

CHAPTER 8. HAPLUSTALFS AND ARGIUSTOLLS OF THE BIRDWELL,
HALE AND BAILEY SURFACES

The soils occur in mapping units I and J (fig. 27).

ARIDIC HAPLUSTALFS AND ARGIUSTOLLS: MAPPING UNIT I, KEENEY COMPLEX

MAPPING UNIT COMPOSITION

<u>Series or variant</u>	<u>Subgroup</u>	<u>Particle-size family</u>	<u>Percentage of mapping unit</u>
KEENEY	ARIDIC HAPLUSTALFS. . . .	FINE-LOAMY.	65
NEWELL	ARIDIC ARGIUSTOLLS. . . .	FINE-LOAMY.	25
Farwell.	Aridic Haplustalfs. . . .	Coarse-loamy.	10

LOCATION, LANDSCAPE, SOIL OCCURRENCE, VEGETATION

Soils of unit I occur in five small depressions in the central and southern part of the study area. Adjacent dunes contribute runoff to soils of this unit, and dark upper horizons are common. Most soils lack mollic epipedons because high-chroma Bt horizons are too near the surface; these are the Farwell and Keeneey soils. Soils with mollic epipedons occur in areas that have been less subject to strong wind erosion, so that the high-chroma Bt horizon is at greater depth and the epipedon qualifies as mollic.

Vegetation observed in mapping unit I consists of blue grama, hairy grama, sand sagebrush, sand dropseed, catclaw, and soapweed.

TYPICAL PEDON AND RANGES IN SELECTED PROPERTIES

A typical pedon and ranges for Keeneey are given in mapping unit H. Pedon 33d is a typical pedon for Newell. See table 40 for characteristics of Pedon 33d. Ranges in color and texture follow; underlined entries are typical.

The A horizon has hue of 7.5YR through 10YR, value of 3 through 5 (4) dry, 1.5 through 3 (2) moist, and chroma of 2 through 3. It is fine sandy loam or loamy fine sand.

The B2tb horizon has hue of 2.5YR through 4YR, value of 4 through 6 (5) dry, 3.5 through 5 (4) moist, and chroma of 4 through 6. It is heavy fine sandy loam or sandy clay loam, except for thin horizons of sandy clay or clay in some pedons.

Newell soils lack a calcic horizon within 90 cm depth. Usually the Bt horizons of Newell soils are underlain by buried horizons instead of C horizons. Pedon 33d has a buried calcic horizon of Bailey age at 132 cm depth.

STUDY SITES

Sites 47-49, small depressions

Sites 47-49 illustrate the effect of run-in on soils of small blowouts. The sampled soils have dark upper horizons, but not mollic epipedons because lower parts of epipedons are not dark enough or have chromas that are too high.

Site 47

Figures 75-77 locate the blowout at Site 47. Much of the blowout has been heavily trampled by cattle using the water tank. East of the tank and windmill is a shallow, but quite long (about 18 m) trench that apparently was once used for water storage. The surface is level along its southeast side. But about 15 m due south, slope is 1 percent to the north. The lower slopes of the high Birdwell dune just southwest appear to slope to this spot and could have contributed sediments to it. The trench well illustrates the dark A horizon and the relatively clayey B horizon of the blowout. The soil surface in the vicinity is largely covered with spoil and feed.

Pedon 47 (fig. 116, table 56) occurs in the southwest corner of the trench. The epipedon is too light-colored in its lower part for a mollic epipedon (table 56).

The thick Bt horizon is thought to be primarily of Hale age, but the high percentage of clay at the very top of the Bt horizon (table 56) suggests the possibility of a colluvial accumulation. Coarse texture of the A1 horizon probably reflects Birdwell or post-Birdwell erosion and deposition of a younger sediment. Auger samples beneath the bottom of the trench showed that a noncalcareous sandy clay loam B2t horizon extended to about 165 cm depth. A B2tca horizon with carbonate nodules extended from about 165-175 cm depth, where a high-carbonate K horizon of Bailey age was encountered.

A different situation occurs in the northwest part of the trench, where the soils are on the north edge of the blowout and are very near the adjacent dune. The latter dune slopes to this part of the blowout and must have contributed sediment to it. Beneath 12 cm of spoil and feed is an A11 horizon, 15 cm thick, 10YR 3/2, moist, a fine sand, that is lighter-colored

Table 56. Characteristics of the Aridic Haplustalf, Keeney, at Site 47^{1/}

Horizon	Depth, cm	Hue	Value/chroma		Struc- ture	Dry consis- tence	pH	Tex- tural class	Sand 2.0- 0.05 mm	Silt 0.05- 0.002 mm	Clay < 0.002 mm
			Dry	Moist							
A1	0-19	10YR	5/2	3/2	m	sh	6.8	fs	91.7	1.1	7.2
B21t	19-38	7.5YR	5/3	4/3	2fsbk	h	7.6	sc	46.8	8.5	44.7
B22t	34-46	5YR	5/4	4/4	2msbk	vh	7.6	scl	59.6	13.3	27.1
B23t	46-60	4YR	5/6	4/6	2msbk	vh	7.6	scl	68.9	7.4	23.7

^{1/} Subordinate colors follow. A1: parts 10YR 4/1, dry. B22t: parts 5YR 5/6, dry. See text for characteristics of auger samples below 60 cm.

