8	0.68	0.066			1.1	0.1			NP	NP		1.61	1.66	0.79		9.1	4.1	1.0	0.8
9 850	8- 23	0.73	0.056			1.0	0.1			23	17		1.38	1.45	0.84		8.4	5.4	1.7	1.4
9 851	23- 97	0.10				0.9	0.1						2.32	2.37	1.00		4.5	4.4	0.7	0.7

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI-DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	C E C NH4-OAC 5A6A	BASE SATURATION SUM+ ACI-DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	PH H2O 1/1 8C1A	PH CA-CL2 8C1E
		MEQ/100G									PERCENT					
9 849	0- 8			0.1	0.5	0.6			0.6	9.3					6.5	6.2
9 850	8- 23			0.1	0.4	0.5			0.5	12.7					6.8	6.4
9 851	23- 97			0.2	0.3	0.5			0.5	8.6					7.4	7.4

BARKERVILLE GRAVELLY HEAVY SANDY LOAM variant 1/

S69Ariz-2-17

Location: Cochise County, Arizona. 1,200 feet west and 400 feet north of the southeast corner of Sec. 33, T. 14 S., R. 27 E. Near State Highway 186 about 15 miles east and 5 miles south of Cochise. Date of sampling: October 17, 1969. Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Typic Argiustoll, loamy, mixed, thermic, shallow.
Vegetation: Blue grama, sideoats grama, green sprangletop, cane beardgrass, three-awn, pricklypear, burroweed, and mesquite. Use: Livestock range.
Climate: Precipitation about 14 inches. Mean annual air temperature 57°F., January 41°F., July 74°F. Parent Material: Granitic rock. Topography: Strongly sloping convex hills. Slope, 13 percent, south-southwest facing.
Elevation: 5350 feet. Drainage: Well drained. Surface runoff is slow to medium. Permeability is moderate to bedrock. Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by Hellige-Truog indicator solution. This sample paired with S69Ariz-2-18.

HORIZON	DESCRIPTION
A1 RSL 69849	0 to 8 cm (0 to 3 inches), dark grayish brown (10YR 4/2) gravelly heavy sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, non- [illegible]
	tubular pores; 40 to 45 percent surface cover of 2 to 30 mm angular granitic gravel, occasional granitic rock outcrop; about 30 percent by volume of 2 to 10 mm angular granitic gravel; noneffervescent; slightly acid (pH 6.5); abrupt wavy boundary.
B2t RSL 69850	8 to 23 cm (3 to 9 inches), dark grayish brown (10YR 4/2) gravelly heavy sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium roots; common fine tubular and few coarse tubular pores; about 15 to 20 percent by volume of 2 to 10 mm angular granitic [illegible]

CONSECUTIVE PEDON NUMBER C 69164 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES BARKERVILLE VARIANT SOIL NO. S69 ARIZ. 2-18 SAMPLE NO. 9 852-9 854 WILLCOX AREA

SOIL FAMILY: TYPIC ARGIUSTOLL,LOAMY,MIXED,THERMIC,SHALLOW RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION 2- .05	SILT .05- .002	CLAY LT .002	VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	1A2A INT. II .2-.02	-COARSE FRAGMENTS- PCT. OF WHOLE 20 I 75- 20-5	II 5-2	III
			PERCENT OF LESS THAN 2MM														SOIL	PCT. OF LT 75		
9 852	0- 5	A1	70.6	20.8	8.6	12.0	22.9	14.0	15.4	6.3	9.7	11.1				23.3	57A	14	30	13
9 853	5- 18	B2T	61.9	24.1	14.0	13.5	16.2	10.9	14.7	6.6	11.0	13.1				25.1	52A	6	34	12
9 854	18- 71	C	61.8	20.2	18.0	23.6	18.2	8.0	8.6	3.4	7.5	12.7				14.7	--G	--	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6G2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L L 4F1	I M I T PL 4F2	1/3 BAR 4A1F	BULK DENSITY EST. 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		-PERCENT-		-PERCENT-		-PERCENT-				PCT.	NO.40	GRAMS PER CC				-PERCENT-			-PERCENT-	
9 852	0- 5	0.71	0.045			0.7	0.1			NP	NP		1.51	1.59	0.57		10.3	4.3	1.7	1.0
9 853	5- 18	0.76	0.057			0.8	0.1			23	17		1.41	1.47	0.63		10.9	6.2	1.4	0.9
9 854	18- 71	0.67	0.077			0.8	0.1					1.50			1.00			9.7		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6U2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4- OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4- OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA- CL2 8C1E
		MEQ/100G									PERCENT					
9 852	0- 5			0.1	0.5	0.6			0.6	9.2					6.1	5.5
9 853	5- 18			0.2	0.3	0.5			0.5	13.3					6.4	6.0
9 854	18- 71			0.2	0.4	0.6			0.6	19.9					6.5	6.3

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY <0.002 MM X RAY I 7A2E	II 7A2E	III 7A2E	IV 7A2E	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY I 7A2E	II 7A2E	III 7A2E
9 852	0- 5									
9 853	5- 18	MI 5	MT 2	KK 2						
9 854	18- 71	MT 4	MI 4	KK 2						

MINERAL CODE: MI MICA, MT MONTMORT, KK KAOLINIT

RELATIVE AMOUNT: 1 TRACE, 2 SMALL, 3 MODERATE, 4 ABUNDANT, 5 DOMINANT, 6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
G=GROUND WHOLE. HORIZON INDURATED OR GRAVEL TOO SOFT TO BE SEPARATED. ALL DATA FOR WHOLE SOIL.

BARKERVILLE GRAVELLY SANDY LOAM variant 1/
S69Ariz-2-18

Location: Cochise County, Arizona. 2,000 east and 400 feet south of northwest corner of Sec.3, T. 15 S., R. 27 E. South of State Highway 186, about 3½ miles north and 20 miles east of Cochise. Date of sampling: October 17, 1969.
Description by: R. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Typic Argiustoll, loamy, mixed, thermic, shallow.
Vegetation: Blue grama, sideoats grama, cane beardgrass, three-awn, burroweed, yucca, and mesquite. Use: Livestock range. Climate: Precipitation about 14 inches. Mean annual air temperature 57°F., January 41°F., July 74°F. Parent Material: Granitic rock. Topography: Strongly sloping convex hills. Slope, 11 percent, southwest facing. Elevation: 5270 feet. Drainage: Well drained. Surface runoff is slow to medium. Permeability is moderate to bedrock. Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by Hellige-Truog indicator solution. This sample paired with S69Ariz-2-17. The C horizon has tongues of dark grayish brown (10YR 4/2) gravelly sandy loam soil material in rock fractures and cracks that extend to a depth of 24 inches.

HORIZON	DESCRIPTION
A1 RSL 69852	0 to 5 cm (0 to 2 inches), dark grayish brown (10YR 4/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak thick platy structure in upper 1/2 inch, weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky, slightly plastic; many fine and medium roots; common fine and medium roots; common fine and medium tubular pores; 40 to 45 percent cover of 2 to 30 mm angular granitic on surface, occasional granitic rock outcrop; about 30 percent by volume of 2 to 10 mm angular granitic gravel; noneffervescent; slightly acid (pH 6.5); abrupt wavy boundary.
B2t RSL 69853	5 to 18 cm (2 to 7 inches), dark grayish brown (10YR 4/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium roots; common fine tubular pores; about 20 percent by volume of 2 to 10 mm angular granitic gravel; noneffervescent; slightly acid (pH 6.5); abrupt irregular boundary.
C RSL 69854	18 to 71 cm (7 to 28 inches), reddish yellow (5YR 6/6), dark grayish brown (10YR 4/2) and white (10YR 8/1) weathered granite, yellowish red (5YR 5/6), very dark grayish brown (10YR 3/2) and white (10YR 8/2) moist; massive; very hard, firm; common fine and medium roots in seams and fissures in rock; few thin yellowish red clay films and dark grayish brown coatings on rock faces; noneffervescent; slightly acid (pH 6.5).

1/ The Barkerville series is in a loamy, mixed, mesic, shallow family of Udorthentic Haplustolls. This pedon has an argillic horizon.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Argiustoll, fine, montmorillonitic, mesic

SOIL Thunderbird cobbly clay loam SOIL Nos. S65Ariz-13-13 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65246 - 65251

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	* Coarse fragments 1A2a: > 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0-3	A1	15.2	65.9	18.9	1.4	2.2	1.2	2.8	7.6	35.7	30.2	44.8	7.6	0	19	22	17	5
3-12	B1t	8.3	55.0	36.7	0.8	0.8	0.7	1.7	4.3	30.2	24.8	35.4	4.0	0	37	**10	3	2
12-21	B21t	4.5	35.6	59.9	0.3	0.7	0.5	1.1	1.9	17.7	17.9	20.2	2.6	0	60	2	2	0
21-29	B22t	7.1	33.0	59.9	0.6	1.5	1.1	1.7	2.2	13.6	19.4	16.7	4.9	0	60	2	2	0
29-40	IIB3tca	52.5	28.2	19.3	13.4	14.6	7.4	11.4	5.7	9.8	18.4	21.7	46.8	0	19	2	2	0
40-81+	IIC	71.1	21.5	7.4	20.8	20.0	9.3	14.3	6.7	7.9	13.6	22.2	64.4	0	7	4	4	0

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$	Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry	Bulk density	3B2	Water content	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLE	4D1 Extensibility COLE	pH: 8C1b Saturated Paste	pH: 8C1a H_2O 1:1	pH: 8C1a H_2O 1:10
	Pct.	Pct.		Pct.	Pct.	g/cc	g/cc	g/cc	Cm	Pct.	Pct.	Pct.	in./in.	in./in.			
0-3	1.35	0.104	13	0.8	-							9.8				6.8	
3-12	1.08	0.086	13	1.0	-	1.35	1.60		0.94		26.4	16.8	0.059	0.055		6.8	
12-21	0.65	0.064	10	1.2	-	1.21	1.78		0.99		41.6	26.4	0.137	0.135		7.5	
21-29	0.54	0.049	11	1.2	1	1.13	1.56		0.99		46.3	29.0	0.113	0.112		7.9	
29-40	0.20			0.9	2	0.95	1.10		0.99		45.1	14.7	0.049	0.049		8.1	
40-81+	0.06			0.9	1	0.97	0.98		0.98		44.1	11.5	-	-		8.0	

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A2a NaOAc	5A1a NH_4OAc	Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K	6I1a CO_3	6J1a HCO_3	6K1a Cl	6L1a SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter								mmho/cm
0-3	11.7	5.5	0.2	0.7	18.1			20.2									
3-12	18.1	9.2	0.6	0.9	28.8			31.3									
12-21	29.4	17.5	2.1	0.9	49.9			50.5	0.6	0.9	3.2	3.2	-	3.4	27.6		0.43
21-29	40.7	21.7	3.1	0.8	66.3			58.2	1.5	1.2	5.0	0.2	-	2.2	0.4		0.73
29-40	30.1	12.7	3.1	0.5	46.4			35.3	6.4	4.3	11.8	0.1	-	2.4	2.5	6.7	2.27
40-81+	28.4	8.9	2.5	0.4	40.2			33.0	7.5	4.1	11.3	0.1	-	1.9	13.2	1.3	2.47

Depth (In.)	8A Water at Saturation	5D2 Exchangeable Na	5B1b Exch. Na meq / 100g	Gypsum	5C1 Base Sat.	Clay mineralogy (<0.002 mm.) 7A: Mont.	Verm.	Mica	Kaolin.
	Pct.	Pct.		Pct.	Pct.	X-ray			
0-3					90	xxx		xx	x
3-12					92	xxx		xx	x
12-21	85.3	3	1.8		99	xxxx		t	x
21-29	98.5	4	2.6		100+	xxxx		t	x
29-40	53.3	7	2.5		100+	xxxx		-	t
40-81+	43.2	6	2.1		100+	xxxx		-	-

* All values from characterization sample (5Kg) (except as noted).

** >2 mm. includes field volume estimate of >76 mm.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

THUNDERBIRD COBBLY CLAY LOAM

S65Ariz-13-13

Location: Western Yavapai County Area, Arizona. About 2 miles east of the junction of the Rancho Moana and Williamson Valley roads on the county road between Skull Valley and Williamson Valley. NE¼ Sec. 12, T15N, R4W. Photo EGE 22-73. Date of Sampling: May 7, 1965.
Collectors: Flach, Nettleton, Jay, Meurisse, Winkelaar, Wiesner, Wendt.
Vegetation: Juniper-grass. Juniper, oakbrush, algerita, blue grama, sideoats grama, and beargrass. Climate: Mean annual precipitation 14-16". Mean annual temperature 54°F. Soil temperature at time of sampling 59°F. at 20" and 60°F. at 60". Parent Material: Basalt and cinders. Relief: Strongly sloping or rolling plain on a 9 percent convex, south facing slope. Elevation: 5,000 feet. Drainage: Medium runoff, moderately slowly permeable, and well drained.
Remarks: This soil is on basalt or cinders, under a juniper-grass cover. It is on nearly level to strongly sloping plains at elevations of 4000 to 6000 feet. Hellige-Truog field kit was used to determine pH. Paired sample is S65 Ariz-13-17.
Classification: Typic Argiustoll, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 65246	0 to 3 inches, grayish brown (10YR 5/2) very cobbly loam, very dark brown (10YR 2/2) when moist, weak medium platy breaking to strong fine granular structure; hard, firm, sticky and plastic; many very fine and fine roots; many interstitial and vesicular and common fine tubular pores; 30 percent cobbles, 50 percent gravels; about 80 percent of the surface is covered by cobble and gravel; noneffervescent; neutral (pH 7.0); clear, smooth boundary.
B1t RSL No. 65247	3 to 12 inches, grayish brown (10YR 5/2) heavy clay loam; dark brown (7.5YR 3/2) when moist; weak medium prismatic breaking to moderate fine and medium subangular blocky structure; hard, firm, sticky and very plastic; many very fine and fine roots; common fine tubular and many fine interstitial pores; few moderately thick clay film on ped faces and in pores; few scattered, <5 percent gravels and cobbles; noneffervescent; neutral (pH 7.0); gradual wavy boundary.
B21t* RSL No. 65248	12 to 21 inches, brown (7.5YR 4/4) dry and moist clay; moderate medium and coarse prismatic; very hard, firm, sticky and very plastic; plentiful very fine and fine roots; common very fine and fine tubular and many interstitial pores; many moderately thick clay films on ped faces and in pores; noneffervescent; mildly alkaline (pH 7.5); gradual wavy boundary.
B22t RSL No. 65249	21 to 29 inches, brown (7.5YR 4/4) dry and moist clay; strong fine and medium angular blocky structure; very hard, firm, sticky and very plastic; moderate very fine and fine roots; common very fine and fine tubular and many interstitial pores; many fine and medium slickensides and pressure faces; 2-10 percent fine and medium gravels; noneffervescent; moderately alkaline (pH 8.0); clear, wavy boundary.
IIB3tca RSL No. 65250	29 to 40 inches, brown (7.5YR 4/4) dry and moist very gravelly clay, (gravels are black basalt cinders 7.5YR 2/N); massive to moderate fine subangular blocky structure; hard, firm, sticky and plastic; few fine roots; slightly to violently effervescent; $CaCO_3$ occurs as common fine distinct few medium and an occasional large (up to 4") irregular soft white to yellow mottles masses. One pocket is 4" in diameter; moderately alkaline (pH 8.0); clear, wavy boundary.
IIC RSL No. 65251	40 to 81 inches plus, black (7.5YR N2/) and reddish yellow (7.5YR 8/6) weathered basalt cinders with a few pockets of white (N8/) lime coated cinders. Pockets are 3 to 20" in diameter. 10 percent of mass is soil material of clay texture. Cinders are weakly cemented.

*Sampled for BPR. B21t and B22t horizons combined for BPR sample.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Argiustoll, fine, montmorillonitic, mesic
SOIL Thunderbird cobbly clay loam SOIL Nos. S65Ariz-13-17 LOCATION Yavapai County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65252 - 65255

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt (0.05–0.002)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	* Coarse fragments 1A2g >2 Pct	2 – 19 Pct. of < 76 mm	19 – 76 Pct. of < 76 mm
		Pct. of < 2 mm																
0-2	A1	21.9	56.7	21.4	5.5	5.5	2.7	3.8	4.4	28.3	28.4	34.6	17.5	0	21		17	0
2-7	B1t	11.5	50.7	37.8	1.7	2.5	1.4	2.4	3.5	21.6	29.1	26.4	8.0	0	38		6	0
7-28	B21t&B22t	8.8	42.1	49.1	1.4	2.0	1.2	1.9	2.3	14.9	27.2	18.2	6.5	0	49		3	0
28-31	Cca	35.4	38.4	26.2	5.8	6.2	3.5	9.2	10.7	11.0	27.4	27.5	24.7	1	25		10	0

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N	6C2a Ext. Iron as Fe Pct.	6E1b Carbonate as $CaCO_3$ Pct.	Bulk density 4A1f 1/3 bar g/cc	Bulk density 4A1h Oven dry g/cc	g/cc	Water content Pct.	Water content 4B1c 1/3 bar Pct.	Water content 4B2 15 bar Pct.	4D1 Extensibility COLEF in./in.	4D1 Extensibility COLE in./in.	pH 8C1b Saturated Paste	pH 8C1a H_2O 1:1	pH 8C1a H_2O 1:10
0-2	2.85	0.198	14		-						12.3				6.8	
2-7	1.17	0.100	12		-						16.6				6.8	
7-28	0.70	0.064	11		-						22.6				7.5	
28-31	0.37				9						29.2				8.0	

Depth (In.)	Extractable bases 6N2a Ca	6O2a Mg	6P2a Na	5B1a 6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity 5A2a NaOAc	5A1a NH_4OAc	Water extract from saturated paste 8A1 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K		6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter									mmho/cm
0-2	13.4	6.3	0.2	1.4	21.3			23.2										
2-7	20.5	10.5	0.2	0.7	31.9			33.1										
7-28	25.6	15.8	1.0	0.7	43.1			42.2										
28-31	41.9	24.7	3.4	0.6	70.6		62.3	54.3	2.4	2.1	6.6	0.1		-	4.00	2.2		1.07

Depth (In.)	8A Water at Saturation Pct.	5D2 Exchangeable Na Pct.	5B1b Exch. Na meq / 100g	Gypsum Pct.	5C1 Base Sat. Pct.	Atterberg limits Plastic limit Pct. of <0.4 mm	Liquid limit	Plastic index
0-2					92			
2-7					96			
7-28					100+	20	73	53
28-31	82.2	5	2.9		100+			

* All values from characterization sample.

THUNDERBIRD COBBLY CLAY LOAM

S65Ariz-13-17

Location: Western Yavapai County Area, Arizona. About 2/10 mile southeast of the Rancho Moana road on the county road between Skull Valley and Williamson Valley, then about 300 feet east of road. NE¼ Sec. 11, T15N R4E. Photo FCF-22-155. Date of Sampling: May 11, 1965.

[redacted]

60°F. at 22". Parent Material: Basalt and cinders. Relief: Moderately sloping plains on an 8 percent convex west facing slope. Elevation: 4850 feet. Drainage: Medium runoff, moderately slow to slowly permeable and well drained.

Remarks: This soil is formed on basalt under a juniper-grass cover. It is on nearly level to strongly sloping plains at elevations of 4,000 to 6,000 feet. About 30 percent of the surface is covered by cobbles and 20 percent is covered by gravels. Hellige-Truog field kit was used to determine pH.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Argiustoll, fine, montmorillonitic, mesic

SOIL Showlow gravelly sandy loam (taxadjunct) SOIL Nos. S65Ariz-13-18 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65276 - 65282

Depth (In.)	Horizon	1B1b Size class and particle diameter (mm) Total Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	3A1 Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Noncarbonate clay	* Coarse fragments 1A2a > 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-2	A1	66.5	24.3	9.2	14.8	14.6	8.3	16.6	12.2	12.8	11.5	34.6	54.3	0	9	25	21	4
2-5	B1t	56.3	17.2	26.5	11.5	12.8	7.4	14.7	9.9	9.5	7.7	27.9	46.4	0	27	23	22	1
5-10	B21t	44.8	12.7	42.5	11.0	10.3	5.5	10.4	7.6	5.8	6.9	19.3	37.7	0	43	25	20	5
10-26	B22t	49.0	12.1	38.9	13.6	11.6	5.4	10.9	7.5	5.2	6.9	19.0	41.5	0	39	23	20	3
26-45	B3t	52.4	12.2	35.4	15.5	11.9	5.8	12.1	7.1	5.3	6.9	19.0	45.3	0	35	35	32	3
45-55	C1ca	60.4	13.8	25.8	19.2	15.5	7.5	12.1	6.1	5.3	8.5	17.7	54.3	0	26	40	36	4
55-68	C2ca	68.9	13.3	17.8	19.1	17.5	9.5	16.2	7.6	5.7	7.6	20.9	61.3	0	18	58	40	18

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$	Carbonate as $CaCO_3$ crushed whole soil	Bulk density: 4A1f 1/3 bar	4A1h Oven dry		Water content:	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH: 8C1a H_2O 1:1		
	Pct.	Pct		Pct.	Pct.		g/cc	g/cc	g/cc	Pct.	Pct.	Pct	in./in.	in./in.			
0-2	0.73	0.059	12	1.1	-							3.9			6.9		
2-5	0.79	0.080	10	1.0	-							11.0			6.6		
5-10	0.71	0.072	10	1.0	-							18.8			6.4		
10-26	0.35	0.038	9	0.8	-							17.8			6.5		
26-45	0.10			0.5	-							17.8			7.2		
45-55	0.05			0.5	tr.	tr.						15.7			8.0		
55-68	0.02			0.6								8.8			8.1		

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum	CEC clay	6G1d KCl Ext.	Base saturation 5C1

SHOWLOW GRAVELLY SANDY LOAM (taxadjunct) 1/
S65Ariz-13-18

Location: Western Yavapai County Area, Arizona. About 1 mile northwest of junction with the Rancho Moana road on the county road between Skull Valley and Williamson Valley, then ½ mile southwest of road. NW¼ Sec. 3, T15N, R4W. Photo EGE #33-204. Date of Sampling: May 14, 1965.
Collectors: Nettleton, Wendt, Meurisse, Wiesner
Vegetation: Brush-grass. Oakbrush, algerita, some juniper, blue grama, sideoats grama and snakeweed. Climate: Mean annual precipitation 14". Mean annual temperature 55°F. Soil temperature at time of sampling 60°F. at 20". Parent Material: Mixed alluvium from granite, schist and some basalt. Relief: Moderately sloping, midslope on 5 percent, convex, west facing alluvial fan. Elevation: 5,000 feet. Drainage: Medium runoff, moderately slowly permeable and well drained.
Remarks: This soil is formed in old alluvium, dominantly from granite and schist with some basalt, under a chaparral-type vegetation. It is on gently to steeply sloping alluvial fans at elevations of 4000 to 6000 feet. Hellige-Truog field kit was used to determine pH. Paired samples are S65 Ariz-13-9 and S65 Ariz-13-12.
Classification: Typic Argiustoll, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 65276	0 to 2 inches, gray (10YR 5/1) gravelly sandy loam, very dark brown (10YR 2/2) when moist; weak medium and coarse platy structure; slightly hard, very friable, slightly sticky and slightly plastic; plentiful very fine and fine roots; many very fine and fine vesicular pores; 50 percent fine and medium gravel, surface has thin gravel pavement; noneffervescent; neutral (pH 7.0); clear, wavy boundary.
B1t RSL No. 65277	2 to 5 inches, dark brown (10YR 3/3) dry and moist finely gravelly clay loam; moderate very fine and fine subangular blocky structure; hard, friable, sticky and plastic; abundant very fine and fine roots; many very fine and fine interstitial and common very fine and fine tubular pores; few thin clay films on ped faces; 20 percent fine gravels and a few cobbles; noneffervescent; neutral (pH 7.0); clear wavy boundary. Tongues of this horizon extend to 26".
B21t*	5 to 10 inches, brown (7.5YR 4/2) finely gravelly clay, dark brown (7.5YR 3/2) when moist;

SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Ziegler silty clay loam (taxadjunct) **LOCATION** Apache County, Arizona

SOIL FAMILY: Typic Argiustoll, fine, montmorillonitic, mesic

SOIL NOS. S56Ariz-1-2 **LAB. NOS.** 561130-561136

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1										
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2	TEXTURAL CLASS

ZIEGLER SILTY CLAY LOAM* (taxadjunct) 1/
S56Ariz-1-2

Location: Apache County, Arizona, in the S1/2NW ¼, Sec. 31, T. 10 N., R. 24 E. 1.85 miles west-southwest of Pinon. Date of Sampling: September 24, 1956.
Collectors: W. M. Johnson, J. G. Cady, M. S. James and Reuben Nelson.
Vegetation: Open stand of pinon pine, alligator juniper, ponderosa pine, few small oak, with sparse understory of blue grama, fescue, western wheatgrass, and annual weeds. Climate: Estimated about 18 to 20 inches precipitation per year. Nearest weather station (Springerville): Mean annual temperature 48.7° F.; January average 31.1° F.; July average 66.9° F.; mean annual precipitation 12.11 inches; mean annual precipitation (Show Low) 18.4 inches. Parent Material:

[redacted]

Relief: Near base of steeply sloping old cinder cone. 12 percent slope, plane, toward north. Elevation: About 7,120 feet. Drainage: Well drained (well aerated). Medium runoff. Slow permeability. Remarks: Single profile--no pair.
Classification: Typic Argiustoll, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
O1 + O2 (not sampled)	½-0" -- Needles and twigs, with thin mor humus layer below. Abrupt, smooth lower boundary.
A11 BSL No. 561130	0-3" -- Dark reddish gray (4YR 4/2) slightly gritty silt loam; dark reddish brown (4YR 3/2) when moist; very weak thin platy structure--mulch-like; soft, very friable, slightly plastic, slightly sticky; few roots; very porous; contains scattered cinders of pebble and cobble size; noncalcareous; abrupt, smooth lower boundary.

[redacted]

CONSECUTIVE PEDON NUMBER C 69168 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES LUZENA SOIL NO. S69 ARIZ. 2-22 SAMPLE NO. 9 865-9 867 WILLCOX AREA

SOIL FAMILY: LITHIC VERTIC ARGIUSTOLL,CLAYEY,MIXED,MESIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE .2U-LT	CARBO NATE 3A1A	1A2A INT. COARSE FRAGMENTS II .2-.02 WHOLE 20 PCT. OF	I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM													SOIL	PCT. OF LT 75		
9 865	0- 8	A1	60.3	22.5	17.2	12.1	10.6	8.2	18.0	11.4	11.4	11.1				33.4	56A	37	18	1
9 866	8- 25	B21T	24.6	13.7	61.7	3.8	5.0	3.3	7.9	4.6	5.2	8.5				14.2	32A	14	16	2
9 867	25- 43	B22T	21.5	15.2	63.3	4.0	3.9	2.8	6.3	4.5	5.7	9.5				13.9	40A	--	37	3

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR-BON 6A1A	NITRO-GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	DI-CIT AL 6G7A	PYROP FE 6C5A	PYROP AL 6G5A	ATTERBERG LL 4F1	PL 4F2	PI 1/3 BAR 4A1F	BULK DENSITY 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		-PERCENT-		-PERCENT-		PERCENT				PCT.	NO.40	GRAMS PER CC				-PERCENT-			-PERCENT-	
9 865	0- 8	1.54	0.115			0.6	0.1			28	21	1.25			0.62			8.5		
9 866	8- 25	1.40	0.126			0.9	0.1						1.17	1.60	0.83		36.5	25.4	11.0	8.8
9 867	25- 43	0.69	0.075	1		0.8	0.1			77	33		1.19	1.66	0.77		38.2	27.6	11.7	8.6

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 6N2A	MG 6P2A	NA 6Q2A	K 6R4A	SUM 6H2A	EXT. ACI- DITY 6G1E	KCL EXT. AL 5A3A	C E C SUM 5A6A	C NH4- 5C1	BASE SATURATION SUM+ 8C1D	SUM+ NH4- 8C1A	PH NAF 8C1E	H2O	CA-
		MEQ/100G									PERCENT				
9 865	0- 8	0.2	1.5	1.7				1.7	13.9				5.9	5.4	
9 866	8- 25	0.4	3.4	3.8				3.8	35.9				6.8	6.6	
9 867	25- 43	0.6	3.9	4.5				4.5	39.4				7.5	7.3	

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY LESS THAN 0.002 MM X RAY DTA 7A2E I	7A2E II	7A2E III	7A2E IV	7A3	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
						-PERCENT-						
9 865	0- 8	MI 4	MT 2	KK 2							MI MICA	1 TRACE
9 866	8- 25	MI 3	MT 2	KK 2							MT MONTMORT	2 SMALL
9 867	25- 43	MI 4	MT 2	KK 2							KK KAOLINIT	3 MODERATE
												4 ABUNDANT
												5 DOMINANT
												6 INDETER.

SAMPLE PREPARATION CODES

LUZENA GRAVELLY LOAM

Location: Cochise County, Arizona. 1,980 feet west and 660 feet north of southeast corner of Sec. 13, T. 17 S., R. 28 E. East of State Highway 181, about 22 miles east and 3½ miles north of Pearce. Date of sampling: October 21, 1969.

Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.

Classification: Lithic Vertic Argiustoll, clayey, mixed, mesic.

Vegetation: Black grama, cane beardgrass, green sprangletop, and some [illegible]

Mean annual air temperature 57°F., January 41°F., July 74°F. Parent Material: Rhyolite. Topography: Moderately sloping convex hills. Slope, 7 percent, south facing. Elevation: 5050 feet. Drainage: Well drained. Runoff is medium to rapid. Permeability is slow. Soil Moisture: Dry when sampled.

Remarks: Field determinations of pH by Hellige-Truog indicator solution. This sample paired with S69Ariz-2-26.

HORIZON	DESCRIPTION
A1 RSL 69865	0 to 8 cm (0 to 3 inches), brown (10YR 5/3) gravelly loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium roots; common very fine and fine tubular pores; about 40 percent surface cover of subangular rhyolite gravel and cobbles, 25 percent of the cover is 1/4 to 2 inch gravel and 15 percent is 3 to 6 inch cobble; horizon contains about 25 percent by volume of 1/4 to 1 1/2 inch subangular rhyolite gravel and 10 percent by volume of 3 to 6 inch cobbles; noneffervescent; medium acid (pH 6.0); clear smooth boundary.
B21t RSL 69866	8 to 25 cm (3 to 10 inches), reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; moderate fine and medium subangular and angular blocky structure; very hard, friable, sticky, very plastic; common fine and medium roots; few fine tubular pores; common thin clay films on ped faces; about 10 percent by volume of 1/4 to 1 1/2 inch subangular rhyolite gravel; noneffervescent; neutral (pH 7.0); clear wavy boundary.
B22t RSL	25 to 43 cm (10 to 17 inches), reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate fine and medium [illegible]

CONSECUTIVE PEDON NUMBER C 69172 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES LUZENA SOIL NO. S69 ARIZ. 2-26 SAMPLE NO. 9 884-9 886 WILLCOX AREA

SOIL FAMILY: LITHIC VERTIC ARGIUSTOLL,CLAYEY,MIXED,MESIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE CARBO 3A1A.02	1A2A INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75		
9 884	0- 5	A1	65.6	21.2	13.2	7.8	15.8	11.5	19.0	11.5	11.3	9.9				33.8	38A 15	12	11
9 885	5- 20	B21T	19.7	14.3	66.0	3.9	3.4	2.3	6.1	4.0	5.9	8.4				13.5	6A --	2	4
9 886	20- 41	B22T	11.3	11.2	77.5	2.2	1.8	1.4	3.5	2.4	3.5	7.7				7.9	3A --	1	2

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR-BON 6A1A	NITRO-GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY EST. 1/3 BAR 4A1F	1/3 BAR 4A1F	ORY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		-PERCENT-		-PERCENT-		-------PERCENT-------				PCT.	NO.40	GRAMS PER CC				----PERCENT---			-PERCENT-	
9 884	0- 5	1.12	0.098									1.25		0.78				7.2		
9 885	5- 20	0.91	0.101							68	34		1.06	1.58	0.98		48.2	25.9	14.2	13.8
9 886	20- 41	0.60	0.081	1									1.02	1.55	0.99		54.3	32.7	15.0	14.7

--EXTRACTABLE BASES--- EXT. KCL --C.E.C-- BASE SATURATION ----PH----

SAMPLE NO.	DEPTH CM.	CA 5B4A 6N2E	MG 5B4A 6Q2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	ACI-DITY 6H2A	EXT. AL 6G1E	SUM 5A3A	NH4-OAC 5A6A	SUM+ ACI- DITY	SUM+ AL	NH4-OAC 5C1	NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
9 884	0- 5			0.1	1.3	1.4			1.4	12.7					6.3	5.7
9 885	5- 20			0.5	5.0	5.5			5.5	38.8					6.9	6.7
9 886	20- 41			0.7	5.8	6.5			6.5	44.5					7.4	7.3

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY ---LESS THAN 0.002 MM--- X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III
9 884	0- 5	MI 3	MT 2							
9 885	5- 20	MT 2	MI 2	KK 1						
9 886	20- 41									

CODE	RELATIVE AMOUNT
MI MICA	1 TRACE
MT MONTMORT	2 SMALL
KK KAOLINIT	3 MODERATE
	4 ABUNDANT
	5 DOMINANT
	6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

LUZENA VERY GRAVELLY LOAM
S69Ariz-2-26

Location: Cochise County, Arizona. 1,000 feet south and 2,000 feet east of the northwest corner of Sec. 13, T. 17 S., R. 28 E. East of State Highway 181, about 4 miles north and 22 miles east of Pearce. Date of sampling: October 23, 1969. Description by: D. Richmond, K. Dunstan. Collectors: D. Richmond, K. Dunstan. Classification: Lithic Vertic Argiustoll, clayey, mixed, mesic. Vegetation: Sideoats grama, hairy grama, cane beardgrass, yucca, pricklypear, and a few juniper. Use: Livestock range. Climate: Precipitation about 17 to 18 inches. Mean annual air temperature 57°F., January 41°F., July 74°F. Parent Material: Rhyolite. Topography: Moderately steep convex hills. Slope, 25 percent, southwest facing. Elevation: 5120 feet. Drainage: Well drained. Runoff is medium to rapid. Permeability is slow. Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by Hellige-Truog indicator solution. This sample paired with S69Ariz-2-22.

HORIZON	DESCRIPTION
A1 RSL 69884	0 to 5 cm (0 to 2 inches), dark brown (7.5YR 4/2) very gravelly loam, dark reddish brown (5YR 2/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and medium roots; common fine and medium tubular pores; surface cover of about 80 percent subangular rhyolite fragments of which approximately 50 percent is 1/2 to 5 cm gravel and 30 percent is 8 to 20 cm cobbles; noneffervescent; medium acid (pH 6.0); abrupt wavy boundary.
B21t RSL 69885	5 to 20 cm (2 to 8 inches), dark reddish gray (5YR 4/2) clay, dark brown (5YR 3/2) moist; moderate fine and medium angular and subangular blocky structure; very hard, firm, sticky, very plastic; many fine and medium roots; few very fine tubular pores; common thin clay films on faces of peds; common pressure faces; approximately 5 percent by volume 8.5 to 10 mm subangular rhyolite gravel; noneffervescent; neutral (pH 7.0); clear wavy boundary.
B22t RSL 69886	20 to 41 cm (8 to 16 inches), dark brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; moderate fine and medium angular and subangular blocky structure; very hard, firm, sticky, very plastic; many fine and medium roots; few very fine tubular pores; common thin clay films on faces of peds; common pressure faces; about 5 percent by volume of 5 to 10 mm subangular rhyolite gravel; noneffervescent; neutral (pH 7.0); abrupt irregular boundary.
R	41 to 51 cm (16 to 20 inches), light yellowish brown (10YR 6/4) and very dark gray (10YR 3/1) fractured rhyolite bedrock, dark brown (10YR 4/3) and black (10YR 2/1) moist; massive; extremely hard; few very fine roots in fractures; contain thin lime coating on faces in fractures; violently effervescent on fracture faces, rock is noneffervescent; slightly acid (pH 6.5).

CONSECUTIVE PEDON NUMBER C 69161 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES ELFRIDA TAXADJUNCT SOIL NO. S69 ARIZ. 2-15 SAMPLE NO. 9 843-9 846 WILLCOX AREA

SOIL FAMILY: TYPIC CALCIUSTOLL,FINE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE	INT. II 3A1A.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT.			
9 843	0- 33	AP	12.6	56.1	31.3	0.1	0.6	1.0	5.1	5.8	17.0	39.1				26.2	--A	--	--	--
9 844	33- 56	A12	20.5	51.1	28.4	0.4	1.1	1.9	8.3	8.8	17.7	33.4			4	31.9	--A	--	--	--
9 845	56- 83	C 1CA	28.3	50.8	20.9	1.1	2.5	3.0	10.6	11.1	19.3	31.5			6	37.2	--A	--	--	--
9 846	83-125	C 2CA	35.0	33.1	31.9	4.4	7.0	4.3	10.5	8.8	12.2	20.9			13	27.5	--G	--	--	--

SAMPLE NO.	DEPTH CM.	ORG. CARBON 6A1A	MATTER NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT--		-PERCENT-		PCT.	PCT.NO.40		GRAMS PER CC				-----PERCENT-----			-PERCENT--				
9 843	0- 33	0.92	0.097	2			35	22		1.37	1.56	1.00		25.8	14.4	4.4	4.4	7.6		7.7
9 844	33- 56	0.60	0.065	11						1.28	1.40	1.00		28.1	14.4	3.0	3.0	7.4		7.7
9 845	56- 83	0.37		22			33	23		1.28	1.33	1.00		28.7	12.2	1.3	1.3	7.5	8.7	7.7
9 846	83-125	0.36		39						1.54	1.59	1.00		21.9	17.3	1.1	1.1	7.6	8.7	7.8

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	CEC NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		-MEQ/100G					PCT.	-MEQ/100G		MMHO	MEQ/1000 ML								PPM	
9 843	0- 33			0.8	2.5	3.3			24.7											
9 844	33- 56			1.0	2.2	3.2			18.7											
9 845	56- 83			0.7	2.4	3.1			13.5	1.60	9.9	3.5	6.2	1.1		2.4	5.3	13.0		7.7
9 846	83-125			0.6	2.2	2.8			12.8	1.12	5.8	3.4	3.9	0.9		2.6	3.5			7.8

SAMPLE NO.	DEPTH CM.	WATER AT 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM-- X RAY DTA I 7A2E	II 7A2E	III 7A2E	IV 7A3 PCT.	-L.T. .0002 MM- X RAY 1 7A2E	II 7A2E	III 7A2E	MINERAL CODE
9 843	0- 33		0.8	3				MI 4	MT 2	KK 2					MI MICA
9 844	33- 56		1.0	5				MI 3	MT 1	KK 1					MT MONTMORT
9 845	56- 83	47.8	0.4	3	2										KK KAOLINIT
9 846	83-125	64.0	0.4	3	2										

RELATIVE AMOUNT
1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
G=GROUND WHOLE. HORIZON INDURATED OR GRAVEL TOO SOFT TO BE SEPARATED. ALL DATA FOR WHOLE SOIL.

ELFRIDA SILTY CLAY LOAM (taxadjunct) 1/
S69Ariz-2-15

Location: Cochise County, Arizona. 700 feet west and 600 feet south of northeast corner of Sec. 11, T. 16 S., R. 25 E. West of Kansas Settlement Road, about 9 miles west and 3½ miles south of Cochise.
Date of sampling: October 16, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Typic Calciustoll, fine-loamy, mixed, thermic.
Vegetation: Alfon cotton grass Hoss Intermixed weeds Clim

Precipitation about 11 to 12 inches. Mean annual air temperature 58°F., January 41°F., July 78°F. Parent Material: Alluvium from limestone, rhyolite and sedimentary rocks. Topography: Level to nearly level valley plain and alluvial fan. Slope, 0.2 percent, west facing. Elevation: 4220 feet. Drainage: Well drained. Runoff is medium to slow. Permeability is moderately slow. Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by thymol blue indicator in 1:5 dilution. This sample paired with S69Ariz-2-11.

HORIZON	DESCRIPTION
Ap RSL 69843	0 to 33 cm (0 to 13 inches), grayish brown (10YR 5/2) silty clay loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, sticky, plastic; few fine and coarse roots; few fine interstitial and tubular pores; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.
A12 RSL 69844	33 to 56 cm (13 to 22 inches), brown (10YR 5/3) silty clay loam, dark brown (7.5YR 3/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, sticky, plastic; few fine and coarse roots; few very fine and fine tubular pores; strongly effervescent; moderately alkaline (pH 8.2); abrupt boundary.
C1ca RSL 69845	56 to 83 cm (22 to 33 inches), pinkish gray (7.5YR 7/2) loam or heavy loam, brown (7.5YR 5/4) moist; massive; hard, friable, slightly sticky, slightly plastic; few fine and medium roots; common very fine and fine tubular pores; about 25 percent by volume of large irregularly shaped lime masses; violently effervescent; moderately alkaline (pH 8.2); abrupt wavy boundary.

CONSECUTIVE PEDON NUMBER C 68144 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES HATHAWAY SOIL NO. S68 ARIZ. 12-15 SAMPLE NO. 81035-81041 E.PIMA-SANTA CRU AREA

SOIL FAMILY: ARIDIC CALCIUSTOLL,LOAMY-SKELETAL,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE. CLASS AND PARTICLE DIAMETER (MM) 1B1B.3A1 1A2A

[redacted]

SAMPLE NO.	DEPTH CM.	HORZ.	SAND 2-.05	SILT .05-.002	CLAY LT .002	VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A	II .2-.02	PCT. OF WHOLE SOIL	I 75-20 PCT.	II 20-5 OF LT 75	III 5-2
			PERCENT OF LESS THAN 2MM																	
81035	0- 13	A11	67.6	15.6	16.8	18.8	13.6	11.0	17.4	6.8	6.9	8.7				22.2	69A	49	17	3
81036	13- 25	A12	57.8	20.6	21.6	11.8	11.1	9.7	17.6	7.6	8.1	12.5			3	24.7	53A	17	23	13
81037	25- 33	C 1CA	54.3	24.2	21.5	8.6	10.3	9.5	17.4	8.5	8.7	15.5			4	26.3	53A	16	23	14
81038	33- 51	C 2CA	60.5	22.2	17.3	12.7	12.7	10.0	17.5	7.6	6.9	15.3			3	22.9	56A	23	24	9
81039	51- 79	C 3CA	69.8	19.4	10.8	11.6	14.6	13.1	21.4	9.1	6.2	13.2			2	25.4	70A	38	24	8
81040	79- 99	C 4CA	75.4	16.0	8.6	16.4	18.2	14.1	20.5	6.2	6.3	9.7			1	21.5	77A	44	28	5
81041	99-1172	C 5CA	60.7	27.1	12.2	13.2	13.1	9.3	15.9	9.2	11.2	15.9			1	28.7	9A	--	7	2

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DITH FE 6C2B	CITRATE AL 6G7A	PYROPHOS FE 6C5A	EXT AL 6G5A	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY 1/3 BAR 4A1F	1/3 BAR 4A1F	OVEN DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		PERCENT		PERCENT		PERCENT				PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT	
81035	0- 13	1.64	0.163	7		0.6	0.1			34	23	1.06	1.13	0.52		23.9	9.1	2.2	1.1	
81036	13- 25	1.31	0.135	13		0.5	TR					1.13	1.19	0.68		20.9	10.4	1.7	1.2	
81037	25- 33	1.08	0.111	19		0.5	TR			34	24	1.09	1.15	0.68		25.1	10.4	1.8	1.2	
81038	33- 51	0.84	0.086	19		0.5	0.1					1.13	1.18	0.65		21.2	8.5	1.5	0.9	
81039	51- 79	0.45		18		0.4	TR			NP	NP	1.37	1.37	0.44		15.7	6.5			
81040	79- 99	0.23		16		0.4	0.2					2.00	2.00	0.28		5.6	5.9			
81041	99-117			13		0.5	TR			27	20	1.66	1.72	0.94		14.2	7.5	1.2	1.1	

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B3A	MG 5B3A	NA 5B4A	K 5B4A	SUM	EXT. ACIDITY 6H2A	KCL EXT. AL 6G1E	CEC SUM 5A3A	CEC NH4-OAC 5A6A	BASE SATURATION SUM+ ACIDITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	PH H2O 1/1 8C1A	PH CACL2 8C1E
		6N4B	6Q4B	6P2A	6Q2A											
		MEQ/100G									PERCENT					
81035	0- 13	38.9	0.9	0.1	0.5	40.4			40.4	19.2	100+		100+		7.8	7.3
81036	13- 25	40.4	0.6	0.1	0.3	41.4			41.4	19.6	100+		100+		8.0	7.4
81037	25- 33	32.6	0.5	0.1	0.3	33.5			33.5	18.2	100+		100+		8.0	7.5
81038	33- 51	28.1	0.5	0.1	0.2	28.9			28.9	15.0	100+		100+		8.0	7.5
81039	51- 79	29.9	2.2	0.1	0.1	32.3			32.3	10.9	100+		100+		8.1	7.5
81040	79- 99	25.2	1.8	0.1	0.1	27.2			27.2	10.3	100+		100+		8.2	7.5
81041	99-117	28.3	2.2	0.2	0.2	30.9			30.9	17.4	100+		100+		8.2	7.5

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3	L.T. 0.0002 MM MINERAL X RAY 7A3	7A2E I	7A2E II	7A2E III	CODE	RELATIVE AMOUNT
		PERCENT										

Santa Cruz County Area

HATHAWAY GRAVELLY SANDY LOAM

S68 Ariz-12-15-1 through 7

Location: Santa Cruz County, Arizona, 4½ miles northwest of Sonoita, 660 feet north of Gardner Canyon Road and 2.8 miles west of State Highway 83. Approximately 1500 feet south and 400 feet east of NW corner Section 3, T20S, R16E, 75 feet up from base of slope. Photo 13-73. Date of Sampling: October 11, 1968.
Description by: Havens, James and Clemmons. Collectors: Nettleton and Brasher.
Classification: Aridic Calciustoll, loamy-skeletal, mixed, thermic.
Vegetation: Grass-minor brush. Brush: Guajillo, mimosa, century plant. Grass: Sideoats grama, purple grama, black grama, wolftail, three-awn. Climate: Mean annual temperature 62°F. Mean annual precipitation 16 to 17 inches.
Parent Material: Mixed alluvium from andesite, rhyolite, tuffs, quartzite and limestone. Topography: Deeply dissected old alluvial fans. 50 percent slope. South aspect. Elevation: 4600 feet. Drainage: Well drained. Soil Moisture: Slightly moist.

HORIZON	DESCRIPTION
	(0-13 cm)
A11	0 to 5 inches, brown (7.5YR 5/2) gravelly sandy loam, dark
RSL	brown (7.5YR 3/2) moist; moderate medium granular structure;
681035	slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; many fine interstitial pores; 35 percent gravel; strongly effervescent; mildly alkaline (pH 7.8); clear wavy boundary.
A12	5 to 10 inches, brown (7.5YR 5/2) gravelly loam, dark brown
RSL	(7.5YR 3/2) moist; moderate medium granular structure; slightly
681036	hard, very friable, slightly sticky and slightly plastic;
(13-25 cm)	common very fine, fine and medium roots; few fine and medium tubular pores; 25 percent gravel; violently effervescent; moderately alkaline; clear wavy boundary.
C1ca	10 to 13 inches, grayish brown (10YR 5/2) very gravelly loam,
RSL	with common medium and large distinct light gray (10YR 7/2)
681037	lime segregations, very dark grayish brown (10YR 3/2) moist;
(25-33 cm)	moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine and medium roots; few fine and medium tubular pores; violently

CONSECUTIVE PEDON NUMBER C 69207 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES HATHAWAY SOIL NO. S69 ARIZ. 2- 1 SAMPLE NO. 91101-91107 WALNUT G.-TUCSON AREA

SOIL FAMILY: ARIDIC CALCIUSTOLL,LOAMY-SKELETAL,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	SILTS CO. 2-.2U	CLAYS FINE LT .2U	CLAYS CARBONATE 3A1A	1A2A INT. COARSE II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE 20	I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM													SOIL	PCT. OF LT 75			
91101	0- 3	A11	70.8	17.4	11.8	10.5	15.1	12.9	21.9	10.4	10.1	7.3			1	31.9	79A	5	59	15
91102	3- 25	A12	67.7	16.0	16.3	21.0	14.9	10.6	15.3	5.9	7.3	8.7			4	20.9	68A	7	38	23
91103	25- 51	C 1CA	56.9	20.7	22.4	26.7	11.8	5.7	8.5	4.2	6.6	14.1			10	15.1	91A	28	37	26
91104	51- 76	C 2CA	56.7	27.2	16.1	21.5	14.2	7.1	9.3	4.6	15.8	11.4			6	24.9	65A	6	41	18
91105	76-102	C 3CA	68.8	15.7	15.5	30.5	16.6	8.0	9.0	4.7	6.0	9.7			3	15.2	75A	8	50	17
91106	102-119	C 4CA	54.6	23.7	21.7	17.0	13.4	7.5	11.1	5.6	8.9	14.8			6	20.3	75A	42	25	8
91107	103-137	2B2tcab	84.4	2.6	13.0	48.4	28.6	4.7	2.3	0.4	0.8	1.8				2.0	51A	--	5	46

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	19-2 6E1B	EXT. IRON FE 6C2B	ATTERBERG L L 4F1	P L 4F2	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
		-PERCENT--		-PERCENT-		PCT.	PCT.NO.40		GRAMS PER CC				----PERCENT---			-PERCENT--				
91101	0- 3	0.65	0.066	9		0.7				1.27	1.35	0.37		18.6	5.2	2.1	0.7	7.6		7.7
91102	3- 25	1.12	0.129	14		0.5			1.25			0.50			8.4			7.6		7.7
91103	25- 51	0.97	0.072	27		0.4				1.20	1.27	0.18		25.1	10.5	1.9	0.3	7.4	8.4	7.6
91104	51- 76	0.49		25		0.3				1.38	1.38	0.50		20.2	6.8			7.4	8.3	7.7
91105	76-102	0.32		11		0.4			1.38			0.38			7.6			7.4	8.4	7.7
91106	102-119			25		0.3			1.38			0.39			9.5			7.4	8.5	7.8
91107	103-137			1		0.6				1.41	1.55	0.65		15.7	8.1	3.2	2.0	7.5		7.8

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA+ OAC 5A2A	NH4+ OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE CA	MG	NA	K	CO3	HCO3	CL	8A1 SO4	B	PH SAT. PASTE 8C1B
		--------MEQ/100G--------					PCT.	-MEQ/100G		MMHO	----------MEQ/1000 ML----------								PPM	
91101	0- 3			0.2	0.6	0.8			10.7											
91103	25- 51			0.2	0.2	0.4			12.4	1.98	24.7	2.1	2.1	0.2		2.3	0.7	27.7		7.5
91104	51- 76			0.3	0.2	0.5			9.6	2.28	29.3	2.9	1.6	0.2		1.7	1.1	33.6		7.5
91105	76-102			0.6	0.3	0.9			11.4	2.44	25.3	5.3	3.0	0.2		2.5	4.4	28.6		7.5
91106	102-119			0.7	0.3	1.0			11.6	1.64	13.3	4.4	4.7	0.2		2.2	3.6	17.2		7.6
91107	103-137			0.7	0.4	1.1			14.9											

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE AT SAT. 8A PCT.	NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. 6F1B PCT.	REQ. 6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY I 7A2E	II 7A2E	III 7A2E	DTA IV 7A3	PCT.	-L.T. .0002 MM- X RAY I 7A2E	II 7A2E	III 7A2E	MINERAL CODE	RELATIVE AMOUNT
91101	0- 3		0.2	2				MT 4 MI 2 KK 1								MT MONTMORT	1 TRACE
91102	3- 25		0.2	1				MT 3								MI MICA	2 SMALL
91103	25- 51	41.9	0.1	1	1	0.1		MT 3								KK KAOLINIT	3 MODERATE
91104	51- 76	36.3	0.2	3	TR	0.2											4 ABUNDANT
91105	76-102	34.8	0.5	4	1	0.1		MT 3 MI 1									5 DOMINANT
91106	102-119	43.7	0.5	4	2												6 INDETER.
91107	103-137		0.7	5													

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

HATHAWAY GRAVELLY SANDY LOAM
S69Ariz-2-1

Location: Cochise County, Arizona. 2,640 feet east and 500 feet north of southwest corner of Sec. 32, T. 19 S., R. 23 E., south side of road. About 5-1/2 miles NE of Tombstone along Bennett Ranch Road. Date of sampling: September 25, 1969.
Description by: Y. H. Havens and D. M. Hendricks. Collectors: Y. H. Havens and D. M. Hendricks.
Classification: Aridic Calciustoll, loamy-skeletal, mixed, thermic.
Vegetation: Whitethorn, tarbush, Mormon tea, guayule, yucca, fairy duster, desert zinnia, fluffgrass, snakeweed, croton, and black grama. Climate: Mean annual temperature approximately 63° F. Mean annual precipitation approximately 14 inches. Parent material: Mixed alluvium--dominantly limestone with some andesite, rhyolite and quartzite. Topography: Moderately sloping, 5 to 7 percent slope. Elevation: Approximately 4,625 feet. Drainage: Well drained. Soil moisture: Dry.

HORIZON	DESCRIPTION
A11 RSL No. 691101	0-3 cm (0-1 inch), grayish brown (10YR 5/2) gravelly sandy loam, dark brown (10YR 3/3) moist; weak thick platy structure; slightly hard, very friable, nonsticky, slightly plastic; common fine and very fine roots; many very fine and fine vesicular, and few very fine tubular pores; 40 percent gravel; few cobbles; strongly effervescent; moderately alkaline (pH 8.1); abrupt smooth boundary.
A12 RSL No. 691102	3-25 cm (1-10 inches), grayish brown (10YR 5/2) gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine and medium granular structure; slightly hard, friable, slightly sticky, slightly plastic; many very fine and fine, and few medium and coarse roots; common fine interstitial and few fine tubular pores; 30 to 40 percent gravel; strongly to violently effervescent; moderately alkaline (pH 8.2); clear smooth boundary.
C1ca RSL No. 691103	25-51 cm (10-20 inches), pale brown (10YR 6/3) gravelly loam, brown (10YR 5/3) moist; massive; hard, friable, slightly sticky, slightly plastic; common very fine and fine, and few medium and coarse roots; common fine interstitial pores; 25 to 30 percent gravel and few cobbles; many fine and large distinct white (N/8) and light gray (7/2) lime segregations and masses; violently effervescent; moderately alkaline (pH 8.1); gradual wavy boundary.
C2ca RSL No. 691104	51-76 cm (20-30 inches), white (10YR 8/2) and light gray (7/2) very gravelly loam, very pale brown (10YR 7/3) and brown (5/3) moist; massive; slightly hard to hard, friable, slightly sticky, slightly plastic; common fine and very fine roots; common fine interstitial pores; 60 percent gravel, few cobbles; violently effervescent; moderately alkaline (pH 8.2); gradual irregular boundary.
C3ca RSL No. 691105	76-102 cm (30-40 inches), white (10YR 8/2) and light gray (7/2) very gravelly loam, very pale brown (10YR 7/3) and brown (5/3) moist; this horizon has pockets and discontinuous layers of light reddish brown (5YR 6/4) gravelly sandy clay loam soil material which is slightly effervescent, reddish brown (5YR 4/4) moist; massive; hard, friable, slightly sticky, slightly plastic; common fine and very fine roots; common fine interstitial pores; 50 to 60 percent gravel and cobble; violently effervescent; moderately alkaline (pH 8.2); gradual irregular boundary.
C4ca RSL No. 691106	102-119 cm (40-47 inches), white (10YR 8/2) and light gray (7/2) very cobbly loam or very cobbly heavy sandy loam, light gray (10YR 7/2) and brown (5/3) moist, with tongues of light reddish brown (5YR 6/4) gravelly sandy clay loam soil material in tongues, yellowish red (5YR 4/6) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; few fine and very fine roots; common fine interstitial pores; 70 percent coarse fragments; violently effervescent;

CONSECUTIVE PEDON NUMBER C 69165 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES COGSWELL TAXADJUNCT SOIL NO. S69 ARIZ. 2-19 SAMPLE NO. 9 855-9 857 WILLCOX AREA

SOIL FAMILY: ARIDIC CALCIUSTOLL,FINE-LOAMY,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2- .2U	FINE LT .2U	CARBONATE 3A1A.02	1A2A INT. II	COARSE FRAGMENTS PCT. OF WHOLE SOIL 75- 20	I 20-5	II 5-2	III PCT. OF LT 75
			PERCENT OF LESS THAN 2MM																	
9 855	0- 25	AP	35.5	33.2	31.3	2.7	6.9	6.7	11.7	7.5	14.2	19.0				28.0	--A	--	--	--
9 856	25- 51	A12	28.2	32.0	39.8	2.1	5.3	5.1	8.9	6.8	13.5	18.5			5	25.0	--A	--	--	--
9 857	51- 76	A13	33.2	30.5	36.3	3.4	5.6	5.1	11.7	7.4	13.8	16.7			6	27.9	--A	--	--	--

[redacted]

SAMPLE NO.	DEPTH CM.	CARBON 6A1A -PERCENT-	NITROGEN 6B1A -PERCENT-	AS CACO3 LT 2 6E1B	AS CACO3 2-20 6E1B	DI-CIT EXT FE 6C2B	DI-CIT EXT AL 6G7A	PYROP EXT FE 6C5A	PYROP EXT AL 6G5A	LIMIT LL 4F1	LIMIT PL 4F2	EST. 1/3 BAR 4A1F	DRY 1/3 BAR 4A1F	DRY 15 BAR 4A1H	3B2	1/10 BAR 4B1C -PERCENT-	1/3 BAR 4B1C	15 BAR 4B2	LEF 4D1 -PERCENT-	LE 4D1
						PERCENT				PCT.	NO.40	GRAMS PER CC								
9 855	0- 25	0.94	0.062	4									1.00					12.2		
9 856	25- 51	0.46	0.065	27									1.00					15.6		
9 857	51- 76	0.41	0.035	14									1.00					15.9		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 584A 6N2E	MG 584A 6D2D	NA 584A 6P2A	K 584A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL	C E C SUM 5A3A	C E C NH4-OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	PH H2O 1/1 8C1A	PH CA-CL2 8C1E
		MEQ/100G									PERCENT					
9 855	0- 25			0.6	2.6	3.2			3.2	20.8					7.8	7.6
9 856	25- 51			1.5	1.6	3.1			3.1	21.9					8.0	8.0
9 857	51- 76			2.1	1.3	3.4			3.4	19.9					8.2	8.2

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY <0.002 MM X RAY 7A2E I	X RAY 7A2E II	X RAY 7A2E III	X RAY 7A2E IV	DTA 7A3 -PERCENT-	DTA 7A3	L.T. 0.0002 MM X RAY 7A2E I	X RAY 7A2E II	X RAY 7A2E III	MINERAL CODE	RELATIVE AMOUNT
9 855	0- 25											1 TRACE
9 856	25- 51										MT MONTMORT	2 SMALL
9 857	51- 76	MT 3	MI 3	KK 1							MI MICA	3 MODERATE
											KK KAOLINIT	4 ABUNDANT
												5 DOMINANT

COGSWELL CLAY LOAM (taxadjunct) 1/
S69Ariz-2-19

Location: Cochise County, Arizona. 500 feet south and 350 feet east of northwest corner of Sec. 4, T. 13 S., R. 24 E. South of Ft. Grant Road, about 4 miles west and 6 miles north of Willcox. Date of sampling: October 17, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Aridic **Calciustoll**, fine-loamy, mixed, thermic.
Vegetation: Cropland, after cotton. Use: Irrigated cropland. Climate: Precipitation about 11 to 12 inches. Mean annual air temperature 58°F., January 41°F., July 78°F. Parent Material: Alluvium from acid and basic igneous rocks with some sedimentary rocks. Topography: Level to nearly level swales, valley plains and old lake margins. Slope, 0.2 percent, southwest facing. Elevation: 4227 feet. Drainage: Well drained. Runoff is slow. Permeability is slow. Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by thymol blue indicator in 1:5 dilution. This sample paired with S69Ariz-2-27. The Ap, A12 and A13 horizons sampled primarily for textural analysis and organic matter. The A13 horizon was also checked for mineralogy.

HORIZON	DESCRIPTION
Ap RSL 69855	0 to 25 cm (0 to 10 inches), brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium and fine granular and subangular blocky structure; hard, friable, slightly sticky, plastic; many fine and medium roots; common fine and medium tubular pores; strongly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
A12 RSL 69856	25 to 51 cm (10 to 20 inches), brown (10YR 5/3) clay, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky, plastic; many fine and medium roots; few very fine and fine tubular pores; many pressure faces; strongly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.
A13 RSL 69857	51 to 76 cm (20 to 30 inches), brown (10YR 5/3) clay, dark brown (10YR 3/3) moist; weak medium subangular and angular blocky structure; very hard, firm, sticky, plastic; few fine and medium roots; few very fine and fine tubular pores; many pressure faces; strongly effervescent; moderately alkaline (pH 8.0); gradual smooth boundary.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Lithic Calciustoll, loamy, mixed, mesic
SOIL Rudd gravelly loam (taxadjunct) SOIL Nos. S65Ariz-1-6 LOCATION Apache County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65652 - 65656

Depth (in.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt (0.05–0.002)	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	1/ Coarse fragments >2	1A2a 2–19	1A2a 19–76
		Pct. of < 2 mm														Pct	Pct of < 76mm	
0- 2	A11	43.4	37.1	19.5	6.9	7.1	5.9	13.3	10.2	19.6	17.5	36.9	33.2	2	18	20		2/
2-10	A12	29.0	37.8	33.2	2.6	3.4	4.0	10.9	8.1	14.8	23.0	28.8	20.9	10	23	20		2/
10-13	C1	32.9	34.4	32.7	4.1	5.8	5.1	10.6	7.3	12.2	22.2	25.5	25.6	13	20	54	8	44 3/
13-24+	R																	4/
Rock from C1																		4/

Depth (in.)	6A1a Organic carbon	6B1a Nitrogen	6B1a C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$	Bulk density 4A1f 1/3 bar	Bulk density 4A1h Oven dry	Water content 4B1c 1/3 bar	Water content 4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH 8C1a H_2O 1:1
	Pct	Pct.		Pct.	Pct.	g/cc	g/cc	Pct.	Pct	in./in.	in./in.	
0- 2	2.02	0.173	12		11				12.3			8.1
2-10	2.74	0.262	10		26				19.6			8.0
10-13	2.90				40				19.2			8.0
13-24+					4							
Rock from C1					41	2.23	2.24		7.7			

Depth (in.)	Extractable bases 5B1a 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity 5A1a NH_4OAc	Cation Exch. Capacity 5A3a Sum	6G1d KCl Ext. Al^{+++}	Base saturation 5C1 NH_4OAc
	meq/100 g									Pct
0- 2	35.3	2.1	0.3	1.7	39.4		24.3			100+
2-10	40.9	2.1	0.3	0.7	44.0		30.1			100+
10-13	33.7	2.7	0.4	0.4	37.2		25.0			100+
13-24+										

Depth (in.)	Clay mineralogy (<0.002 mm) 7A Mont.	Verm.	Mica	Kaolin
	X-ray			
0- 2				
2-10				
10-13	xx			t
13-24+				

1/ From characterization sample (5 kg) except as noted.
2/ 2-19 and 19-76 mm not separated.
3/ 2-19 mm from characterization sample, 19-76 mm from field volume estimate. >2 mm includes volume estimate of >76 mm.
4/ >2 mm not determined. Characterization sample ground whole.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

RUDD GRAVELLY LOAM (taxadjunct) 1/

S65Ariz-1-6

Location: Apache County, Arizona. A pit located in the NE¼ of the SE¼ of the NE¼ of Sec. 13, T. 9 N., R. 28 E., 150 feet north and 30 feet west of gate from Highway 60. Photo No. 4643. Approximately 3½ miles northwest of Springerville. Date of Sampling: September 21, 1965.

Collectors: M.L. Miller, J.E. Jay, R.E. Nelson and B. Brasher.

Vegetation: Never cultivated. Grass aspect. Basal density of 35 percent. Blue grama, ring muhly, needle-and-thread, wolftail, native annuals. Climate: 12 inches ppt. 48° approximate M.A.T. Parent Material: Basalt flow of Quaternary age. Relief: Gently sloping plain, convex-complex 1 percent slope with south aspect at pit site. Elevation: 6975 feet. Drainage: Runoff is medium. Soil is well drained. Ground water is very deep. Permeability is moderate.

Remarks: Determination of pH was made with a Hellige-Truog field kit. Depth to R horizon ranges from 9 to 20 inches. Measure of free carbonate obtained by observing reaction to dilute HCl. This soil is mapped in a complex of Apache gravelly loam and very stony loam, 0 to 8 percent slopes (approximately 60 percent gravelly loam and 40 percent very stony loam, with some basalt rock outcrop in the very stony loam).

Classification: Lithic Calciustoll, loamy, mixed, mesic.

HORIZON	DESCRIPTION
A11 RSL No. 65652	0 to 2 inches, grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) when moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; abundant fine and few medium roots; many fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.
A12 RSL No. 65653	2 to 10 inches, grayish brown (10YR 5/2) or dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) when moist; weak to moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Lithic Calciustoll, loamy, mixed, mesic

SOIL Rudd gravelly loam (taxadiunct) SOIL Nos. S65Ariz-1-20 LOCATION Apache County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65645 - 65650

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Size class and particle diameter (mm) 3A1 Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Silt: Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	1/ Coarse fragments 1A2a: > 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0- 2	A11	57.0	26.5	16.5	6.8	17.5	11.8	13.7	7.2	14.0	12.5	28.0	49.8	0	17	47	12	21
2-10	A12	41.1	29.1	29.8	3.1	9.1	8.4	12.5	8.0	12.1	17.0	26.8	33.1	9	21	47	12	21
10-13	C	44.2	27.4	28.4	6.6	11.7	9.2	11.2	6.5	10.9	16.5	23.2	37.7	14	1	27		
13-24+	R																	
3/4 - 3"	rock from A12																	
3/4 - 3"	rock from C1																	

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$	Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry	Bulk density:	3B2	Water content:	Water content: 4B1c 1/3 bar	Water content: 4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH: 8C1a H_2O 1:1	pH	
	Pct.	Pct.		Pct.	Pct	g/cc	g/cc	g/cc	Cm	Pct	Pct.	Pct	in./in.	in./in.			
0- 2	1.47	0.125	12		7							9.3			8.0		
2-10	2.09	0.224	9		22	1.13	1.19		0.73		26.3	16.1	0.019	0.014	8.0		
10-13	2.43				40							16.0			8.0		
13-24+ Rock from A12					7 12												

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	Cation Exch. Capacity: 5A3a Sum	6G1d KCl Ext. Al^{+++}	Base saturation 5C1 NH_4OAc	
	meq/100 g									Pct	Pct.
0- 2	26.1	2.3	0.3	0.9	29.6		19.4			100+	
2-10	33.2	2.3	0.3	0.7	36.5		23.8			100+	
10-13	24.8	1.9	0.3	0.4	27.4		19.1			100+	
13-24+											

Depth (In.)	Clay mineralogy 6/ (<0.002 mm) 7A1: Mont.	Verm.	Mica	Kaolin
	X-ray			
0- 2				
2-10	xxx			t
10-13	xx			-
13-24+				

1/ From characterization sample (5 kg) except as noted.
2/ Estimated to be the same as A12 horizon.
3/ 2-19 mm from characterization sample, 19-76 mm from field weights. >2 mm includes volume estimate of >76 mm.
4/ 2-19 and 19-76 mm not separated.
5/ >2 mm not determined. Characterization sample ground whole.
6/ After dithionite-citrate treatment.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

RUDD GRAVELLY LOAM (taxadjunct) 1/
S65Ariz-1-20

Location: Apache County, Arizona. A pit located 1848 feet north and 396 feet east of the center of Section 11, T. 9 N., R. 28 E. Approximately 5½ miles northwest of Springerville, on Photo No. 4643. Date of Sampling: September 21, 1965.
Collectors: M.L. Miller, J.E. Jay, R.E. Nelson and B. Brasher.
Vegetation: Never cultivated. Grass with a basal density of 37 percent. Blue grama, ring muhly, needle-and-thread, wolftail, native annuals. Climate: 12 inches ppt. 48°F. approximate M.A.T. Parent Material: Basalt flow of Quaternary age. Relief: Gently sloping plain, convex-complex 1 percent slope with northwest aspect at pit site. Elevation: 6750 feet. Drainage: Runoff is medium. Soil is well drained. Ground water is very deep. Permeability is moderate.
Remarks: Determination of pH was made with a Hellige-Truog field kit. Measure of free carbonate was obtained by observing reaction to dilute HCl. Depth to R horizon ranges from 9 to 20 inches. This soil is mapped in a complex of Apache gravelly loam and very stony loam, 0 to 8 percent slopes (approximately 60 percent gravelly loam and 40 percent very stony

loam, with some basalt rock outcrop in the very stony loam).
Classification: Lithic Calciustoll, loamy, mixed, mesic.

HORIZON	DESCRIPTION
A11 RSL No. 65645	0 to 2 inches, grayish brown (10YR 5/2) gravelly loam, dark brown (7.5YR 3/2) when moist; weak fine granular structure; weakly coherent, very friable, slightly sticky and slightly plastic; abundant fine and medium roots; many fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.
A12 RSL No. 65646	2 to 10 inches, dark grayish brown (10YR 4/2) loam, dark brown (7.5YR 3/2) when moist; weak and moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and plastic; abundant fine and medium roots; few fine tubular and many fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.2); clear wavy boundary.
C* RSL No. 65647	10 to 13 inches, grayish brown (10YR 5/2) gravelly loam with a few cobbles, dark brown (10YR 3/3) when moist; massive; slightly hard, very friable, slightly sticky and plastic; abundant fine and medium roots; many fine interstitial pores; violently effervescent; moderately alkaline (pH 8.2); abrupt wavy boundary.
R** RSL No. 65648	13 to 24 inches +, dark gray (N4/) basalt bedrock, black (N2/) when moist, with white (N8/) lime coatings on rock surfaces and in pockets on rock fractures, pinkish gray (7.5YR 7/2) when moist; massive; extremely hard, extremely firm, plentiful fine roots on interfaces; violently effervescent outside, noneffervescent inside; moderately alkaline (pH 8.2).

1/ The Rudd series is in a loamy-skeletal, mixed, mesic family of Lithic Calciustolls. This pedon has somewhat fewer coarse fragments.

* Variations in thickness of C from 1 inch to 6 inches.

** Lime coating on all rock surfaces, along fracture planes, some lime drips on underside of coarse fragments.

CONSECUTIVE PEDON NUMBER C 69157 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES ELFRIDA TAXADJUNCT SOIL NO. S69 ARIZ. 2-11 SAMPLE NO. 9 816-9 823 WILLCOX AREA

SOIL FAMILY: PACHIC CALCIUSTOLL,COARSE-LOAMY,CARBON.,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 TOTAL FRACTION SANDS SAND 2-.05	SILT .05-.002	CLAY LT .002	VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A	1A2A INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM															PCT. OF LT 75		
9 816	0- 5	A11	29.1	52.1	18.8	1.9	5.6	3.3	10.3	8.0	18.5	33.6			3	32.9	--A	--	--	--
9 817	5- 28	A12	21.1	50.2	28.7	1.0	2.6	2.3	8.7	6.5	16.2	34.0			10	28.4	--A	--	--	--
9 818	28- 51	A13	19.6	43.6	36.8	1.2	2.2	1.8	8.6	5.8	13.7	29.9			16	25.2	--A	--	--	--
9 819	51- 71	A14	21.5	42.9	35.6	1.7	2.8	2.2	8.8	6.0	14.2	28.7			18	25.9	--A	--	--	--
9 820	71- 94	A15CA	35.5	35.4	29.1	1.1	2.7	2.6	19.4	9.7	12.0	23.4			17	34.5	--A	--	--	--
9 821	94-120	C 1CA	43.9	38.4	17.7	1.7	2.0	1.6	22.8	15.8	13.9	24.5			9	48.6	--A	--	--	--
9 822	120-160	2C 2	8.7	55.6	35.7	0.4	1.1	0.7	3.5	3.0	17.4	38.2			5	23.1	--A	--	--	--
9 823	0- 25	A1															--A	--	--	--

SAMPLE NO.	DEPTH CM.	ORG. MATTER CARBON 6A1A -PERCENT--	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	19-2 6E1B	EXT. IRON FE 6C2B PCT.	ATTERBERG LIMIT LL 4F1 PCT.	PL 4F2 NO.40	BULK DENSITY EST 1/3 BAR 4A1F GRAMS	1/3 BAR 4A1F PER CC	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C -----PERCENT----	15 BAR 4B2	EXTENSBLTY LEF 4D1 -PERCENT--	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
9 816	0- 5	1.36	0.137	17		0.2	33	28		1.13	1.20	1.00		24.4	13.8	2.0	2.0	7.8	8.9	7.8
9 817	5- 28	1.20	0.129	28		0.2				1.13	1.21	1.00		32.9	15.7	2.3	2.3	7.7	8.8	7.8
9 818	28- 51	1.19		38		0.1				1.18	1.30	1.00		31.6	16.1	3.3	3.3	7.8	8.9	8.0
9 819	51- 71	0.98		45		0.1	45	25		1.28	1.39	1.00		29.4	16.2	2.8	2.8	7.9	9.0	9.3
9 820	71- 94	0.53		42		0.1	35	20		1.30	1.37	1.00		18.8	11.2	1.8	1.8	8.0	8.9	8.4
9 821	94-120			33		0.1				1.58	1.66	1.00		12.5	5.8	1.7	1.7	7.8	9.0	8.3
9 822	120-160			18		0.3				1.35	1.68	1.00		30.7	14.8	7.6	7.6	7.9	8.9	8.2
9 823	0- 25			25		0.2			1.13			1.00			15.1			7.8		7.7

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A	MG 5B4A	NA 5B4A	K 5B4A	SUM	BASE SAT.	C E C NA+ OAC	NH4+ OAC	WATER EXTRACT FROM SATURATED PASTE EC	CA	MG	NA	K	CO3	HCO3	CL	SO4	B	PH SAT. PASTE
9 816	0- 5																			
9 817	5- 28																			
9 818	28- 51																			
9 819	51- 71																			
9 820	71- 94																			
9 821	94-120																			
9 822	120-160																			
9 823	0- 25																			

SAMPLE NO.	DEPTH CM.	MEQ/100G CA	MG	NA	PCT. K	MEQ/100G SUM	MMHO BASE SAT.	MEQ/1000 ML NA+ OAC	NH4+ OAC	EC	CA	MG	NA	K	PPM B	PH SAT. PASTE
9 816	0- 5	0.3	2.7	3.0		20.6	0.82	5.3	1.3	1.1	1.4	6.1	1.3			7.8
9 817	5- 28	0.3	2.0	2.3		19.1	0.86	4.3	1.8	1.9	1.0	4.3	1.3	1.5		7.6
9 818	28- 51	3.0	1.7	4.7		15.4	3.85	6.7	7.6	22.7	1.9	4.0	19.3	20.0		7.8
9 819	51- 71	6.2	1.4	7.6		13.4	10.3	13.4	69.8	64.0	2.0	2.8	48.4	91.5		8.0
9 820	71- 94	6.2	0.9	7.1		8.7	14.5	26.7	107.5	84.6	2.3	1.2	81.4	138.8		7.9
9 821	94-120	3.4	0.4	3.8		6.5	10.7	26.8	75.1	64.0	1.2	1.6	46.2	115.4		7.9
9 822	120-160	6.9	1.0	7.9		20.8	0.96	6.7	1.8	1.0	1.2	3.9	3.8			7.1
9 823	0- 25	0.2	2.3	2.5		20.1										

SAMPLE NO.	DEPTH CM.	WATER EXCHANGBLE CA 6N1A	MG 6N1A	NA 6N1A	K 6N1A	GYPSUM 6G1A	CLAY MINERALOGY
9 816	0- 5						
9 817	5- 28						
9 818	28- 51						
9 819	51- 71						
9 820	71- 94						
9 821	94-120						
9 822	120-160						
9 823	0- 25						

ELFRIDA LOAM (taxadjunct) 1/
S69Ariz-2-11

Location: Cochise County, Arizona. 950 feet north and 2,350 feet west of the southeast corner of Sec. 10, T. 16 S., R. 24 E. East of U. S. Highway 666, about 4½ miles north and 2 miles east of Cochise. Date of sampling: October 16, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Pachic Calciustoll, coarse-loamy, carbonatic, thermic.
Vegetation: Tobosa, fluffgrass, burrograss, scattered alkali sacaton and mesquite. Use: Live-

and limestone. Topography: Level and nearly level alluvial fan near old lake margins. Slope, 0.2 percent, east facing. Elevation: 4135 feet. Drainage: Well drained. Runoff is medium to slow. Permeability is moderately slow. Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by thymol blue indicator in 1:5 dilution. This sample

CONSECUTIVE PEDON NUMBER C 69173 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES COGSWELL SOIL NO. S69 ARIZ. 2-27 SAMPLE NO. 9 887-9 888 WILLCOX AREA

SOIL FAMILY: PACHIC CALCIUSTOLL,FINE,MIXED,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL SAND 2-.05	FRACTION SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.20	FINE LT .20	CARBONATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS I PCT. OF WHOLE 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														SOIL	PCT. OF LT 75	
9 887	25- 51	A12	12.3	40.4	47.3	1.5	2.7	1.0	3.3	3.8	12.0	28.4			3	18.0	--A	--	--	--
9 888	51- 76	A13	11.0	40.1	48.9	0.8	2.1	1.2	2.9	4.0	11.1	29.0			3	17.0	--A	--	--	--

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG LL 4F1	PL 4F2	MOIST 1/3 BAR 4A1F	TEST. 1/3 BAR 4A1H	BULK DENSITY DRY 382	CM	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		-PERCENT-		-PERCENT-		PERCENT				PCT.NO.40				GRAMS PER CC		PERCENT			-PERCENT-	
9 887	25- 51	0.77	0.069	8										1.00				18.8		
9 888	51- 76	0.71		9										1.00				21.0		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4-OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
9 887	25- 51			1.0	2.0	3.0			3.0	27.0					8.0	7.8
9 888	51- 76			2.2	1.9	4.1			4.1	28.0					8.3	8.0

SAMPLE NO	DEPTH CM.	CLAY MINERALOGY <.002 MM X RAY I 7A2E	II 7A2E	III 7A2E	IV 7A2E	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM MINERAL X RAY I 7A2E	II 7A2E	III 7A2E	CODE
9 887	25- 51										
9 888	51- 76										

RELATIVE AMOUNT

1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.

COGSWELL CLAY
S69Ariz-2-27

Location: Cochise County, Arizona. 1,500 feet south and 250 feet west of the northeast corner of Sec. 7, T. 17 S., R. 25 E. Northwest of State Highway 181, about 6 miles north and 21 miles east of Pearce. Date of sampling: October 23, 1969. Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Pachic Calciustoll, fine, mixed, thermic.
Vegetation: Cropland, after grain sorghum. Use: Irrigated cropland. Climate: Precipitation about 11 to 12 inches. Mean annual air temperature 58°F., January 41°F., July 78°F. Parent Material: Alluvium, principally from rhyolite, andesite, limestone. Topography: Nearly level concave swale. Slope, 0.2 percent, north facing. Elevation: 4180 feet. Drainage: Well drained. Runoff is slow. Permeability is slow. Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by thymol blue indicator in 1:5 dilution. This sample paired with S69Ariz-2-19.

HORIZON	DESCRIPTION
Ap	0 to 25 cm (0 to 10 inches), brown (10YR 5/3) light clay, dark brown (10YR 3/3) moist; weak fine granular structure; hard, friable, sticky, plastic; common fine and medium roots; few very fine tubular pores; strongly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.
A12 RSL 69887	25 to 51 cm (10 to 20 inches), dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; very hard, friable, sticky, plastic; few fine and medium roots; common fine and very fine tubular pores; few to common pressure faces; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.
A13 RSL 69888	51 to 76 cm (20 to 30 inches), dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/3) moist; moderate fine subangular blocky structure; very hard, friable, sticky, plastic; few fine and medium roots; common very fine and fine tubular pores; few to common pressure faces; strongly effervescent; moderately alkaline (pH 8.2); clear wavy boundary.
C1ca	76 to 110 cm (30 to 44 inches), reddish yellow (5YR 6/6) clay loam, yellowish red (5YR 4/6) moist; massive; slightly hard, friable, sticky, slightly plastic; many fine and very fine tubular pores; 30 to 35 percent by volume of 1/8 to 1/2 inch irregularly shaped lime concretions and fine and medium irregularly shaped pinkish white soft lime masses; violently effervescent; moderately alkaline (pH 8.2); clear wavy boundary.
C2ca	110 to 145 cm (44 to 58 inches), pinkish gray (7.5YR 7/2) gravelly clay loam, light brown (7.5YR 6/4) moist; massive; slightly hard, friable, sticky, slightly plastic; many fine and very fine tubular pores; 25 to 35 percent by volume of 1/8 to 1/2 inch irregularly shaped lime concretions and fine and medium irregularly shaped white soft lime masses; violently effervescent; moderately alkaline (pH 8.2); clear wavy boundary.
C3ca	145 to 160 cm (58 to 64 inches), pinkish gray (7.5YR 7/2) light clay, light brown (7.5YR 6/4) moist; massive; slightly hard, friable, sticky, plastic; common very fine tubular pores; about 15 percent by volume of fine and medium irregularly shaped white soft lime masses; strongly effervescent; moderately alkaline (pH 8.2).

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Petrocalcic Caliustoll, loamy, mixed, thermic, shallow

SOIL Kimbrough gravelly loam SOIL Nos. S64Ariz-2-26 LOCATION Cochise County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 64638 - 64642

Depth	Horizon	1B1b Total Sand	Total Silt	Total Clay	Size class and particle diameter (mm) 3A1 Sand Very	Sand Coarse	Sand Medium	Sand Fine	Sand Very fine	Silt	Silt Int. III	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 1A2a >2	2 – 19	19 – 76

KIMBROUGH GRAVELLY LOAM
S64Ariz-2-26

Location: Cochise County, Arizona. 29 miles ESE of Willcox, Arizona via State Highway 186. 1/2 mile NNE on a ranch road which intersects Highway 186 at a small cemetery. Pit is 400 feet east of ranch road on ridgetop. Approximately 560 feet south and 150 feet west of the northeast corner of Sec. 23, T. 16 S., R. 28 E. Date of Sampling: October 22, 1964.

Description by: James Jay and M. L. Richardson. Collectors: K. W. Flach, B. Brasher, James Jay, M. L. Richardson, and R. K. Preece.

Classification: Petrocalcic Calciustoll, loamy, mixed, thermic, shallow.

Vegetation: Grassland. Fair cover of black and sideoats grama, wolftail, tall three-awn, plains lovegrass, [illegible] shrubby buckwheat, winterfat, and blue grama. Climate: Precipitation 14-16 inches annual

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Petrocalcic Calciustoll, loamy, mixed, thermic, shallow
SOIL Kimbrough gravelly loam SOIL Nos. S64Ariz-2-27 LOCATION Cochise County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 64643 - 64647

Depth (In)	Horizon	1B1b Total Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0.02–0 002)	3A1 Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 1A2a: ≥ 2 Pct.	2 – 19 Pct. of < 76 mm	19 –76 Pct. of < 76 mm
		Pct. of < 2 mm																
0–12	A1	60.2	24.3	15.5	7.6	9.0	7.6	21.6	14.4	15.3	9.0	43.3	45.8			27	25	2
12–20	C1cam																	
20–34	IIC2	51.6	30.4	18.0	5.7	8.1	6.2	17.5	14.1	14.2	16.2	39.5	37.5			31	20	11
34–53	IIIC3ca																	
53–80+	IVC4	79.8	12.2	8.0	23.1	20.2	10.0	19.3	7.2	5.8	6.4	24.2	72.6			60	60	tr.
		Recalculated data based on the whole soil (<2 mm and >2 mm)																
0–12	A1	43.9	17.7	11.3	5.5	6.6	5.5	15.8	10.5	11.2	6.6	31.6	33.4			27	25	2
12–20	C1ca																	
20–34	IIC2	35.6	21.0	12.4	3.9	5.6	4.3	12.1	9.7	9.8	11.2	27.2	25.9			31	20	11
34–53	IIIC3ca																	
53–80+	IVC4	31.9	4.9	3.2	9.2	8.1	4.0	7.7	2.9	2.3	2.6	9.7	29.0			60	60	tr.

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N		6E1b Carbonate as $CaCO_3$ 1/ Pct	3A1a Carbonate in <0.002 mm Pct.	Bulk density: 4A1f 1/3 bar g/cc	4A1h Oven dry g/cc	Atterberg limits: Plastic limit	Liquid limit	Plastic index Pct. of <0.4 mm	Water content: 4B1c 1/3 bar Pct.	4B2 15 bar Pct	4D1 Extensibility COLE in./in.	4D1 Extensibility COLE in./in.	3B2 Cm	pH: 8C1a 1:1 H_2O	8C1a 1:10 H_2O
0–12	0.70	0.07	10		0	0.0	1.39	1.52	25	36	11	10.1	5.4	0.06	0.06	0–12	7.8	7.6
12–20	0.40	0.05	8		0	0.0	1.42	1.55	25	36	11	9.8	5.2	0.06	0.06	12–20	7.8	7.6
20–34	0.30	0.04	8		0	0.0	1.45	1.58	25	36	11	9.5	5.0	0.06	0.06	20–34	7.8	7.6
34–53	0.20	0.03	7		0	0.0	1.48	1.61	25	36	11	9.2	4.8	0.06	0.06	34–53	7.8	7.6
53–80+	0.10	0.02	5		0	0.0	1.51	1.64	25	36	11	8.9	4.6	0.06	0.06	53–80+	7.8	7.6

KIMBROUGH GRAVELLY LOAM
S64Ariz-2-27

[redacted]

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Aridic Haplustoll, loamy-skeletal, carbonatic, mesic
SOIL Winona gravelly fine sandy loam (taxadjunct) SOIL Nos. S62Ariz-3-33 LOCATION Coconino County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62329 - 62332

Depth (In.)	Horizon	1B1b Total: Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			Coarse fragments 2A2: > 2* Pct.	2 – 19 Pct. of < 76 mm	19 – 76 Pct. of < 76 mm
		Pct. of < 2 mm																
0- 3	A1	68.3	20.1	11.6	1.2	3.6	11.6	28.2	28.7	13.0	7.1	59.3	39.6			23		
3-10	C1	58.3	26.1	15.6	1.1	3.0	8.8	22.4	23.0	17.1	9.0	57.2	35.3			22		
10-27	C2	61.7	21.9	16.4	1.3	4.0	10.0	23.4	23.0	11.7	10.2	52.4	38.7			43		
27+	R	Rock																

Depth (In.)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct.	C/N		6E1b Carbonate as $CaCO_3$ Pct.	3A1a Carbonate in <0.002 mm. Pct.	Bulk density g/cc	g/cc	g/cc		Water content: Pct	4B2 15 bar Pct.	Pct			pH: 8C1b Sat. Paste	8C1a 1:10
0- 3	1.77	0.144	12		2	-						6.6				7.7	8.1
3-10	2.19	0.177	12		7	2						9.5				7.8	8.2
10-27	1.72	0.135	13		15	4						10.0				7.9	8.4
27+		Rock															

Depth (In.)	Extractable bases 5B1a: 6N2c Ca	6O2c Mg	6P2a Na	6Q2a K		Cation Exch. Capacity 5A2a NaOAc		Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K		6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity
	meq/100 g							meq/liter									mmho/cm
0- 3	19.9	1.4	0.2	0.7		16.7		7.0	0.6	0.5	0.4		-	7.2	0.3		0.72
3-10	29.8	1.7	0.2	0.6		22.9		5.0	0.8	0.3	0.2		-	5.0	0.1		0.52
10-27	26.0	3.3	0.2	0.3		21.1		5.6	1.2	0.8	0.1		-	5.6	0.3		0.70
27+		Rock															

Depth (In.)	8A Water at Saturation Pct.	5D1 Exchangeable Na Pct	5B1b Exch. Na meq / 100 g	Gypsum Pct.
0- 3	35.9	1	0.1	
3-10	45.7	1	0.2	
10-27	46.2	1	0.2	
27+		Rock		

* Percent of <19 mm ; see profile description for estimates of >19 mm.

WINONA GRAVELLY FINE SANDY LOAM (taxadjunct) 1/
S62Ariz-3-33

Location: Central Coconino County Area, Arizona. 1320 feet east and 530 feet north of the SW corner of Sec. 26, T15N, R14E. 35 miles S and 50 miles E of Flagstaff. Date of Sampling: June 14, 1962.
Collectors: R. Nelson, L. Grant, D. Cox, R.W. Mitchell, L. Haverfield, C.C. Michaels and J.E. Jay.
Classification: Aridic Haplustoll, loamy-skeletal, carbonatic, mesic.
Vegetation: The vegetation at the sample site consists of blue grama and squirreltail grasses with a ground cover density of approximately 50 percent. Use: Rangeland. Climate: Annual precipitation is approximately 15 inches. The average cool season temperature is approximately 33° F. and the average warm season temperature is approximately 69°F. The mean annual temperature is approximately 51°F. Parent Material: Pink to light reddish brown fine grained, calcareous, massive hard, dense sandstone member of the Kaibab formation. There are many irregularly spaced seams and joints in this sandstone. Elevation: 5800 feet. Relief: Undulating plain, convex, slope 20 percent to the north. Drainage: Well drained, slow runoff, moderate permeability.
Remarks: The surface 1/4 inch algal crust is noneffervescent but has a pH (Hellige-Truog) of 8.0 and is soft and porous. There are coatings of reprecipitated lime on all rock fragments throughout the profile which range in thickness from 1/8 to 1/2 inch. The depth to the R horizon ranges from 10 to 30 inches.

HORIZON	DESCRIPTION
A1 RSL 62329	0 to 3 inches, brown (7.5YR 5/4) gravelly fine sandy loam, dark brown (7.5YR 3/2) when moist; weak fine granular structure; loose when dry and moist; nonsticky and slightly plastic when wet; plentiful fine and medium roots; many fine interstitial pores; strongly effervescent; moderately alkaline, pH (Hellige-Truog) 8.0; abrupt smooth boundary. 35-40 percent by volume of gravel 1/8-1/2 inch diameter.
C1 RSL 62330	3 to 10 inches, brown (7.5YR 4/2) gravelly light loam, dark brown (7.5YR 3/2) when moist; weak fine and medium subangular blocky structure; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; abundant fine and medium roots; few fine continuous simple tubular and common fine interstitial pores; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary. 10 percent by volume gravel greater than 3/4" in diameter discarded from laboratory sample.
C2	10 to 27 inches, brown (7.5YR 5/4)—[illegible]

[redacted]

RSL 62331	moist; massive; slightly hard when dry, friable when moist, slightly sticky and slightly plastic when wet; plentiful fine and medium roots; few fine continuous simple tubular and common fine interstitial pores; violently effervescent; moderately alkaline, pH 8.0; abrupt irregular boundary. 35 percent by volume gravel greater than 3/4 inch in diameter discarded from laboratory sample.
R RSL 62332	27 to 29 inches +, pink (5YR 8/3) fine grained, hard, dense calcareous sandstone, pink (5YR 7/3) when moist. This is a calcareous sandstone member of the Kaibab formation. Violently effervescent, moderately alkaline, pH 8.2; irregularly jointed and cracked.

1/ The Winona series is in a loamy, carbonatic, mesic family of Lithic Torriorthents. This pedon has a mollic epipedon, more than 35 percent gravel and cobbles by volume, and less than 40 percent carbonate.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Aridic Haplustoll, loamy-skeletal, carbonatic, mesic
SOIL Winona gravelly fine sandy loam (tax-adjunct) SOIL Nos. S62Ariz-3-36 LOCATION Coconino County, Arizona
SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 62333 - 62336

Depth (In)	Horizon	1B1b Size class and particle diameter (mm) 3A1 — Total: Sand (2-0.05)	Total: Silt (0.05-0.002)	Total: Clay (<0.002)	Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Silt: 0.05-0.02	Silt: Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)			Coarse fragments 2A2: >2* Pct.	2-19 Pct. of <76 mm	19-76 Pct. of <76 mm
		Pct. of <2 mm																
0- 2	A1	56.0	32.9	11.1	2.4	2.1	4.6	17.7	29.2	22.8	10.1	66.7	26.8			34		
2-12	C1	50.9	30.4	18.7	1.5	2.4	3.5	16.5	27.0	17.4	13.0	58.0	23.9			39		
12-22	C2	56.9	23.4	19.7	2.5	7.1	6.9	16.8	23.6	10.2	13.2	45.4	33.3			56		
22+	R	Rock																

Depth (In)	6A1a Organic carbon Pct.	6B1a Nitrogen Pct	C/N		6E1b Carbonate as $CaCO_3$ Pct.	3A1a Carbonate in <0.002 mm Pct.	Bulk density g/cc	g/cc	g/cc		Water content: Pct.	4B2 15 bar Pct.	Pct.			pH: 8C1b Sat. Paste	8C1a 1:10
0- 2	1.74	0.159	11		6	1						7.4				7.8	8.2
2-12	2.22	0.229	10		18	6						10.8				7.8	8.3
12-22	1.58	0.115	14		47	13						13.4				8.0	8.4
22+		Rock															

Depth (In)	Extractable bases 5B1a: 6N2c Ca	6O2a Mg	6P2a Na	6Q2a K		Cation Exch. Capacity 5A2a NaOAc			Water extract from saturated paste 8A1: 6N1a Ca	6O1a Mg	6P1a Na	6Q1a K		6I1a CO_3	6J1a HCO_3	6K1a Cl	SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter									mmho/cm
0- 2	24.1	1.2	0.2	1.0		19.5			7.2	0.6	0.3	0.5		-	7.0	0.2		0.71
2-12	31.3	1.7	0.2	0.7		23.5			5.5	0.8	0.3	0.3		-	5.6	0.1		0.58
12-22	20.1	2.6	0.1	0.3		15.9			4.2	1.9	0.7	0.3		-	4.9	0.3		0.64
22+		Rock																

Depth (In.)	8A Water at Saturation Pct.	5D1 Exchangeable Na Pct.	5B1b Exch. Na meq / 100 g	Gypsum Pct			
0- 2	41.2	1.0	0.2				
2-12	54.4	0.9	0.2				
12-22	51.9	0.6	0.1				
22+		Rock					

* Percent of <19 mm ; see profile description for estimates of >19 mm.

WINONA GRAVELLY FINE SANDY LOAM (taxadjunct) 1/
S62Ariz-3-36

Location: Central Coconino County Area, Arizona. 1000 feet west of the E 1/4 corner of Sec. 26, T15N, R14E. Date of Sampling: June 14, 1962.
Collectors: R. Nelson, L. Grant, D. Cox, L. Haverfield, C.C. Michaels, R.W. Mitchell and J.E. Jay.
Classification: Aridic Haplustoll, loamy-skeletal, carbonatic, mesic.
Vegetation: At the sample site with a 25 percent ground cover density the vegetation consists of blue grama, winterfat and needle and thread grass. Use: Rangeland. Climate: Annual precipitation is approximately 15 inches. The average temperature in the cool season is approximately 33° F. and the average temperature in the warm season is approximately 69°F. The mean annual temperature is approximately 51°F. Parent Material: Pink to light reddish brown, fine grained, calcareous, massive, hard, dense sandstone member of the Kaibab formation. There are many irregularly spaced seams and joints in this sandstone. Elevation: 5800 feet. Relief: Undulating plains, slightly convex, slope 2 percent to the north. Drainage: Well drained, slow runoff, moderate permeability.
Remarks: The surface algal crust, approximately 1/4" thick, is noneffervescent, but has a pH (Hellige-Truog) of 8.0. There are coatings of reprecipitated lime on all rock fragments throughout the profile which range in thickness from 1/8 to 1/2 inch.
The depth to the R horizon ranges from approximately 10 to 30 inches.
Examination and sampling done in a hand-dug pit.

HORIZON	DESCRIPTION
A1 RSL 62333	0 to 2 inches, brown (7.5YR 5/4) gravelly fine sandy loam, dark brown (7.5YR 3/2) when moist; weak fine granular structure; loose dry and moist, slightly sticky and slightly plastic when wet; plentiful fine roots; many fine interstitial pores; strongly effervescent; moderately alkaline, pH (Hellige-Truog) 8.0; abrupt smooth boundary. 5 percent by volume of rock material greater than 3/4 inch in diameter discarded from laboratory sample.
C1	2 to 12 inches, brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/2) when moist;

CONSECUTIVE PEDON NUMBER C 69149 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES MABRAY SOIL NO. S69 ARIZ. 2- 3 SAMPLE NO. 9 767-9 769 WILLCOX AREA

SOIL FAMILY: LITHIC HAPLUSTOLL,LOAMY-SKELETAL,CARBONTC,THRMC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

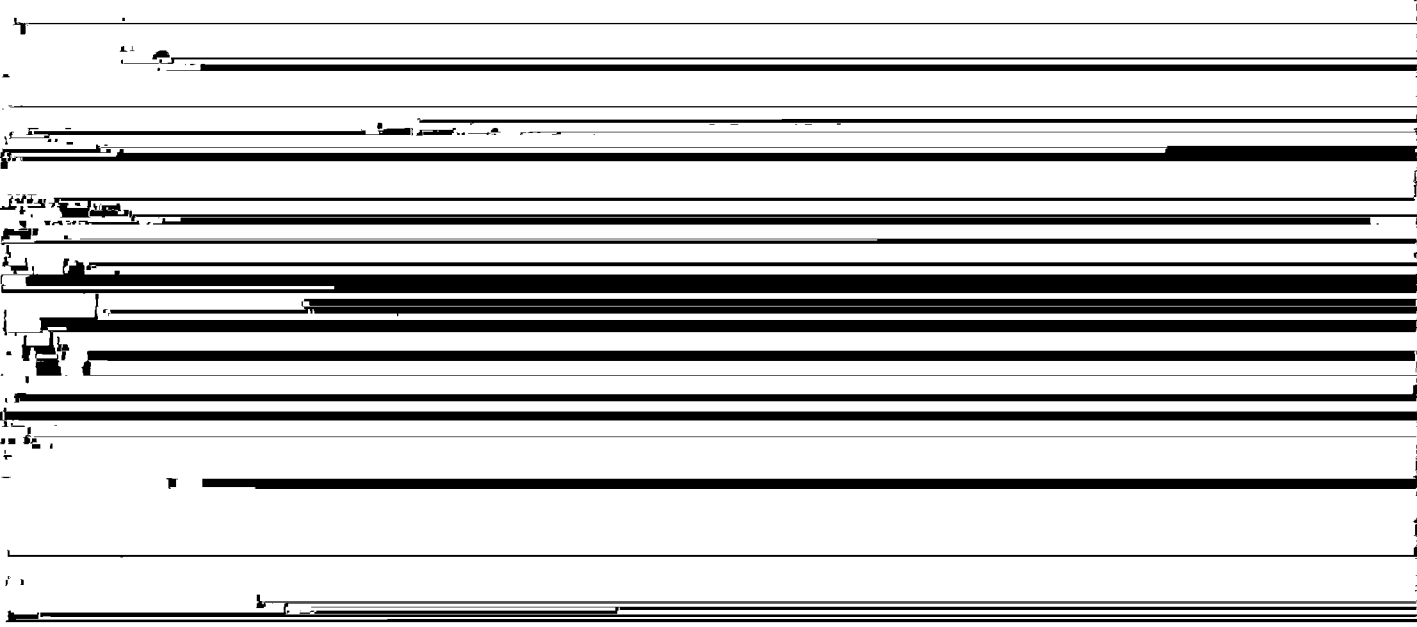
SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	INT. II .2- .02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75			
9 767	0- 8	A11	23.3	48.5	28.2	1.9	1.6	1.4	7.5	10.9	28.6	19.9			3	44.7	65*	41	16	2
9 768	8- 23	A12	59.1	27.6	13.3	10.8	9.2	7.0	19.5	12.6	13.4	14.2				38.1	84*	73	7	1
9 769	23- 33	C CA	47.3	30.8	21.9	13.5	10.7	5.2	9.5	8.4	14.1	16.7			8	28.0	95*	72V	13	5

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L I M I T LL 4F1	PL 4F2	BULK DENSITY EST. 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
9 769	23- 33	1.10	0.074	67		0.1	TR					1.35			0.10			6.8		

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4- OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4- OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA- CL2 8C1E
		MEQ/100G									PERCENT					
9 767	0- 8			0.4	0.6	1.0			1.0	31.9					7.6	7.2
9 768	8- 23			0.4	0.6	1.0			1.0	16.2					7.6	7.3
9 769	23- 33			0.5	0.2	0.7			0.7	10.9					7.6	7.6

MABRAY VERY GRAVELLY LOAM
S69Ariz-2-3

Location: Cochise County, Arizona. 1,200 feet north and 200 feet east of southwest



and 11 miles east of Willcox. Date of Sampling: October 14, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Lithic Haplustoll, loamy-skeletal, carbonatic, thermic.
Vegetation: Sideoats grama, three-awn, ocotillo, yucca, pricklypear, and sage. Use: Livestock range. Climate: Precipitation about 13 to 15 inches. Mean annual air temperature is 60°F., January 42°F., July 78°F. Parent Material: Limestone. Topography: Smooth, convex, moderately steep hills. Slope, 17 percent, south facing. Elevation: 4650 feet. Drainage: Well drained. Runoff is medium to rapid. Permeability is moderate. Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by Hellige-Truog indicator and thymol blue 1:5 dilution. Paired with sample S69Ariz-2-4.

HORIZON	DESCRIPTION
A11 RSL 69767	0 to 8 cm (0 to 3 inches), grayish brown (10YR 5/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, sticky, slightly plastic; many very fine and fine roots; common very fine and fine tubular pores; about 80 percent of surface is covered by angular limestone gravel and cobbles; 50 to 60 percent gravel of 1/4 to 1-1/2 inches in size and 20 to 30 percent cobbles of 3 to 6 inches in size; pendants and thin coatings of secondary lime on bottom of all stone fragments; strongly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.
A12 RSL 69768	8 to 23 cm (3 to 9 inches), grayish brown (10YR 5/2) very gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular and subangular blocky structure; slightly hard, very friable, sticky, slightly plastic; many very fine and fine roots; many very fine and fine tubular pores; about 30 percent by volume of 1/2 to 2 inch angular limestone gravel and 20 percent by volume of 4 to 8 inch angular limestone cobbles; strongly effervescent; moderately alkaline (pH 8.2); clear wavy boundary.
Cca RSL 69769	23 to 33 cm (9 to 13 inches), brown (10YR 5/3) very gravelly loam, dark brown (10YR 3/3) moist; weak fine and very fine granular structure; soft, very friable, sticky, slightly plastic; common very fine and fine roots; about 50 percent by volume of 2 to 3 inch angular limestone gravel and 40 percent by volume of 4 to 8 inch angular limestone cobbles; violently effervescent; moderately alkaline (pH 8.2); abrupt irregular boundary.

CONSECUTIVE PEDON NUMBER C 69150 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES MABRAY SOIL NO. S69 ARIZ. 2- 4 SAMPLE NO. 9 770-9 772 WILLCOX AREA

SOIL FAMILY: LITHIC HAPLUSTOLL,LOAMY-SKELETAL,CARBON.,THERMC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION 2- .05	SANDS .05- .002	SILTS .002 LT	CLAYS	VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	CSI .05-.02	FSI .02-.002	CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A	INT. II .2- .02 WHOLE	COARSE FRAGMENTS- PCT. OF 75- 20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														1A2A SOIL	PCT. OF LT 75		
9 770	0- 8	A11	60.4	26.7	12.9		8.0	8.6	7.9	22.7	13.2	12.6	14.1			40.0	63*	43	--	4
9 771	8- 28	A12	46.8	32.8	20.4		6.0	6.9	5.5	16.0	12.4	14.6	18.2			36.7	89*	75	6	2
9 772	28- 36	C CA	43.9	32.5	23.6		5.0	5.4	4.7	16.1	12.7	13.5	19.0			1 36.6	94*	78V	7	2

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON 6A1A -PERCENT-	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L L 4F1	P L 4F2	BULK DENSITY EST. 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2 -PERCENT-	EXTNSBLTY LEF 4D1	LE 4D1 -PERCENT-
						PERCENT				PCT.NO.40		GRAMS PER CC								
9 770	0- 8	1.40	0.137	2								1.18		0.57				6.8		
9 771	8- 28	1.99	0.186	1								1.25		0.21				9.3		
9 772	28- 36	2.37	0.237	7								1.35		0.11				12.7		

SAMPLE NO.	DEPTH CM	EXTRACTABLE BASES CA 5B4A	MG 5B4A	NA 5B4A	K 5B4A	SUM	EXT. ACI- DITY	KCL EXT. AL	C E C SUM	BASE SATURATION NH4- OAC	SUM+ ACI-	SUM+ AL	NH4- OAC	PH NAF 2 MIN	H2O 1/1	CA- CL2
		MEQ/100G									PERCENT					
9 770	0- 8	0.5	0.7	1.2			1.2	16.3						7.6	7.4	
9 771	8- 28	0.4	0.4	0.8			0.8	24.4						7.6	7.4	
9 772	28- 36	0.4	0.3	0.7			0.7	22.7						7.6	7.5	

C L A Y M I N E R A L O G Y

MABRAY VERY GRAVELLY LOAM
S69Ariz-2-4

Location: Cochise County, Arizona. 1,600 feet south and 600 feet east of the northwest corner of Sec. 24, T. 16 S., R. 23 E. About 6 miles south and 2½ miles west of Cochise. Date of sampling: October 14, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Lithic Haplustoll, loamy-skeletal, carbonatic, thermic.
Vegetation: Black grama, sideoats grama, ocotillo, mesquite, agave, and pricklypear. Use: Livestock range. Climate: Precipitation about 13 to 15 inches. Mean annual temperature is 60°F., January 42°F., July 78°F.
Parent Material: Limestone. Topography: Smooth, convex, moderately steep limestone hills. Slope, 22 percent, northeast facing. Elevation: 4450 feet. Drainage: Well drained. Runoff is medium to rapid. Permeability is moderatel Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by Hellige-Truog indicator and thymol blue in 1:5 dilution. Paired with sample S69Ariz-2-3.

HORIZON	DESCRIPTION
A11 RSL 69770	0 to 8 cm (0 to 3 inches), dark brown (10YR 4/3) very gravelly loam, dark brown (7.5YR 3/2) moist; weak fine granular and weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and very fine roots; common fine interstitial and tubular pores; about 80 percent of surface covered with angular limestone gravels and cobbles; about 60 percent by volume of 1/4 to 2-1/2 inch gravel and about 20 percent of 3 to 5 inch cobbles; slightly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.
A12 RSL 69771	8 to 28 cm (3 to 11 inches), dark brown (7.5YR 4/2) very gravelly loam, dark brown (7.5YR 3/2) moist; moderate fine granular and weak fine subangular blocky structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and very fine roots; common fine interstitial and tubular pores; about 50 percent by volume of 1/4 to 2-1/2 inch angular limestone gravel and 30 percent of 3 to 5 inch cobbles; slightly effervescent, mildly alkaline (pH 7.8); abrupt wavy boundary.
Cca RSL 69772	28 to 36 cm (11 to 14 inches), reddish brown (5YR 4/3) very gravelly loam, dark reddish brown (5YR 3/3) moist; massive; slightly hard, friable, slightly sticky, slightly plastic; common very fine, fine and medium roots; few fine interstitial pores; 45 to 50 percent by volume of 1/4 to 2 inch angular limestone gravel and 30 to 40 percent of 4 to 8 inch cobbles pinkish white lime coatings on all fragments; strongly effervescent; mildly alkaline (pH 7.8); abrupt irregular boundary.
R	36 to 46 cm (14 to 18 inches), reddish gray (5YR 5/2) and light gray (5YR 7/1) limestone bedrock, dark reddish brown (5YR 3/2) and reddish gray (5YR 5/2) moist; massive; extremely hard; few very fine roots in rock fractures; violently effervescent.

CONSECUTIVE PEDON NUMBER C 68143 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES FARAWAY SOIL NO. S68 ARIZ. 2- 7 SAMPLE NO. 81031-81034 E.PIMA-SANTA CRU AREA

SOIL FAMILY: LITHIC HAPLUSTOLL LOAMY-SKELETAL,MIXED,MESIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBONATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE 20	I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														SOIL	PCT. OF LT 75		
81031	0- 5	A11	71.7	17.9	10.4	10.6	12.7	10.7	24.1	13.6	9.6	8.3				37.3	58A	38	12	8
81032	5- 30	A12	65.2	20.0	14.8	5.9	10.6	9.9	24.0	14.8	10.3	9.7				39.2	70A	53	11	6
81033	30- 43	R															--G	--G	--G	--G
81034 1/	0- 0		34.3	27.9	37.8	9.7	4.2	2.9	9.6	7.9	14.4	13.5				28.2	--G	--G	--G	--G

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L L 4F1	P I 4F2	M I T 4A1F	BULK DENSITY EST. 1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
		-PERCENT-		-PERCENT-		PERCENT				PCT.	NO.40		GRAMS PER CC			PERCENT			-PERCENT-	
81031	0- 5	1.49	0.104			1.1	TR						1.31		0.60			7.4		
81032	5- 30	1.35				0.9	TR						1.44		0.45			8.6		
81033	30- 43					0.2	TR							2.46 2.47	1.00		2.8	2.2	0.1	0.1
81034	0- 0													2.29 2.34	1.00		4.2		0.7	0.7

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6D2D	NA 5B4A 6P2A	K 5B4A 6D2A	SUM	EXT. ACI- DITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4- OAC 5A6A	BASE SATURATION SUM+ ACI- DITY	SUM+ AL	NH4- OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
81031	0- 5	9.8	2.6	0.1	0.4	12.9			12.9	12.6	100+		100+		6.2	5.5
81032	5- 30	10.1	2.9	0.1	0.4	13.5			13.5	15.1	100+		89		6.1	5.4
81033	30- 43	4.0	1.3	0.1	0.5	5.9			5.9	5.0	100+		100+		7.5	6.3
81034	0- 0															

CLAY MINERALOGY

SAMPLE NO	DEPTH CM.	<.002 MM X RAY I 7A2E	II 7A2E	III 7A2E	IV 7A2E	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY I 7A2E	II 7A2E	III 7A2E
81031	0- 5	MT 2	MI 2	KK 1						
81032	5- 30	MT 2	MI 2	KK 1						
81033	30- 43	MI 2	MT 1							
81034	0- 0									

CODE	MINERAL	RELATIVE AMOUNT
MT	MONTMORT	1 TRACE
MI	MICA	2 SMALL
KK	KAOLINIT	3 MODERATE
		4 ABUNDANT
		5 DOMINANT
		6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
G=GROUND WHOLE. HORIZON INDURATED OR GRAVEL TOO SOFT TO BE SEPARATED. ALL DATA FOR WHOLE SOIL.
1/ = Ground sample of weathered rock.

FARAWAY VERY COBBLY SANDY LOAM

S68 Ariz-2-7-1 through 3

Location: Cochise County, Arizona, approximately 12½ miles N.E. of Lochiel, Arizona, 1700 feet north and 1000 feet east of SW corner Section 17, T23S, R19E, 200 feet north of Highway 83 and 300 feet east of entrance to Parker Canyon recreation area. Photo AMS [illegible] Date of Sampling: October 17, 1968

Description by: Havens, Richardson and Clemmons. Collectors: Nettleton and Brasher.
Classification: Lithic Haplustoll, loamy-skeletal, mixed, mesic.

Vegetation: Juniper, oak, few pinon pine. Grasses: sprucetop grama, deergrass, sideoats grama, bluestem, three-awn, blue grama, plains lovegrass and wolftail. Climate: Mean annual temperature 56°F. Mean annual precipitation 18-20 inches. Parent Material: Dacite (fractured). Topography: Mountain slope - 15 percent slope, north aspect. Elevation: 5600 feet. Drainage: Well drained. Medium runoff. Soil Moisture: Moist.
Remarks: This site was paired with S68 Ariz-2-6-1 through 5.

HORIZON	DESCRIPTION
	(0-5 cm)
A11 RSL 681031	0 to 2 inches, dark grayish brown (10YR 4/2) very cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine and medium roots; common fine interstitial pores; noneffervescent; medium acid (pH 6.0); abrupt smooth boundary.
A12 RSL 681032 (5-30 cm)	2 to 12 inches, dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine and medium roots; common fine interstitial pores; noneffervescent; medium acid (pH 6.0); abrupt irregular boundary.
R RSL 681033 (30-46 cm)	12 to 18 inches plus, reddish gray (10R 5/1) fractured extremely hard dacite bedrock with soil material from A12 in fractures, weak red (10R 4/2) moist, with many fine distinct pale red (10R 6/4) and pink (5YR 8/3) grains or crystals; massive; extremely hard, extremely firm; common fine and medium roots.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Lithic Haplustoll, loamy-skeletal, mixed, mesic

SOIL Moano gravelly loam SOIL Nos. S65Ariz-13-10 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65238 - 65239

Depth (in.)	Horizon	1B1b Total Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Size class and particle diameter (mm) Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	3A1 Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	* Coarse fragments 1A2a > 2	2 - 19	19 - 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-3	A1	39.8	42.2	18.0	9.2	9.2	4.5	8.6	8.3	20.0	22.2	32.8	31.5	0	18	28	26	2
3-9	AC	38.7	37.3	24.0	10.7	10.4	4.5	7.1	6.0	13.0	24.3	22.8	32.7	0	24	56	44	12

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$	Bulk density 4A1f 1/3 bar	4A1h Oven dry		Water content 4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH 8C1a H_2O 1:1	
	Pct.	Pct.		Pct.	Pct.	g/cc	g/cc	g/cc	Pct.	Pct.	Pct.	in./in.	in./in.	
0-3	2.64	0.170	16	2.3	-					9.7			6.3	
3-9	1.43	0.076	18	1.9	-					12.4			5.8	

Depth (In.)	Extractable bases 5B1a 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity 5A1a NH_4OAc	5A3a Sum	6G1d KCl Ext. Al^{+++}	Base saturation 5C1 NH_4OAc	5C3 Sum
	meq/100 g									Pct.	Pct.
0-3	16.7	3.9	0.2	0.4	21.2	5.2	23.7	26.4		89	80
3-9	22.3	6.0	0.2	0.2	28.7	7.0	32.4	35.7		88	80

Depth (In.)	Clay mineralogy (<0.002 mm) 7A Mont.	Verm.	Mica	Kaolin
	X-ray			
0-3	xxxx	-	x	xx
3-9	xxxx	t	-	xx

* All values from characterization sample.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

MOANO GRAVELLY LOAM
S65Ariz-13-10

Location: Western Yavapai County, Arizona. About 1½ miles northwest of Mayer, Arizona on State Highway #69, then 1 mile west on an old mine road. 1/2 mile south and 2/10 mile east of northwest corner Sec. 16, T12N, R1E. Photo #326. AMS, Project 134, Lot FA. Date of Sampling: May 6, 1965.
Classification: Lithic Haplustoll, loamy-skeletal, mixed, mesic.
Collectors: Flach, Nettleton, Jay, Wendt.
Vegetation: Brush. Oakbrush, deerbrush, mountain mahogany, squawbush, manzanita, and snakeweed.
Climate: Mean annual precipitation 12-14". Mean annual temperature 57°F. Soil temperature at time of sampling 60°F. at 4". Parent Material: Schist and phyllite. Relief: Moderately steep, convex hill on a 23 percent east facing slope. Elevation: 4675 feet. Drainage: Medium runoff, moderately permeable and well drained.
Remarks: This soil is formed on hills of vertically oriented schist and phyllite under a brush vegetation. It is on gently sloping to steep hills. Hellige-Truog field kit was used to determine pH. Paired samples are S65 Ariz-13-11, S65 Ariz-13-19 and S65 Ariz-13-20.

HORIZON	DESCRIPTION
A1 RSL No. 65238	0 to 3 inches, brown (10YR 4/3) gravelly loam, very dark grayish-brown (10YR 3/2) when moist; moderate medium and fine granular structure; slightly hard, very friable; slightly sticky and plastic; few fine roots; many fine interstitial pores; 30-50 percent fine medium schist gravel; noneffervescent; neutral (pH 7.2); clear irregular boundary.
AC RSL NO. 65239	3 to 9 inches, brown (10YR 4/3) very gravelly loam slightly finer textured than A horizon, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard, very friable, slightly sticky and plastic; abundant fine and medium roots; many fine and medium interstitial pores; 75 percent gravel; noneffervescent; neutral (pH 7.0); gradual irregular boundary.
CR	9 to 13 inches plus, olive brown (2.5Y 4/4) and light gray (N 7/0) hard vertically oriented weathered phyllite; extremely hard; plentiful fine roots; common thin and moderately thick clay films on rock faces in joints; noneffervescent; neutral (pH 7.0).

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Lithic Haplustoll, loamy-skeletal, mixed, mesic

SOIL Moano gravelly loam SOIL Nos. S65Ariz-13-11 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65240 - 65241

Depth (In.)	Horizon	1B1b Total Sand (2-0.05)	Total Silt (0.05-0.002)	Total Clay (<0.002)	Sand: Very coarse (2-1)	Sand: Coarse (1-0.5)	Sand: Medium (0.5-0.25)	Sand: Fine (0.25-0.1)	Sand: Very fine (0.1-0.05)	Silt: 0.05-0.02	Silt: Int. III (0.02-0.002)	Int. II (0.2-0.02)	(2-0.1)			★ Coarse fragments 1A2a: ≥ 2 Pct.	2 - 19 Pct. of <76mm	19 - 76 Pct. of <76mm
		Pct. of < 2 mm																
0-3	A1															46	33	13
3-9	AC															59	25	34

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonates as $CaCO_3$		Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry		Water content: 4B1c 1/3 bar	Water content: 4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH: 8C1a H_2O 1:1		
	Pct.	Pct		Pct.	Pct		g/cc	g/cc	g/cc	Pct	Pct.	Pct	in./in.	in./in.			
0-3	0.66	0.065	10		-							6.1			5.9	
3-9	0.73	0.080	9		-							8.7			6.3	

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum		6G1d KCl Ext. Al^{+++}						Base saturation: 5C1 NH_4OAc	5C3 Sum
	meq/100 g															Pct.	Pct.
0-3	5.4	1.6	0.1	0.6	7.7	5.5	11.9	13.2								65	58
3-9	12.4	2.8	0.1	0.4	15.7	6.0	19.0	21.7								83	72

Depth (In.)	Clay mineralogy (<0.002 mm) 7A: Mont.	Verm.	Mica	Kaolin	
	X-ray				

★ All values from characterization sample.

MOANO GRAVELLY LOAM
S65Ariz-13-11

Location: Western Yavapai County, Arizona. About 1 mile east of Mayer, Arizona on ranch road, then 2/10 miles north on east-facing slope of schist hill. 1/10 mile north and 1/10 mile west of southeast corner of Sec. 14, T12N, R1E. Photo #326, AMS Project 134, Lot FA.

Date of Sampling: May 6, 1965.
Collectors: Flach, Nettleton, Jay, Meurisse, Wendt
Vegetation: Grass. Sideoats grama, three-awn, squirreltail, tridens, snakeweed, mesquite and annuals.
Climate: Mean annual precipitation 12". Mean annual temperature 57°F. Temperature at time of sampling 71°F. at 9". Parent Material: Schist and phyllite. Relief: Moderately steep, 27 percent convex, east-facing slope, hill. Elevation: 4600 feet. Drainage: Medium runoff, moderately permeable and well drained.
Remarks: This soil is formed on hills of vertically oriented schist and phyllite under a grass-brush vegetation. It is on gently sloping to steep hills. Hellige-Truog field kit was used to determine pH. Paired samples are S65 Ariz-13-10, S65 Ariz-13-19 and S65 Ariz-13-20.
Classification: Lithic Haplustoll, loamy-skeletal, mixed, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 65240	0 to 3 inches, brown (10YR 4/3) very gravelly loam, very dark grayish-brown (10YR 3/2) when moist; strong fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; abundant fine roots; many fine interstitial pores; 75 percent schist gravel with gravel surface pavement; noneffervescent; strongly acid (pH 5.5); clear smooth boundary.
AC RSL No. 65241	3 to 9 inches, brown (7.5YR 4/2) very gravelly heavy loam, dark brown (7.5YR 3/2) when moist; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; abundant fine and medium roots; many fine interstitial pores; 75 percent gravel;noneffervescent; slightly acid (pH 6.5); gradual irregular boundary.
CR	9 to 13 inches plus, brown (7.5YR 4/2) and very dark gray (N3/0) very hard vertically oriented weathered phyllite with soil material covering faces of rocks. Iron coatings on fracture faces.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Lithic Haplustoll, loamy-skeletal, mixed, mesic

SOIL Moano gravelly loam SOIL Nos. S65Ariz-13-19 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65242 - 65243

Depth (In.)	Horizon	1B1b Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non-carbonate clay	* Coarse fragments 1A2a: > 2	2 - 19	19 - 76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-4	A1	54.3	35.0	10.7	13.1	14.2	6.5	12.4	8.1	18.3	16.7	32.9	46.2	0	11	41	23	18
4-9	AC	52.4	37.2	10.4	12.0	14.1	6.3	10.9	9.1	19.1	18.1	33.9	43.3	0	10	41	33	8

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$	Bulk density: 4A1f 1/3 bar	4A1h Oven dry		3B2	Water content:	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH: 8C1a H_2O 1:1		
	Pct.	Pct.		Pct.	Pct.	g/cc	g/cc	g/cc	Cm	Pct	Pct.	Pct	in./in.	in./in.			
0-4	2.79	0.145	19		-	0.81	0.91		0.82		25.4	10.4	0.040	0.032	7.1		
4-9	0.91	0.059	15		-	1.33	1.39		0.74		18.3	10.3	0.014	0.011	6.9		

Depth (in.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum		6G1d KCl Ext. Al^{+++}	Base saturation: 5C1 NH_4OAc	
	meq/100 g										Pct	Pct.
0-4	22.5	7.1	0.1	0.2	29.9		31.3				96	
4-9	26.5	9.5	0.2	0.1	36.3		38.3				95	

Depth (In.)	Clay mineralogy (<0.002 mm) 7A: Mont.	Verm.	Mica	Kaolin	
	X-ray				
0-4	xxxx	x	-	x	
4-9	xxxx	xx	-	x	

* All values from characterization sample.

- = looked for but not found
t = trace
x = small
xx = moderate
xxx = abundant
xxxx = dominant

MOANO GRAVELLY LOAM
S65Ariz-13-19

Location: Western Yavapai County, Arizona. About 3 miles northwest of Mayer on State Highway #69, then west 3/4 mile on old mine road, on schist hill with east-facing slope. 2/10 mile west and 3/10 mile south of NE corner, Sec. 8, T12N, R1E. Photo #326. AMS Project 134, Lot FA.
Date of Sampling: May 12, 1965.
Collectors: Flach, Nettleton, James, Meurisse, Wendt.
Vegetation: Brush-Manzanita. Climate: Mean annual precipitation 12". Mean annual temperature 57°F. Temperature at time of sampling 60°F. at 12". Parent Material: Schist and phyllite.
Relief: Moderately steep, convex, hill on a 25 percent east-facing slope. Elevation: 4,800 feet.
Drainage: Medium runoff, moderately permeable and well drained.
Remarks: This soil is formedon hills of vertically oriented schist and phyllite under a brush vegetation. It is on gently sloping to steep hills. Hellige-Truog field kit was used to determine pH. Paired samples are S65 Ariz-13-10, S65 Ariz-13-11 and S65Ariz-13-20.
Classification: Lithic Haplustoll, loamy-skeletal, mixed, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 65242	0 to 4 inches, brown (7.5YR 4/4) finely gravelly loam, dark brown (7.5YR 3/2) when moist; strong, very fine and fine granular structure; soft, friable, slightly sticky and plastic; plentiful very fine and fine roots; many interstitial pores; 40 percent schist gravel; noneffervescent; mildly alkaline (pH 7.5); clear, irregular boundary.
AC RSL No. 65243	4 to 9 inches, strong brown (7.5YR 5/6) dry and moist very gravelly loam; massive or rock controlled structure; slightly hard, friable, slightly sticky and plastic; abundant fine, medium, and few coarse roots; many interstitial pores; 70 percent gravel; noneffervescent; neutral (pH 7.0); clear, irregular boundary.
CR	9 inches plus, strong brown (7.5YR 5/6) foliated vertically oriented rock varying in hardness from soft to hard; common clay coatings on rock faces.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Lithic Haplustoll, loamy-skeletal, mixed, mesic

SOIL Moano gravelly loam SOIL Nos. S65Ariz-13-20 LOCATION Yavapai County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 65244 - 65245

Depth (In.)	Horizon	1B1b Size class and particle diameter (mm) 3A1 — Total: Sand (2–0.05)	Silt (0.05–0.002)	Clay (< 0.002)	Sand: 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: 0.05–0.02	Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)			* Coarse fragments 1A2a: > 2	2 - 19	19–76
		Pct. of < 2 mm														Pct.	Pct. of < 76mm	
0-3	A1															33	21	12
3-9	AC															30	24	6

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C2a Ext. Iron as Fe	6E1b Carbonate as $CaCO_3$		Bulk density: 4A1f 1/3 bar	4A1h Oven dry			Water content:	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility COLEF	4D1 Extensibility COLE	pH: 8C1a H_2O 1:1		
	Pct.	Pct.		Pct.	Pct.		g/cc	g/cc	g/cc		Pct.	Pct.	Pct.	in./in.	in./in.			
0-3	0.91	0.064	14		-								6.8			6.9		
3-9	0.62	0.046	13		-								6.7			7.0		

Depth (In.)	Extractable bases 5B1a: 6N2a Ca	6O2a Mg	6P2a Na	6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A1a NH_4OAc	5A3a Sum		6G1d KCl Ext. Al^{+++}						Base saturation: 5C1 NH_4OAc	5C3 Sum
	meq/100 g															Pct	Pct.
0-3	15.5	5.5	0.2	0.1	21.3	4.1	23.4	25.4								91	84
3-9	23.0	6.7	0.1	0.1	29.9	4.3	32.3	34.2								92	87

Depth (In.)	Clay mineralogy (<0.002 mm) 7A: Mont.	Verm.	Mica	Kaolin	
	< X-ray >				

* All values from characterization sample.

MOANO GRAVELLY LOAM
S65Ariz-13-20

Location: Western Yavapai County, Arizona. One mile northeast of Mayer, Arizona on schist hill with east exposure, near a spring development. 2/10 mile east and 1/10 mile south of northwest corner of Sec. 23, T12N, R1E. Photo #326. AMS Project 134, Lot FA. Date of Sampling: May 12, 1965.
Classification: Lithic Haplustoll, loamy-skeletal, mixed, mesic.
Collectors: Flach, Nettleton, James, Meurisse, Wendt.
Vegetation: Grass-brush. Sideoats grama, blue grama, three-awns, false mesquite, oakbrush, deerbrush, and snakeweed. Climate: Mean annual precipitation 10-12". Mean annual temperature 57°F. Temperature of soil at time of sampling 67°F. at 20". Parent Material: Schist and phyllite. Relief: Moderately steep, convex hill on 18 percent east facing slope. Elevation: 4,500 feet. Drainage: Medium runoff, moderately permeable and well drained.
Remarks: This soil is formed on hills of vertically oriented schist and phyllite hills under a grass-brush vegetation. It is on gently sloping to steep hills. Outcrops are common and a few cobble and stone size schist fragments are in the profile. Hellige-Truog field kit was used to determine pH. Paired samples are S65 Ariz-13-10, S65 Ariz-13-11 and S65Ariz-10

HORIZON	DESCRIPTION
A1 RSL No. 65244	0 to 3 inches, brown (7.5YR 4/4) gravelly loam, dark brown (7.5YR 3/2) when moist; moderate very fine and fine granular structure; soft, very friable, slightly sticky and slightly plastic; plentiful very fine and fine roots; many fine interstitial pores; 50 percent gravel and a surface pavement of gravel; noneffervescent; neutral (pH 7.0); clear,irregular boundary.
AC RSL No. 65245	3 to 9 inches, brown (7.5YR 4/4) dry and moist very gravelly loam; massive or rock controlled structure; slightly hard, friable, slightly sticky and slightly plastic; abundant fine and medium and few coarse roots; many fine interstitial pores; 70 percent soft schist fragments gravel size; noneffervescent; moderately alkaline (pH 8.0); clear, irregular boundary.
CR	9 to 14 inches plus, olive (5Y 4/4) and olive brown (2.5Y 4/4) foliated, vertically oriented hard rock with some soil material coating rock faces in fractures. May be some clay coatings.

CONSECUTIVE PEDON NUMBER C 68142 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES FARAWAY TAXADJUNCT SOIL NO. S68 ARIZ. 2- 6 SAMPLE NO. 81026-81030 E.PIMA-SANTA CRU AREA

SOIL FAMILY: LITHIC HAPLUSTOLL,COARSE-LOAMY,MIXED,MESIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 1A2A

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	SILTS CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBO NATE 3A1A	INT. II .2-.02	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														PCT. OF LT 75			
81026	0- 8	A11	68.8	24.0	7.2	21.9	19.0	9.4	12.4	6.1	10.6	13.4				23.1	48A	18	7	23
81027	8- 20	A12	65.7	25.9	8.4	18.4	18.7	9.0	12.6	7.0	9.6	16.3				22.6	46A	14	10	22
81028	20- 33	C	69.0	21.1	9.9	25.6	21.6	8.0	9.1	4.7	6.9	14.2				16.1	36A	24	5	7
81029	33- 48	R1															--G	--G	--G	--G
81030	48- 61	R2															--G	--G	--G	--G

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A -PERCENT-	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG L I M I T LL 4F1	PL 4F2	EST. 1/3 1/3 BAR 4A1F	BULK DENSITY DRY BAR 4A1F	4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEF 4D1	LE 4D1
						PERCENT				PCT.	NO.40	GRAMS PER CC				PERCENT			PERCENT	
81026	0- 8	0.97	0.057			0.6	TR			NP	NP		1.31	1.33	0.69		13.1	5.5	0.5	0.3
81027	8- 20	0.61	0.034			0.5	TR			NP	NP		1.44	1.45	0.68		12.6	5.4	0.2	0.2
81028	20- 33	0.40				0.5	TR			NP	NP		1.78	1.84	0.73		11.8	6.2	1.1	0.8
81029	33- 48					0.3	0.1						2.20	2.27	1.00		7.0	6.7	1.0	1.0
81030	48- 61					0.3	TR						2.26	2.32	1.00		5.8	6.2	0.9	0.9

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACIDITY 6H2A	KCL EXT. AL 6G1E	C E C SUM 5A3A	NH4-OAC 5A6A	BASE SATURATION SUM+ ACIDITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									PERCENT					
81026	0- 8	22.2	5.1	0.8	0.6	28.7			28.7	12.2	100+		100+		5.9	5.1
81027	8- 20	3.5	1.7	0.1	0.4	5.7	5.0		10.7	8.8	53		65		4.9	4.1
81028	20- 33	3.5	4.3	0.1	0.5	8.4	3.2	0.7	11.6	10.9	72	92	77		5.1	4.3
81029	33- 48	4.2	4.1	0.1	0.6	9.0			9.0	9.6	100+		94		6.2	6.0
81030	48- 61	2.8	2.6	0.1	0.6	6.1			6.1	6.5	100+		94		6.3	5.7

CLAY MINERALOGY

SAMPLE NO	DEPTH CM.	LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY 7A2E 1	7A2E II	7A2E III	MINERAL CODE	RELATIVE AMOUNT
81026	0- 8	MT 2	MI 2	KK 1							MT MONTMORT	1 TRACE
81027	8- 20	MT 2	MI 2	KK 2							MI MICA	2 SMALL
81028	20- 33	MT 3	MI 2	KK 2							KK KAOLINIT	3 MODERATE
81029	33- 48	MT 2	MI 2	KK 2								4 ABUNDANT
81030	48- 61	MT 2	MI 2	KK 2								5 DOMINANT
												6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
G=GROUND WHOLE. HORIZON INDURATED OR GRAVEL TOO SOFT TO BE SEPARATED. ALL DATA FOR WHOLE SOIL.

FARAWAY VERY COBBLY LOAM (taxadjunct) 1/
S68 Ariz-2-6-1 through 5

Location: Cochise County, Arizona, approximately 12 miles N.E. of Lochiel, Arizona and 8 miles south-southeast of Canelo, 150 feet upslope and west of the north end of Parker Canyon Lake waterline. Approximately 800 feet S and 600 feet E of NW corner Section 18, T23S, R19E. Photo AMS 663, F.S. EEX-15-164. Date of Sampling: October 17, 1968.
Description by: Havens, Richardson and Clemmons. Collectors: Nettleton and Brasher.
Classification: Lithic Haplustoll, coarse-loamy, mixed, mesic.
Vegetation: Oak, juniper, chihuahua pine, pinon pine, squawberry bush, agave, deergrass, sideoats grama. Climate: Mean annual temperature 56°F. Mean annual precipitation 18-20 inches. Parent Material: Fractured dacite. Topography: Mountain - lower slope - 55 percent slope, east aspect. Elevation: 5,475 feet. Drainage: Well drained. Rapid runoff. Soil moisture: Slightly moist.
Remarks: This site was paired with S68 Ariz-2-7-1 through 3.

HORIZON	DESCRIPTION
	(0-8 cm)
A11	0 to 3 inches, grayish brown (10YR 5/2) very cobbly loam, dark brown
RSL	(10YR 3/3) moist; moderate fine granular structure; slightly hard,
681026	friable, nonsticky and nonplastic; common fine and medium roots;
	common fine interstitial pores; 60 percent coarse fragments;
	noneffervescent; medium acid (pH 6.0); abrupt smooth boundary.
A12	3 to 8 inches, brown (7.5YR 5/2) gravelly sandy loam, dark brown
RSL	(7.5YR 3/2) moist; moderate medium granular and weak fine subangular
681027	blocky structure; slightly hard, friable, nonsticky and slightly
(8-20 cm)	plastic; common fine and medium roots; common fine interstitial pores;
	40 percent coarse fragments; noneffervescent; strongly acid (pH 5.5);
	abrupt wavy boundary.
C	8 to 13 inches, pinkish gray (7.5YR 7/2) very gravelly and cobbly
RSL	sandy loam, brown (7.5YR 5/2) moist; weak medium and coarse subangular
681028	blocky structure; hard, friable, slightly sticky and slightly plastic;
(20-33 cm)	many fine, medium and coarse roots; few fine interstitial pores;
	weathered dacite rock; noneffervescent; medium acid (pH 6.0); abrupt
	irregular boundary.
R1	13 to 19 inches, reddish gray (10R 6/1) weathered and fractured dacite
RSL	bedrock coated with light gray (10YR 7/1) soil material, dark reddish
681029	gray (10R 4/1) and brown (10YR 5/3) moist; bedrock is tilted or is at
(33-48 cm)	angle of approximately 45 percent to surface of soil; massive; very hard,
	firm; common fine and very fine roots in fractures; noneffervescent;
	strongly acid (pH 5.5); abrupt wavy boundary.
R2	19 to 24 inches plus, reddish gray (10R 5/1) extremely hard fractured
RSL	dacite bedrock, dark reddish gray (10R 4/1) moist; massive; extremely
681030	hard, extremely firm; few fine roots in fractures; noneffervescent.
(48-61 cm)	

1/ The Faraway series is in a loamy-skeletal, mixed, mesic family of Lithic Haplustolls. This pedon has less than 35 percent coarse fragments by volume in its control section.

SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Ziegler silty clay loam (taxadjunct) **LOCATION** Apache County, Arizona

SOIL FAMILY: Petrocalcic Paleustoll, fine, montmorillonitic, mesic

SOIL NOS. S56Ariz-1-1 **LAB. NOS.** 561120-561129

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)								3A1		TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	1/ > 2	
0-2	A_{11}	3.0	2.2	1.3	3.4	8.6	55.0	26.5	34.0	31.7	39	sil/sic
2-4	A_{12}	2.0	1.5	0.9	2.5	6.0	46.7	40.4	25.3	29.0	21	sic/sicl
4-8	B21t	0.8	1.3	0.8	2.3	5.2	39.2	50.4	21.6	24.2	11	c/sic
8-15	B22t	1.2	1.4	0.9	2.3	4.9	35.8	53.5	19.6	22.5	26	c
15-20	B23t	0.8	0.9	0.6	1.6	3.5	30.6	62.0	15.4	19.8	3	c
20-23	B24tca	1.8	2.1	1.2	2.4	4.4	40.8	47.3	17.1	29.6	11	sic/c
23-26	B25tca	3.8	3.2	1.6	3.4	5.6	45.5	36.9	18.0	35.4	46	sicl
26-46	C1cam				not analyzed							
46-49	C2ca											
49-20	C3											

pH	ORGANIC MATTER		6C1a	ELECTRICAL CONDUCTIVITY	MOISTURE TENSIONS		
8C1a	6A1b	6B2a	Free		H_2O	Bulk	

ZIEGLER SILTY CLAY LOAM* (taxadjunct) 1/
S56Ariz-1-1

Location: Apache County, Arizona. Near center of Sec. 10, T. 10 N., R. 24 E. 3.45 miles east of Apache-Navajo County line, and 0.3 miles north of U. S. Highway 60. 10 yards west of west end of cinder pit. 14 miles east of Show Low. Date of Sampling: September 24, 1956.
Collectors: W. M. Johnson, J. G. Cady, M. S. James and Reuben Nelson.
Vegetation: Juniper-grass cover. Juniper (J. monocarpa), pinon pine (about 200-300 trees per acre), Algerita sp., scattered patches of blue grama, muhly, three-awn grass. Much of the soil surface is bare and covered with a pavement of coarse cinders. Few alligator-bark juniper, few prickly-pear cactus. Climate: Estimated about 18 to 20 inches precipitation per year. Nearest weather

[redacted]

Parent Material: Coarse, black, volcanic cinders with many basalt "bombs". Probably ultra-

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Chromustert, fine, montmorillonitic, mesic

SOIL Springerville clay SOIL Nos. S56Ariz-9-31 LOCATION Navajo County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 56190 - 56194

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non carbonate clay	1/ Coarse fragments 2A2: > 2	2 – 19	19 – 76
		Pct. of < 2 mm														Pct.	Pct. of < 76 mm	
0–2	A1	6.3	41.2	52.5	0.6	0.5	0.4	2.0	2.8	21.4	19.8	25.5	3.5			3		
2–14	C1	5.6	39.9	54.5	0.5	0.3	0.5	1.6	2.7	21.4	18.5	25.3	2.9			0		
14–28	C2	5.7	40.9	53.4	0.3	0.4	0.5	1.8	2.7	21.2	19.7	25.1	3.0			1		
28–46	C3	10.2	36.8	53.0	2.9	2.0	1.0	1.8	2.5	16.8	20.0	20.4	7.7			12		
46+	R					Not sampled												

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C1b Free Fe_2O_3	6E1b Carbonate as $CaCO_3$	Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry	Bulk density	3B2 Cm	Water content	4B1c 1/3 bar	4B2 15 bar	4D1 Extensibility LEf	4D1 Extensibility LE	pH: 8C1b Saturated Paste	pH: 8C1a H_2O 1:1	pH: 8C1a H_2O 1:10
	Pct.	Pct.		Pct.	Pct.	g/cc	g/cc	g/cc		Pct.	Pct	Pct	Pct	Pct.			
0–2	0.83	0.062	13	2.0								21.1			6.6		6.6
2–14	0.72	0.051	14	2.0								22.0			6.5		6.7
14–28	0.64	0.050	13	2.0								21.7			6.9		6.9
28–46	0.26			1.8	5							23.1			7.5		7.8
46+																	

Depth (In.)	Extractable bases: 6N2b Ca	6O2c Mg	6P2a Na	5B1a 6Q2a K	Sum of bases	6H2a Ext. Acidity	Cation Exch Capacity: 5A2a NaOAc	5A6a NH_4OAc	Water extract from saturated paste 8A1: 6N1a 6O1a Ca + Mg	6P1a Na	6Q1a K	6I1a CO_3	6J1a HCO_3	6K1a Cl	6L1b SO_4	8A1a Electrical conductivity
	meq/100 g								meq/liter							mmho/cm
0–2	27.9	11.4				4.1	51.4		2.9	0.6	0.1		2.5	–		0.3
2–14	29.2	11.5				4.0	55.1		1.9	0.9	0.1		1.6	–		0.3
14–28	21.0	7.5				2.1	52.3		2.2	1.6	0.1		1.9	0.3		0.4
28–46	29.5	23.6				–	54.5		7.6	5.4	0.1		1.9	8.8		1.4
46+																

Depth (In.)	8A Water at Saturation	Exch. bases: 5B3b Ca	5B1b 6Q2a K	5B1b 6P2a Na	5D2 Exchangeable Na	5C3 Base Sat.	Gypsum	Clay mineralogy (<0.002 mm) 3A1: Mont.	Verm.	Mica 7A2 X-ray	Kaolin.
	Pct.	meq./100 g.			Pct.	Pct.	Pct.				
0–2	64.7		1.1	0.3		91		x			
2–14	64.0		0.8	0.5		91		xx			x
14–28	68.0		0.7	0.8		93		xx			
28–46	76.1		0.7	1.6				xx			
46+											

1/ Percent of whole soil 4 inches, 20 percent 4-6 inches cobbles in C3 horizon discarded.

SPRINGERVILLE CLAY
56Ariz-9-31-1 through 4

Location: Navajo County, Arizona NE corner of the NW ¼ of SW ¼, Sec. 13, T 9 N, R 22 E, 2 miles north of Lakeside. Date of Sampling: May 1956.
Collectors: M. S. James, Gerald Kester, R. E. Nelson, and George Wendt.
Vegetation: Blue grama, downy chess, western wheatgrass, juniper, alfileria, wild garlic.
Climate: About 20 inches precipitation. Nearest weather station (Lakeside): Mean annual temperature 47.2° F.; January average 26.9° F.; July average 67.1° F.; mean annual precipitation 22.08 inches. Parent Material: Basalt lava flows. Relief: Smooth upland plain with 0 to 1 percent slope to northeast. Elevation: 6,700 feet. Drainage: Well drained. Slow to very slow runoff; permeability is very slow; however, the initial infiltration into cracks is very rapid.
Classification: Typic Chromustert, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
A1 RSL No. 56190	0-2" -- Dark brown (7.5YR 3.5/2) dry, (3/2) moist; clay; moderate very fine granular mulch; loose when dry, very friable when moist, sticky and very plastic when wet; few plant roots; noncalcareous; pH 6.5; abrupt, wavy lower boundary.
C1 RSL No. 56191	2-14" -- Dark reddish gray (5YR 3.5/2) dry, dark reddish brown (3/1.5) moist; clay; weak medium to coarse subangular and angular blocky; common clay films and a few slickensides; extremely firm when moist, sticky and very plastic when wet; many plant roots; noncalcareous; pH 7; gradual, wavy lower boundary.
RSL No. 56192	strong medium and coarse angular blocky; many slickensides on oblique angles ranging from a 5 to 45° angle; extremely hard when dry, firm when moist, sticky and very plastic when wet; plant roots common; noncalcareous; pH 7.5; gradual, wavy lower boundary.
C3 RSL No. 56193	28-46" -- Dark brown (7.5YR 3.5/2) dry, (3/2) moist; cobbly clay with an estimated 20 percent of rounded basalt cobbles that range from 4 to 6 inches in diameter; weak coarse angular blocky; extremely hard when dry, firm when moist, very plastic when wet; few plant roots; very strongly calcareous with few large prominent white lime mottlings (7.5YR 8/2) dry and moist; pH 8.
R RSL No. 56194	46"+ -- Bed of hard basalt boulders; close to solid basalt rock.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL FAMILY: Typic Chromustert, fine, montmorillonitic, mesic

SOIL Springerville clay SOIL Nos. S56Ariz-9-32 LOCATION Navajo County, Arizona

SOIL SURVEY LABORATORY Riverside, California LAB. Nos. 56195 - 56199

Depth (In.)	Horizon	1B1b Total Sand (2–0.05)	Total Silt (0.05–0.002)	Total Clay (< 0.002)	Sand: Very coarse (2–1)	Sand: Coarse (1–0.5)	Sand: Medium (0.5–0.25)	Sand: Fine (0.25–0.1)	Sand: Very fine (0.1–0.05)	Silt: 0.05–0.02	Silt: Int. III (0.02–0.002)	Int. II (0.2–0.02)	(2–0.1)	3A1a Carbonate clay	3A1a Non carbonate clay	Coarse fragments 2A2: > 2	Coarse fragments 2A2: 2 – 19	Coarse fragments 2A2: 19 – 76
		Pct. of < 2 mm														Pct	Pct. of < 76 mm	
0–2	A1	14.6	36.1	49.3	0.3	0.7	1.1	5.2	7.3	20.0	16.1	30.9	7.3			11		
2–17	C1	11.1	35.0	53.9	0.3	0.5	1.0	3.7	5.6	19.3	15.7	27.5	5.5			0		
17–30	C2	10.4	36.8	52.8	0.2	0.4	0.9	3.6	5.3	21.0	15.8	28.8	5.1			0		
30–43	C3ca	16.9	29.5	53.6	6.6	3.8	1.5	2.5	2.5	12.9	16.6	16.9	14.4			31		
43+	R	Basalt Rock																

Depth (In.)	6A1a Organic carbon	6B1a Nitrogen	C/N	6C1b Free Fe_2O_3	6E1b Carbonate as $CaCO_3$	Bulk density: 4A1f 1/3 bar	Bulk density: 4A1h Oven dry	Bulk density	3B2	Water content: 4B1c 1/3 bar	Water content: 4B2 15 bar	4D1 Extensibility LEf	4D1 Extensibility LE	pH: 8C1b Saturated Paste	pH: 8C1a H_2O 1:1	pH: 8C1a H_2O 1:10
	Pct.	Pct		Pct.	Pct.	g/cc	g/cc	g/cc	Cm	Pct	Pct.	Pct	Pct			
0–2	1.26	0.091	14	2.0							18.0			6.4		6.6
2–17	0.79	0.067	12	2.1							21.5			6.2		6.3
17–30	0.73	0.062	12	2.2							22.2			6.7		6.7
30–43	0.39			1.4	19						22.1			7.6		8.0
43+					Basalt Rock											

Depth (In.)	Extractable bases: 6N2b Ca 5B1a	6O2c Mg 5B1a	6P2a Na 5B4a	6Q2a K 5B4a	Sum of bases	6H2a Ext. Acidity	Cation Exch. Capacity: 5A2a NaOAc	5A6a NH_4OAc		Water extract from saturated paste 8A1: 6N1a 6O1a Ca + Mg	6P1a Na	6Q1a K		6I1a CO_3	6J1a HCO_3	6K1a Cl	6L1b SO_4	8A1a Electrical conductivity
	meq/100 g									meq/liter								mmho/cm
0–2	24.6	11.4				4.7	50.2			3.2	0.4	0.2			2.6	–		0.3
2–17	26.4	11.4				5.0	51.2			1.9	0.7	tr.			1.7	–		0.2
17–30	26.8	11.5				3.5	52.6			2.3	1.4	tr.			2.0	–		0.3
30–43	29.1	21.8					51.2			3.3	2.6	tr.			2.6	1.3		0.6
43+					Basalt Rock													

Depth (In.)	8A Water at Saturation	Exch. bases: 5B3b Ca	5B1b K 6Q2a	5B1b Na 6P2a	5D2 Exchangeable Na	SAR	Base Sat. 5C3	Clay mineralogy (<0.002 mm) 3A1: Mont.	Verm.	Mica 7A2 X-ray	Kaolin.
	Pct.	meq /100 g			Pct.		Pct.				
0–2	59.9		1.3	0.2			89	xx			
2–17	65.1		0.7	0.4			89	xx			
17–30	68.8		0.7	0.6			92	xx			x
30–43	75.4		0.5	1.0				xxx			x
43+					Basalt Rock						

SPRINGERVILLE CLAY
56Ariz-9-32-1 through 4

Location: Navajo County, Arizona NE corner of the NW ¼ of the SW ¼, Sec. 24, T 9 N, R 22 E, in Forest Service pasture. One mile north of Lakeside. Date of Sampling: May 1956.
Collectors: M. S. James, W. G. Harper, Gerald Kester, R. E. Nelson and George Wendt.
Vegetation: Western wheatgrass, blue grama, juniper, wild garlic and snakeweed. Climate: About 20 inches precipitation. Nearest weather station (Lakeside): Mean annual temperature 47.2° F.; January average 26.9° F.; July average 67.1° F.; mean annual precipitation 22.08 inches.
Parent Material: Basalt lava flows. Relief: Smooth plain with less than 1 percent slope to northeast. Elevation: 6,700 feet. Drainage: Slow drainage; infiltration into cracks would be rapid.
Classification: Typic Chromustert, fine, montmorillonitic, mesic.
Remarks: Soil was moist throughout. Very slight wind and water erosion. Many subangular or rounded basalt cobbles and boulders ranging from 3 to 12 inches in diameter are common on the surface.

HORIZON	DESCRIPTION
RSL No. 56195	loose when dry, friable when moist, very plastic and very sticky when wet; few grass roots; slowly permeable; noncalcareous; pH 7; abrupt, wavy lower boundary.
C1 RSL No. 56196	2-17" -- Dark reddish gray (5YR 4/2) dry, dark brown (5YR 4/3) moist; clay; weak platy in upper 4 inches over weak very coarse prisms that break to strong coarse angular blocky; extremely hard when dry, extremely firm when moist, very plastic when wet; many grass roots; very slowly permeable; noncalcareous; pH 6.3; gradual, wavy lower boundary.
C2 RSL No. 56197	17-30" -- Reddish brown (5YR 4/3) dry, dark reddish brown (5YR 3/3) moist; clay; strong coarse subangular blocky; many slickensides 5 to 45° angles; extremely hard when dry, very firm when moist, very plastic and very sticky when wet; grass roots common; very slowly permeable; noncalcareous; pH 6.5; clear, wavy lower boundary.
C3ca RSL No. 56198	30-43" -- Dark reddish gray (5YR 4/2.5) dry, (5YR 3/2.5) moist; clay; with few coarse prominent lime splotches, white (5YR 8/1) dry, and pink (5YR 8/3) moist; massive; extremely hard when dry, extremely firm when moist, very sticky and very plastic when wet; few grass roots; very strongly calcareous; pH 8.3.
R RSL No. 56199	43"+ -- Basalt cobble and boulders that contain many vesicules ranging from ¼ to ½ inch in diameter. Some of these vesicules contain calcium carbonate.

SOIL SURVEY LABORATORY Beltsville, Maryland

OIL TYPE Springerville stony silty clay **LOCATION** Yavapai County, Arizona

SOIL FAMILY: Typic Chromustert, fine, montmorillonitic, mesic

SOIL NOS. S56Ariz-13-5 **LAB. NOS.** 561026-561032

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent)							3A1		2A2	TEXTURAL CLASS
		VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	> 2 1/	
0-1	A_{11}	0.2	0.6	0.6	1.9	8.6	54.4	33.7	44.9	19.3	8	sicl
1-5	A_{12}	0.5	0.6	0.5	1.3	6.7	50.6	39.8	37.0	21.1	3	sicl/sic
5-12	C_1	0.5	0.5	0.4	1.1	6.1	57.2	34.2	37.4	26.6	4	sicl
12-19	C_2	0.5	0.7	0.5	1.3	6.8	45.0	45.2	38.0	14.6	1	sic
19-29	C_3	0.5	0.6	0.4	1.2	6.2	51.6	39.5	37.0	21.5	2	sicl/sic
29-36	C_4	0.3	0.6	0.4	1.0	5.6	52.1	40.0	36.2	22.2	1	sicl/sic
36+	R	Not analysed										

8C1a pH H_2O 1:1	8C1c pH KCl	ORGANIC MATTER 6A1b ORGANIC CARBON %	6B2a NITROGEN %	C/N	6C1a "Free" Fe_2O_3 %	ELECTRICAL CONDUCTIVITY EC×10³ MILLIMHOS PER CM @25°C.	2/ H_2O %	4A2a Bulk Density g/cc	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
6.3		0.80	0.065	12.3	1.3			--			
6.0		0.59	0.056	10.5	1.4		2.2	1.78			
6.8		0.49	0.049	10.0	1.3		3.1	1.89			
7.3		0.49	0.045	10.9	1.4		2.1	1.94			
7.7		0.47	0.046	10.2	1.2		3.7	1.78			
7.8		0.47	0.042	11.2	1.2		3.0	1.92			

5A3a CATION EXCHANGE CAPACITY (Sum)	EXTRACTABLE CATIONS 6N2b 5B1a Ca	6O2b 5B1a Mg	6H2a H	6P2a 5B1a Na	6Q2a 5B1a K	BASE SAT. % 5C3	SATURATION EXTRACT SOLUBLE K	MOISTURE AT SATURATION %
	milliequivalents per 100g. soil →						← milliequivalents per liter →	
36.4	22.7	8.2	4.3	0.15	1.07	88		
39.1	25.4	8.7	4.2	0.20	0.61	89		
38.5	27.5	7.9	2.2	0.32	0.56	94		
37.9	27.9	7.7	1.2	0.56	0.57	97		
41.0	30.5	8.4	0.6	0.85	0.63	98		
42.6	31.6	8.8	0.4	1.17	0.65	99		

1/ Percent of <1-inch material

2/ H_2O content at corresponding bulk density

SPRINGERVILLE STONY SILTY CLAY*
S56Ariz-13-5-1 through 7

Location: Yavapai County, Arizona. 2¼ miles south and .55 mile east of Sunset Point Lookout. (Black Canyon area). Date of Sampling: September 17, 1956.
Collectors: W. M. Johnson, J. G. Cady, M. S. James and Reuben Nelson.
Vegetation: About 30 percent cover of tobosa grass, pricklypear cactus, white-thorn (Acacia gregii?), few annual weeds. Many patches of bare earth. Climate: Estimated 12 inches annual precipitation. Nearest weather station (Cordes): Mean annual temperature 60.8° F.: January average 42.8° F.; July average 80.2° F.; mean annual precipitation 12.73 inches. Parent Material: Tertiary basalt flow. Apparently consists of weathered basalt, cinders and ash. Basalt is high in olivine, is ultrabasic. Relief: Broadly undulating basalt plateau. 2 percent convex, slope toward northwest. No gilgai microrelief. Elevation: About 3,340 feet. Drainage: Well drained. Runoff medium. Permeability slow or very slow.
Remarks: There is a scattered pavement of basalt cobbles, stones and boulders on the surface and in the upper 4 inches of the soil. There are scattered pebbles of vein quartz and quartzite on the surface and throughout the profile; these are mostly subrounded. Source of quartz and quartzite not known. A nearby pipeline ditch shows the profile to be variable. In places there is practically no soil over the hard rock; in other spots there may be more than 30 inches of soil overlying cinders and ash. ½ inch wide cracks, spaced 10 to 14 inches apart, run vertically from the surface to depths of 1 to 29 inches, although the soil is not completely dry.
Classification: Typic Chromustert, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
A11 BSL No. 561026	0-1" -- Brown (7.5YR 4/2) stony silty clay, dark brown (7.5YR 3/2) when moist; moderate medium and thin platy structure; hard, friable, very plastic, very sticky; there is a soft crust ¼ to ½ inch thick at the surface; few fine black spherical concretions ½ to 1 mm diameter; few roots; stones are hard, slightly weathered basalt; noncalcareous; abrupt, smooth lower boundary.
A12 BSL No. 561027	1-5" -- Stony silty clay of the same color as above; strong medium and fine subangular blocky structure; hard, firm, very plastic, very sticky; stones are hard, slightly weathered basalt; few fine black spherical concretions ½ to 1 mm diameter; many roots; no clay films; noncalcareous; clear, slightly wavy lower boundary.
C1 BSL No. 561028	5-12" -- Silty clay of the same color as above; strong medium angular and subangular blocky structure; extremely hard, very firm, very plastic, very sticky; many medium and fine roots; no clay films; few black spherical concretions ¼ to 1 mm diameter; common slickensides; few hard weathered basalt pebbles and few quartz and quartzite pebbles; noncalcareous; gradual, wavy boundary.
C2 BSL No. 561029	12-19" -- Silty clay of the same color as above; thick (½ to 2 inches) crude lozenges or plates break to moderate coarse and medium blocks; extremely hard, very firm, very plastic, very sticky; few black spherical concretions ¼ to 1 mm diameter; common fine roots; no clay films; few hard weathered basalt pebbles; few quartz and quartzite pebbles; crude lozenge-like peds are formed by intersection of many slickensides; noncalcareous; gradual, wavy lower boundary.
C3 BSL No. 561030	19-29" -- Silty clay of same color as above; the soil breaks out in crudely lenticular plates from ½ to 2 inches in diameter, and these plates break to weak medium blocks; extremely hard, very firm, very plastic, very sticky; the crude coarse plates are formed by intersection of many slickensides; common fine roots; common fine white mottles ½ to 1 mm diameter; there appear to be a few thin patchy clay films on some vertical surfaces; few black spherical concretions ½ to 1 mm diameter; mildly calcareous, especially the white specks; gradual, wavy lower boundary.
C4 BSL No. 561031	29-36" -- Silty clay of the same color as above, with few fine white mottles (segregated calcium carbonate); massive or very weak medium and coarse blocky structure; extremely hard, very firm, very plastic, very sticky; common fine roots; appears to have a few thin patchy clay films on some vertical surfaces; contains a few hard, weathered basalt pebbles and an occasional quartz or quartzite pebble; occasional black spherical concretions, ½ to 1 mm in diameter; mildly calcareous; abrupt, irregular lower boundary.
R BSL No. 561032	36"+ -- Hard, slightly weathered basalt.

*Identified in original notes as Unnamed Brown Grumusol

SOIL SURVEY LABORATORY Beltsville, Maryland

SOIL TYPE Springerville stony silty clay **LOCATION** Yavapai County, Arizona

SOIL FAMILY: Typic Chromustert, fine, montmorillonitic, mesic

SOIL NOS. S56Ariz-13-6 **LAB. NOS.** 561033-561039

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	3A1 0.2-0.02	0.02-0.002	2A2 >2 1/	TEXTURAL CLASS
0-1	A_{11}	0.7	1.4	1.2	2.6	8.5	54.3	31.3	45.0	19.3	4	sicl
1-4	A_{12}	1.2	1.3	1.1	2.4	8.1	50.7	35.2	40.5	19.7	9	sicl
4-10	AC	0.7	1.2	0.9	2.1	6.8	45.5	42.8	33.1	20.3	1	sic
10-17	C_1	0.6	1.0	0.8	1.9	5.8	47.1	42.8	32.6	21.3	<1	sic
17-29	C_2	0.7	1.3	0.9	1.8	5.4	46.9	43.0	31.8	21.5	0	sic
29-34	C_3	0.6	1.1	0.8	1.7	5.2	47.2	43.4	31.6	21.8	12	sic
34+	R	Not analysed										

pH 8C1a H_2O 1:1	8C1c KCl	ORGANIC MATTER 6A1b ORGANIC CARBON %	6B2a NITROGEN %	C/N	6C1a "Free" Fe_2O_3 %	6E1e $CaCO_3$ equivalent %	2/ H_2O %	4A2a Bulk Density g/cc	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS.
6.0		1.24	0.100	12.4	1.8			--			
5.2		1.22	0.094	13.0	1.8			--			
6.3		0.90	0.070	12.8	1.9		3.5	1.82			
7.5		0.56	0.048	11.6	1.8	2	3.1	1.95			
7.7		0.52	0.048	10.8	1.9	2	3.2	1.98			
7.7		0.62	0.049	12.6	1.8	2	3.0	1.92			

5A3a CATION EXCHANGE CAPACITY (Sum)	EXTRACTABLE CATIONS 6N2b 5B1a Ca	6Q2b 5B1a Mg	6H2a H	6P2a 5B1a Na	6Q2a 5B1a K	BASE SAT. % 5C3	SATURATION EXTRACT SOLUBLE Na	K	MOISTURE AT SATURATION %
	milliequivalents per 100g. soil →						← milliequivalents per liter →		
31.5	16.4	8.0	5.6	0.09	1.40	82			
36.2	18.0	8.5	8.6	0.16	0.98	76			
42.0	26.4	9.9	4.6	0.28	0.85	89			
	32.1	8.2	--	0.74	0.67	100			

1/ Percent of <1-inch material

2/ H_2O content at corresponding bulk density

SPRINGERVILLE STONY SILTY CLAY*
S56Ariz-13-6

Location: Yavapai County, Arizona. 1.95 mile north and 0.3 mile east of Sunset Point Lookout. (Black Canyon area). Date of Sampling: September 15, 1956.
Collectors: W. M. Johnson, J. G. Cady, M. S. James and Reuben Nelson.
Vegetation: About 30 percent cover of tobosa grass, pricklypear cactus, yucca, mesquite, cholla, whitethorn, rare scrubby juniper. Many barren spots. Climate: Estimated about 12 inches per year precipitation. Nearest weather station (Cordes): Mean annual temperature 60.8° F.; January average 42.8° F.; July average 80.2° F.; mean annual precipitation 12.73 inches. Parent Material: Weathered olivine basalt, cinders and ash. Flow said to be of Tertiary age. Relief: Broadly undulating basalt plateau on 2½ percent plane slope toward the north. No gilgai microrelief. Elevation: About 3,300 feet. Drainage: Well drained. Runoff medium to slow. Permeability slow or very slow.
Remarks: This profile is paired with S56Ariz-13-5-1 through 7. Many boulders, stones, and cobbles are scattered over the surface and through the profile. There are many quartz and quartzite pebbles on the surface and in the soil. Although the soil was not completely air-dry at the time of sampling, there were many cracks 3/8 to 1/2 inch wide extending from the surface to depths of 4 to 18 inches.
Classification: Typic Chromustert, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
A11 BSL No. 561033	0-1" -- Brown (7.5YR 4.5/2) stony light silty clay, dark brown (9YR 3/2) when moist, with a soft crust ¼ inch thick at the surface; moderate medium platy, breaking to strong fine and very fine granular structure; hard, friable, very plastic, very sticky; very few roots; stones are hard, slightly weathered basalt; noncalcareous; abrupt, smooth lower boundary.
A12 BSL No. 561034	1-4" -- Brown (7.5YR 4/2) stony silty clay, dark brown (9YR 3/2) when moist; strong medium and fine subangular blocky structure; extremely hard, firm, very plastic, very sticky; many roots; no clay films; stones are slightly weathered, hard basalt; noncalcareous; clear, wavy boundary.
AC BSL No. 561035	4-10" -- Dark brown (7.5YR 3.5/2) silty clay, slightly darker (3/2) when moist; moderate very coarse prismatic, breaking to moderate coarse and medium subangular blocky structure; extremely hard, very firm, very plastic, very sticky; many roots; no clay films; noncalcareous; gradual, wavy lower boundary.
C1 BSL No. 561036	10-17" -- Dark brown (7.5YR 3.5/2) silty clay, darker (2.5/2) when moist; moderate very coarse prismatic, breaking to weak coarse and medium subangular blocky structure; extremely hard, extremely firm, very plastic, very sticky; common roots; common slickensides; no clay films; very slightly calcareous; gradual, wavy lower boundary.
C2 BSL No. 561037	17-29" -- Silty clay of the same color as above, with common fine white mottles due to hard, rounded calcium-carbonate concretions 1 to 3 mm in diameter; weak coarse blocky structure; extremely hard, extremely firm, very plastic, very sticky; few fine black spherical concretions; common fine roots; no clay films; many slickensides; mildly calcareous; gradual, wavy lower boundary.
C3 BSL No. 561038	29-34" -- Silty clay of the same color as above; weak coarse and medium blocky structure; extremely hard, very firm, very plastic, very sticky; common fine roots; few fine black spherical concretions (less than 1 mm diameter); no clay films; common slickensides; common hard, weathered basalt pebbles and stones; few quartz and quartzite pebbles; very slightly calcareous; abrupt, irregular lower boundary.
R BSL No. 561039	34"+ -- Hard, slightly weathered olivine basalt.

*Identified in original notes as Unnamed Brown Grumusol

SOIL SURVEY LABORATORY Beltsville, Maryland

OIL TYPE Springerville stony silty clay **LOCATION** Yavapai County, Arizona

SOIL FAMILY: Typic Chromustert, fine, montmorillonitic, mesic

SOIL NOS. S56Ariz-13-7 **LAB. NOS.** 561040-561047

DEPTH INCHES	HORIZON	1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1 VERY COARSE SAND 2-1	COARSE SAND 1-0.5	MEDIUM SAND 0.5-0.25	FINE SAND 0.25-0.10	VERY FINE SAND 0.10-0.05	SILT 0.05-0.002	CLAY < 0.002	0.2-0.02	0.02-0.002	2A2 > 2 1/	TEXTURAL CLASS
0-1	A_{11}	0.5	0.6	0.3	1.6	4.2	49.8	43.0	28.6	26.4	38	sic
1-4	A_{12}	0.3	0.4	0.3	1.3	3.5	50.0	44.2	26.2	28.3	9	sic
4-9	C_1	0.4	0.4	0.4	1.4	3.2	46.8	47.4	25.2	25.8	0	sicl
9-15	C_2	0.4	0.3	0.3	1.2	3.2	48.0	46.6	24.9	27.1	1	sic
15-25	C_3	0.2	0.2	0.2	1.2	3.3	47.5	47.4	24.5	27.1	0	sic
25-35	C_4	0.2	0.2	0.2	1.0	3.1	47.2	48.1	24.0	27.0	0	sic
35-39	C5ca	0.4	0.8	0.6	1.6	2.0	42.4	52.2	17.0	28.3	<1	sic
39+	R	Not analysed										

8C1a pH H_2O 1:1	8C1c pH KCl	ORGANIC MATTER 6A1b ORGANIC CARBON %	6B2a NITROGEN %	C/N	6C1a Free Iron % Fe_2O_3	6E1e $CaCO_3$ equivalent %	2/ H_2O %	4A2a Bulk Density g/cc	MOISTURE TENSIONS 1/10 ATMOS. %	1/3 ATMOS. %	15 ATMOS. %
7.5		0.89	0.060	14.8	1.5			---			
7.6		0.63	0.053	11.9	1.7	2	4.0	1.78			
7.7		0.61	0.046	13.3	1.4	2	6.0	1.80			
7.7		0.58	0.046	12.6	1.5	3	3.8	1.86			
7.7		0.52	0.036	14.4	1.6	3	5.6	1.86			
7.7		0.50	0.048	10.4	1.6	2	5.8	1.91			
7.8		0.57	0.032	17.8	1.5	10	5.0	1.86			

5A3a CATION EXCHANGE CAPACITY (Sum)	EXTRACTABLE CATIONS 6N2b 5B1a Ca	6Q2b 5B1a Mg	6H2a H	6P2a 5B1a Na	6Q2a 5B1a K	BASE SAT. % 5C3	SATURATION EXTRACT SOLUBLE Na	K	MOISTURE AT SATURATION %
	milliequivalents per 100g. soil →						← milliequivalents per liter →		
50.8	39.8	8.2	1.1	0.10	1.59	98			

1/ Percent of <1-inch material

2/ H_2O content at corresponding bulk density

SPRINGERVILLE STONY SILTY CLAY*
S56Ariz-13-7

Location: Yavapai County, Arizona. 50 feet west of the center of U. S. Highway 89 at a point 6/10 mile south of Milepost 350 (14.8 mile south of the junction of U. S. Highways 89 and 66). About 16 miles south of Ash Fork. Date of Sampling: September 18, 1956.
Collectors: W. M. Johnson, J. G. Cady, M. S. James and Reuben Nelson.
Vegetation: Juniper-grass cover. Tobosa grass, junipers (J. osteosperma and monosperma), pricklypear and staghorn cacti, ring muhly, a little snakeweed. Dominant juniper trees are 18 to 22 feet high, 12 to 15 inches in diameter b.h. and appear to be 100 to 150 years old.
Climate: Estimated 12 to 15 inches per year rainfall. Nearest weather station (Ash Fork): Mean annual temperature 54.2° F.; January average 36.1° F.; July average 74.4° F.; mean annual precipitation 13.25 inches. Parent Material: Mainly weathered olivine basalt, with little admixture of weathered cinders and ash. Relief: Undulating basalt plateau slope about 2 percent slightly convex, toward the east. Elevation: About 4,700 feet. Drainage: Well drained. Runoff medium or slow; permeability slow or very slow.
Remarks: There are basalt stones and pebbles scattered over the surface and throughout the profile. Depth to hard basalt is quite variable within short distances.
Classification: Typic Chromustert, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
All	0-1" -- Brown (7.5YR 4.5/2) very stony silty clay, dark brown (3.5/2) when moist,

OIL URVEY LABORATORY Beltsville, Maryland

SOIL TYPE Springerville very stony silty clay **LOCATION** Yavapai County, Arizona

SOIL FAMILY: Typic Chromustert, fine, montmorillonitic, mesic

SOIL NOS. S56Ariz-13-8 **LAB. NOS.** 561048-561055

DEPTH		1B1b PARTICLE SIZE DISTRIBUTION (in mm.) (per cent) 3A1								2A2	TEXTURAL
		VERY				VERY					

SPRINGERVILLE VERY STONY SILTY CLAY*
S56Ariz-13-8

Location: Yavapai County, Arizona. 45 feet east of the center of U. S. Highway 89 at a point 1.55 miles north of Milepost 351. About 15 miles south of Ash Fork. Date of Sampling: September 18, 1956.
Collectors: W. M. Johnson, J. G. Cady, M. S. James and Reuben Nelson.
Vegetation: Juniper and grass cover. Junipers (J. monosperma and osteosperma), patches of tobosa grass; sand dropseed; ring muhly; three-awn grass; sideoats grama; blue grama. Much bare gound. Some patches of stone pavement. Junipers average about 18 feet high, about 300 of them per acre. Climate: Estimated 12 to 15 inches rainfall per year. Nearest weather station (Ash Fork): Mean annual temperature 54.2° F.; January average 36.1° F.; July average 74.4° F.; mean annual precipitation 13.25 inches. Parent Material: Weathered olivine basalt, probably with admixture of some weathered cinders and ash. Relief: Gently, broadly rolling basalt plateau, simple slope of 1 percent toward the east. Elevation: About 4,800 feet. Drainage: Well drained (well aerated). Runoff, slow. Permeability, very slow.
Remarks: There are a few basalt pebbles and stones scattered over the surface and throughout the profile. Paired with S56Ariz-13-7.
Classification: Typic Chromustert, fine, montmorillonitic, mesic.

HORIZON	DESCRIPTION
A11 BSL No. 561048	0-1" -- Brown (7.5YR 4/2) very stony silty clay, brown (7.5YR 3.5/2) when moist; soft crust $\frac{1}{4}$ inch thick at the surface; strong very fine granular structure; hard, friable, very plastic, very sticky; very few roots; mildly calcareous; abrupt, slightly wavy lower boundary.
A12 BSL No. 561049	1-5" -- Dark brown (7.5YR 3/2) very stony silty clay, slightly darker (2.5/2) when moist; moderate coarse prismatic, breaking to moderate coarse subangular blocky structure that in turn breaks to weak very fine granular structure; extremely hard, very firm, very plastic, very sticky; many roots; no clay films; noncalcareous; clear, wavy lower boundary.
C1 BSL No. 561050	5-10" -- Dark brown (7.5YR 3.5/2) silty clay, slightly darker (3/2) when moist; many slickensides form thick lozenge-shaped peds that break to coarse subangular blocks; extremely hard, very firm, very plastic, very sticky; many roots; few basalt pebbles and cobbles; no clay films; mildly calcareous; gradual, wavy lower boundary.
C2 BSL No. 561051	10-17" -- Silty clay of the same color as above; many slickensides form thick lozenge-shaped peds that break to moderate medium and fine blocks; extremely hard, very firm, very plastic, very sticky; common roots; appear to be a few thin patchy clay films on some vertical surfaces; mildly calcareous; gradual, wavy lower boundary.
C3 BSL No. 561052	17-28" -- Silty clay of the same color as above; many slickensides form lozenge-shaped peds $\frac{1}{2}$ to 2 inches thick; these break to moderate fine blocks; extremely hard, very firm, very plastic, very sticky; common roots; there appear to be a few thin patchy clay films on some vertical surfaces; mildly calcareous; gradual, wavy lower boundary.
C4 BSL No. 561053	28-35" -- Silty clay of the same color as above; many slickensides form lozenge-shaped peds from $\frac{1}{2}$ to $1\frac{1}{2}$ inches thick; these break to weak coarse and medium blocks; extremely hard, very firm, very plastic, very sticky; contains a few fine white hard carbonate concretions from 1 to 2 mm in diameter; few fine roots; there are a few patches on some vertical surfaces that may be clay films; mildly calcareous; gradual, wavy lower boundary.
C5ca BSL No. 561054	35-45" -- Finely mottled dark brown and light reddish brown (7.5YR 3.5/2 and 6YR 6/3) gritty silty clay, mottled dark brown and reddish brown (7.5YR 3/2 and 6YR 5/3) when moist, with numerous fine white specks (less than 1 mm) due to hard carbonate concretions; massive, with many slickensides about 1 inch apart, producing thick, crude plates; extremely hard, very firm, very plastic, very sticky; few fine roots; moderately calcareous; abrupt, irregular lower boundary.
R BSL No. 561055	45"+ -- Hard, weathered, olivine basalt.

*This profile was identified in original notes as Unnamed Brown Grumsol

CONSECUTIVE PEDON NUMBER C 69175 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES BONITA SOIL NO. S69 ARIZ. 5- 1 SAMPLE NO. 9 891-9 898 WILLCOX AREA

SOIL FAMILY: TYPIC CHROMUSTERT,FINE,MONTMORILLONITIC,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2- .05	SILT .05- .002	CLAY LT .002	SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1 SANDS VCS 2-1	CS 1- .5	MS .5- .25	FS .25- .10	VFS .1- .05	CSI .05- .02	FSI .02- .002	CLAYS CO. 2- .2U	FINE LT .2U	CARBONATE 3A1A.02	1A2A INT. II	COARSE FRAGMENTS PCT. OF WHOLE SOIL	I 75- 20 PCT.	II 20-5 PCT. OF LT 75	III 5-2
			PERCENT OF LESS THAN 2MM																	
9 891	0- 5	A11	13.7	42.6	43.7	1.8	1.9	1.3	3.6	5.1	19.5	23.1			26.8	7A	3	3	1	
9 892	5- 20	A12	11.7	42.8	45.5	1.5	1.6	1.4	3.7	3.5	20.0	22.8			25.6	--A	--	--	--	
9 893	20- 28	A13	12.5	41.4	46.1	1.5	1.4	1.5	3.5	4.6	18.7	22.7			25.2	--A	--	--	--	
9 894	28- 48	C 1	10.7	42.1	47.2	1.3	1.3	1.4	3.4	3.3	19.0	23.1			24.3	2A	--	1	1	
9 895	48- 79	C 2	11.7	40.8	47.5	2.4	1.8	1.2	2.8	3.5	17.6	23.2			22.7	5A	--	2	3	
9 896	79-102	2C 3CA	42.4	31.0	26.6	12.0	11.3	6.7	8.1	4.3	10.2	20.8		2	18.3	85A	79	5	1	
9 897	102-135	2C 4CA	27.2	48.0	24.8	10.5	7.3	2.3	3.0	4.1	17.1	30.9			22.8	47*	25	7	6	
9 898	135-160	2C 5CA	24.9	49.1	26.0	8.8	5.5	2.2	3.4	5.0	18.8	30.3			25.7	43*	26V	6	3	

SAMPLE NO.	DEPTH CM.	ORG.MATTER CAR- BON 6A1A -PERCENT--	NITRO GEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B -PERCENT-	19-2 6E1B	EXT. IRON FE 6C2B PCT.	ATTERBERG L I M I T LL 4F1 PCT.	PL 4F2 NO.40	BULK DENSITY EST 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTENSBLTY LEF 4D1	LE 4D1	PH H2O 1/1 8C1A	H2O 1/10 8C1A	CACL2 8C1E
									GRAMS PER CC				----PERCENT---			-PERCENT--				
9 891	0- 5	0.86	0.081			0.9	52	27	1.25		0.97				18.5			7.3		7.2
9 892	5- 20	0.76	0.063	1		0.9	48	27		1.28	1.75	1.00		32.2	21.5	11.0	11.0	7.8		7.6
9 893	20- 28	0.72		1		0.9				1.30	1.68	1.00		31.2	19.2	8.9	8.9	7.8		7.6
9 894	28- 48	0.67		1		1.0	59	28		1.30	1.80	0.99		35.0	23.7	11.5	11.3	8.0		7.7
9 895	48- 79	0.54		3		0.9				1.29	1.72	0.98		35.5	22.9	10.1	9.8	8.0		7.7
9 896	79-102	0.16		14		0.7	44	28		1.26	1.38	0.25		28.3	14.9	3.1	0.7	8.0	9.1	7.7
9 897	102-135	0.04		4		0.9				1.30	1.46	0.69		28.5	14.5	3.9	2.7	7.8	9.2	7.5
9 898	135-160			3		0.9				1.47	1.66	0.70		23.4	14.2	4.1	2.8	7.8	9.1	7.6

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	BASE SAT.	C E C NA- OAC 5A2A	NH4- OAC 5A6A	EC 8A1A	WATER EXTRACT FROM SATURATED PASTE 8A1 CA 6N1B	MG 6O1B	NA 6P1A	K 6Q1A	CO3 6I1A	HCO3 6J1A	CL 6K1A	SO4 6L1B	B 6T1A	PH SAT. PASTE 8C1B
		MEQ/100G					PCT.	-MEQ/100G		MMHO	MEQ/1000 ML								PPM	
9 891	0- 5			0.3	2.0	2.3			39.6											
9 892	5- 20			1.0	1.2	2.2			39.9											
9 893	20- 28			1.5	1.3	2.8			38.6											
9 894	28- 48			2.9	1.2	4.1			39.5											
9 895	48- 79			4.2	1.1	5.3			38.3											
9 896	79-102			5.7	1.0	6.7			29.6	2.26	3.9	1.6	18.7	0.1		3.0	11.0			7.6
9 897	102-135			5.9	1.0	6.9			28.2	2.66	5.2	2.5	31.8	0.2		2.5	15.8	15.7		7.6
9 898	135-160			5.0	1.2	6.2			27.0	2.31	4.1	2.3	17.2	0.3		2.2	14.1			7.7

SAMPLE NO.	DEPTH CM.	WATER AT SAT. 8A PCT.	EXCHANGBLE NA 5B4B MEQ.	NA 5D2 PCT.	SAR 5E	GYPSUM AMT. REQ. 6F1B PCT.	6P3A MEQ.	CLAY MINERALOGY --LESS THAN 0.002 MM--- X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 PCT.	-L.T. .0002 MM- X RAY 7A2E I	7A2E II	7A2E III	MINERAL CODE
9 891	0- 5		0.3	1				MT 3								MT MONTMORT
9 892	5- 20		1.0	3				MT 4								
9 893	20- 28		1.5	4												
9 894	28- 48		2.9	7				MT 4								
9 895	48- 79		4.2	11												
9 896	79-102	48.6	4.8	16	11			MT 2								
9 897	102-135	51.0	4.3	15	16											
9 898	135-160	54.3	4.1	15	10											

RELATIVE AMOUNT
1 TRACE
2 SMALL
3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
*=THE 75-250MM FRACTION IS INCLUDED.
V=NOT WEIGHED. VALUE CALCULATED FROM A VOLUME ESTIMATE.

BONITA GRAVELLY CLAY
S69Ariz-5-1

Location: Graham County, Arizona. 2280 feet north and 600 feet west of the SE corner, Section 4, T11S, R22E. About 21 miles northwest of Willcox. Date of sampling: October 13, 1969.
Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Typic Chromustert, fine, montmorillonitic, thermic.
Vegetation: Tobosa grass. Use: Livestock range. Climate: Mean annual precipitation is about 12 to 14 inches. Mean annual air temperature is 61°F., January 45°F., July 79°F. Parent Material: Alluvium from basalt, rhyolite and basaltic andesite. Topography: Slightly convex to smooth, gently sloping fan. Slope, 2-1/2 percent, northeast facing. Elevation: 4580 feet. Drainage: Well drained. Runoff is very slow. Permeability is very slow. Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by thymol blue indicator is 1:5 dilution. Paired with sample S69Ariz-5-2. There are many cracks 1/2 to 2 inches wide that extend from the surface downward to a depth of 24 inches or more. Gilgai relief is evident. The low areas appear to have more gravel on the surface and less vegetation, whereas, the higher areas have less gravel and more vegetation.

HORIZON	DESCRIPTION
A11 RSL No. 69891	0 to 5 cm (0 to 2 inches), dark brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; moderate fine granular and weak fine subangular blocky structure; soft, friable, sticky, plastic; many fine and medium roots; many fine interstitial pores; surface has 15 to 25 percent cover of rounded basalt gravel and cobbles; about 25 percent by volume of 1 to 3 inch rounded basalt gravel and about 5 percent of 6 inch rounded basalt cobbles; slightly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
A12 RSL No. 69892	5 to 20 cm (2 to 8 inches), dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; moderate medium and coarse subangular blocky structure; hard, firm, sticky, plastic; many fine and medium roots; few fine interstitial pores; about 10 percent by volume of 1 to 6 inch rounded basalt gravel and cobbles; slightly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.
A13 RSL No. 69893	20 to 28 cm (8 to 11 inches), dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; moderate coarse subangular blocky structure; very hard, firm, sticky, very plastic; common fine and medium roots; few pressure faces and small slickensides; about 3 percent of 1 to 3 inch rounded basalt gravel; slightly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.
C1 RSL No. 69894	28 to 48 cm (11 to 19 inches), dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; massive; very hard, firm, sticky, very plastic; few fine roots; common pressure faces and slickensides; about 3 percent of 1 to 3 inch rounded basalt gravel; slightly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.
C2 RSL No. 69895	48 to 79 cm (19 to 31 inches), dark brown (7.5YR 4/2)clay, dark brown (7.5YR 3/2) moist; massive; very hard, firm, sticky, very plastic; few fine roots; many pressure faces and slickensides; about 3 percent of 1 to 3 inch rounded basalt gravel; slightly effervescent; moderately alkaline (pH 8.0); clear wavy boundary.
IIC3ca RSL No. 69896	79 to 102 cm (31 to 40 inches), mottled reddish brown (5YR 5/4), white (10YR 8/2), and reddish yellow (7.5YR 7/6) gravelly light clay loam, dark reddish brown (5YR 3/4), light reddish brown (5YR 6/4), and strong brown (7.5YR 5/6) moist; weak and moderate fine and medium subangular and angular blocky structure; hard, friable, slightly sticky, slightly plastic; few fine roots; common fine interstitial pores; common moderately thick clay films on ped faces; common thin very dark gray coatings on faces of peds; about 20 percent by volume of 2 to 3 inch rounded basalt gravel and 20 percent by volume of 4 to 8 inch rounded basalt cobbles; many fine and large irregularly shaped soft masses of lime; gravel and cobbles are coated with calcium carbonate; violently effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
IIC4ca RSL No. 69897	102 to 135 cm (40 to 53 inches), mottled reddish brown (5YR 4/4) and pinkish white (7.5YR 8/2) gravelly clay loam, dark reddish brown (5YR 3/4) and light brown (7.5YR 6/4) moist; weak and moderate fine and medium subangular and angular blocky structure; hard, friable, slightly sticky, plastic; very few fine roots; common fine interstitial pores; common moderately thick clay films on ped faces; about 20 percent by volume of 2 to 3 inch rounded basalt gravel and 20 percent by volume of 4 to 8 inch rounded basalt cobbles; gravel and cobbles coated with lime; common fine and medium old tubular pores filled with white irregularly shaped soft lime masses; common thin black manganese coatings on faces of peds and in veins; violently effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
IIC5ca RSL No. 69898	135 to 160 cm (53 to 63 inches), mottled reddish brown (5YR 4/4)and pinkish white (7.5YR 8/2) gravelly light clay loam, dark reddish brown (5YR 3/4) and light brown (7.5YR 6/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky, plastic, very few fine roots; common fine interstitial pores; few thin clay films on ped faces; about 20 percent by volume of 4 to 8 inch rounded basalt cobbles; gravel and cobbles have thin coatings of lime; common fine and medium tubular pores filled with white large, irregularly shaped soft masses of lime, common fine black manganese coatings on faces of peds and in veins; strongly effervescent.

CONSECUTIVE PEDON NUMBER C 69176 C H A R A C T E R I Z A T I O N D A T A

SOIL SERIES BONITA SOIL NO. S69 ARIZ. 5- 2 SAMPLE NO. 9 899-9 905 WILLCOX AREA

SOIL FAMILY: TYPIC CHROMUSTERT,FINE,MONTMORILLONITIC,THERMIC RIVERSIDE SOIL SURVEY LABORATORY

SIZE, CLASS AND PARTICLE DIAMETER (MM) 1B1B,3A1

SAMPLE NO.	DEPTH CM.	HORZ.	TOTAL FRACTION SAND 2-.05	SILT .05-.002	CLAY LT .002	SANDS VCS 2-1	CS 1-.5	MS .5-.25	FS .25-.10	VFS .1-.05	SILTS CSI .05-.02	FSI .02-.002	CLAYS CO. 2-.2U	FINE LT .2U	CARBONATE 3A1A	1A2A INT. .2-.02	COARSE FRAGMENTS PCT. OF WHOLE 20 I 75-20	II 20-5	III 5-2
			PERCENT OF LESS THAN 2MM														SOIL	PCT. OF LT 75	
9 899	0- 5	A11	13.3	36.8	49.9	0.8	2.1	2.4	4.6	3.4	12.4	24.4				18.2	61A	58	2	1
9 900	5- 15	A12	12.9	35.4	51.7	2.9	2.3	1.4	3.3	3.0	12.1	23.3				17.0	4A	--	3	1
9 901	15- 36	A13	11.9	35.6	52.5	2.9	2.3	1.2	2.8	2.7	11.3	24.3				15.6	2A	—	1	1
9 902	36- 58	C 1	11.5	37.3	51.2	1.7	2.1	1.5	3.1	3.1	12.5	24.8				17.3	--A	--	--	--
9 903	58- 79	C 2	10.6	37.6	51.8	1.0	2.0	1.5	3.0	3.1	11.6	26.0				16.4	9A	6	3	--
9 904	79- 89	C 3CA	15.2	36.4	48.4	3.9	3.1	1.7	3.1	3.4	11.5	24.9				16.7	19A	8	11	--
9 905	89-127	2C 4CA	40.0	35.2	24.8	16.2	6.4	3.5	7.7	6.2	8.4	26.8			3	18.9	81*	49	20	10

SAMPLE NO.	DEPTH CM.	ORG.MATTER CARBON 6A1A	NITROGEN 6B1A	CARBONATE AS CACO3 LT 2 6E1B	2-20 6E1B	SESQUIOXIDES DI-CIT FE 6C2B	EXT AL 6G7A	PYROP FE 6C5A	EXT AL 6G5A	ATTERBERG LIMIT LL 4F1	PL 4F2	BULK DENSITY EST. 1/3 BAR 4A1F	1/3 BAR 4A1F	DRY 4A1H	CM 3B2	WATER CONTENT 1/10 BAR 4B1C	1/3 BAR 4B1C	15 BAR 4B2	EXTNSBLTY LEE 4D1	LE 4D1
		-PERCENT-		-PERCENT-		------PERCENT-------				PCT.NO.40		GRAMS PER CC				----PERCENT---			-PERCENT-	
9 899	0- 5	0.83	0.073									1.25			0.58			18.4		
9 900	5- 15	0.63	0.055							54	29		1.27	1.71	0.98		34.5		10.4	10.2
9 901	15- 36	0.58											1.28	1.69	0.99		35.6	5.4	9.7	9.6
9 902	36- 58	0.58		1								1.25			1.00			5.4		
9 903	58- 79	0.52		1						57	26		1.23	1.62	0.96		35.6	6.4	9.6	9.1
9 904	79- 89	0.37		4								1.15			0.91					
9 905	89-127			16											0.30					

SAMPLE NO.	DEPTH CM.	EXTRACTABLE BASES CA 5B4A 6N2E	MG 5B4A 6O2D	NA 5B4A 6P2A	K 5B4A 6Q2A	SUM	EXT. ACI-DITY 6H2A	KCL EXT. AL 6G1E	CEC SUM 5A3A	NH4-OAC 5A6A	BASE SATURATION SUM+ ACI-DITY	SUM+ AL	NH4-OAC 5C1	PH NAF 2 MIN 8C1D	H2O 1/1 8C1A	CA-CL2 8C1E
		MEQ/100G									----PERCENT----					
9 899	0- 5			0.3	2.8	3.1			3.1	36.1					7.0	6.7
9 900	5- 15			0.7	2.2	2.9			2.9	38.0						
9 901	15- 36			1.5	1.5	3.0			3.0	37.5					8.1	7.2
9 902	36- 58			2.8	1.4	4.2			4.2	38.0					8.2	7.4
9 903	58- 79			3.6	1.3	4.9			4.9	37.4					8.3	7.6
9 904	79- 89			4.5	1.3	5.8			5.8	37.9						
9 905	89-127			4.9	1.1	6.0			6.0	31.2						

CLAY MINERALOGY

SAMPLE NO	DEPTH CM.	LESS THAN 0.002 MM X RAY 7A2E I	7A2E II	7A2E III	7A2E IV	DTA 7A3 -PERCENT-	7A3	L.T. 0.0002 MM X RAY 7A2E I	7A2E II	7A2E III
9 899	0- 5	MT 3	MI 2	KK 1						
9 900	5- 15	MT 3	MI 2	KK 1						
9 901	15- 36									
9 902	36- 58									
9 903	58- 79									
9 904	79- 89									
9 905	89-127									

CODE MINERAL RELATIVE AMOUNT

MT MONTMORT 1 TRACE
MI MICA 2 SMALL
KK KAOLINIT 3 MODERATE
4 ABUNDANT
5 DOMINANT
6 INDETER.

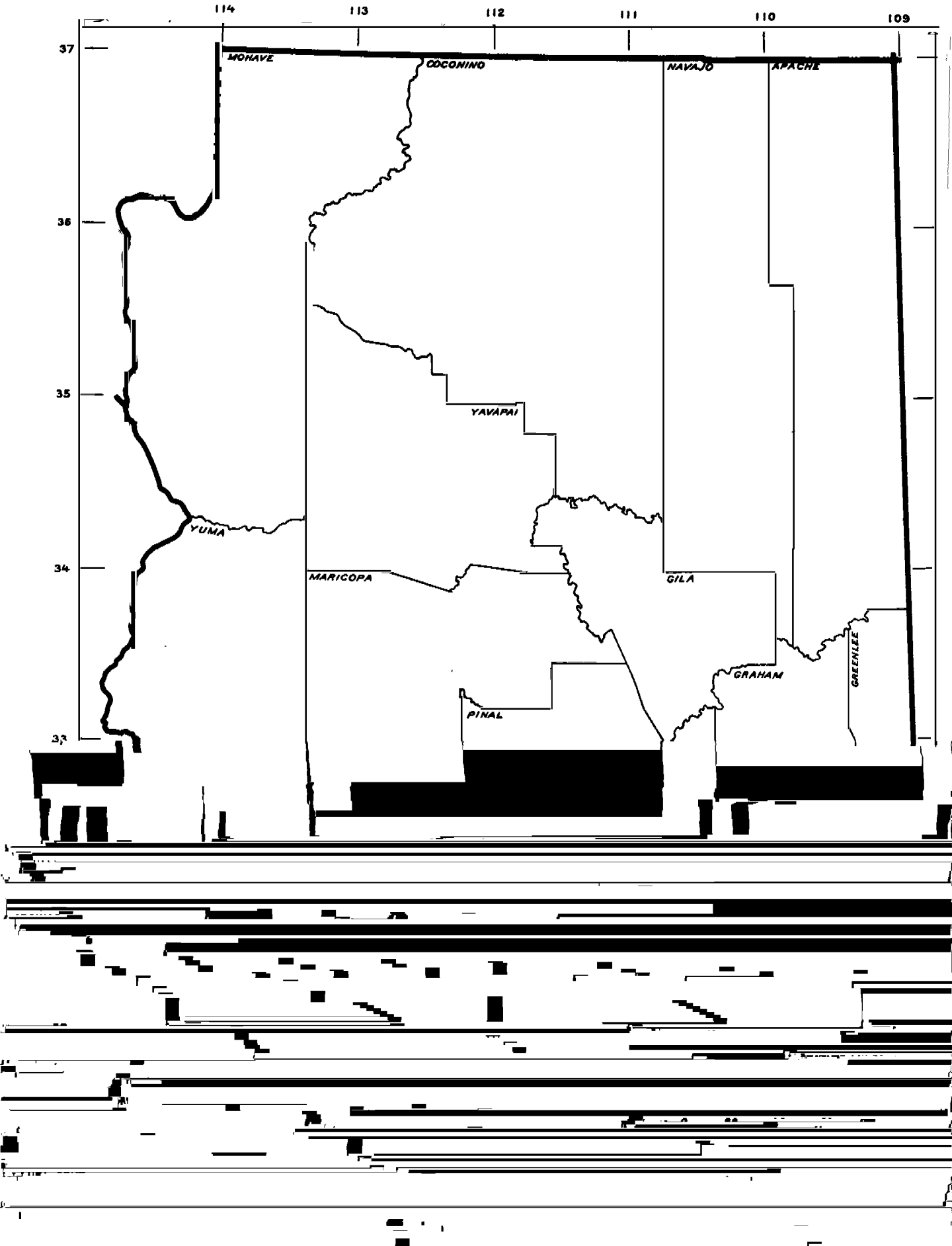
SAMPLE PREPARATION CODES
A=STANDARD PREPARATION.
*=THE 75-250MM FRACTION IS INCLUDED.

BONITA GRAVELLY CLAY
S69Ariz-5-2

Location: Graham County, Arizona. 750 feet south and 100 feet west of the NE corner, Section 24, T11S, R22E. About 21 miles northwest of Willcox. Date of sampling: October 13, 1969. Description by: D. Richmond, H. Havens, K. Dunstan. Collectors: D. Richmond, H. Havens, K. Dunstan.
Classification: Typic Chromustert, fine, montmorillonitic, thermic.
Vegetation: Tobosa grass, annual weeds and few mesquite. Use: Livestock range. Climate: Mean annual precipitation is about 12 to 14 inches. Mean annual air temperature is 61°F., January 45°F., July 79°F. Parent Material: Alluvium from basalt, rhyolite and basaltic andesite. Topography: Slightly convex to smooth, nearly level to gently sloping fan. Slope, 2 percent, northeast facing. Elevation: 4550 feet. Drainage: Well drained. Runoff is very slow. Permeability is very slow. Soil Moisture: Dry when sampled.
Remarks: Field determinations of pH by thymol blue indicator in 1:5 dilution. Paired with sample S69Ariz-5-1. There are many cracks of 1/2 to 2 inches wide that extend from the surface downward to a depth of 20 to 24 inches or more.

HORIZON	DESCRIPTION
A11 RSL 69899	0 to 5 cm (0 to 2 inches), dark brown (7.5 YR 4/2) gravelly clay, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, friable, sticky, plastic; common fine and medium roots; common fine interstitial pores; surface cover about 25 percent of subangular 2 to 3 inch basalt gravel and 10 to 15 percent of 4 to 6 inch cobbles; very slightly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.
A12 RSL 69900	5 to 15 cm (2 to 6 inches), dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; moderate medium and coarse subangular blocky structure; hard, friable, sticky, very plastic; few fine and medium roots; few very fine interstitial and tubular pores; about 5 to 10 percent by volume of 2 to 3 inch rounded basalt gravel; very slightly effervescent; neutral (pH 7.0); clear wavy boundary.
A13 RSL 69901	15 to 36 cm (6 to 14 inches), dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; weak coarse subangular and angular blocky structure; very hard, friable, sticky, very plastic; few fine and medium roots; few very fine interstitial [illegible] volume of 2 to 3 inch rounded basalt gravel; very slightly effervescent; neutral (pH 7.2); clear wavy boundary.
C1 RSL 69902	36 to 58 cm (14 to 23 inches), dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; weak subangular blocky structure with many slickensides that intersect; very hard, friable, sticky, very plastic; few fine and very fine roots; about 3 to 5 percent by volume of 2 to 3 inch rounded basalt gravel; slightly effervescent; moderately alkaline (pH 8.0); gradual wavy boundary.
C2 RSL 69903	58 to 79 cm (23 to 31 inches), dark brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) moist; massive; very hard, friable, sticky, very plastic; few fine and very fine roots; about 3 to 5 percent by volume of 2 to 3 inch rounded basalt gravel; few

ARIZONA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MOHAVE
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