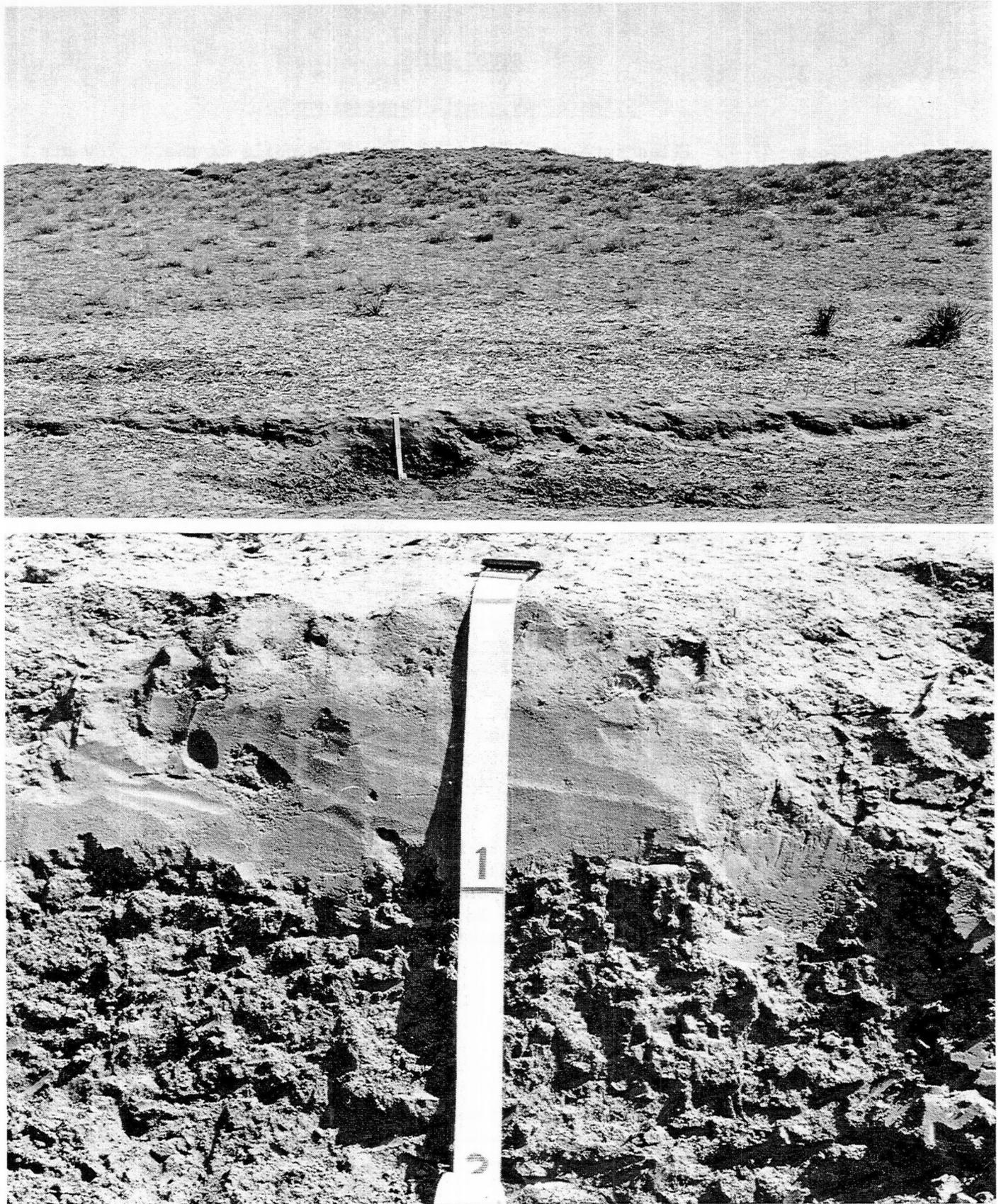


Figure 116. Upper. Landscape view of part of the blowout at Site 47 and the Birdwell dune in the background. The view is south. Photographed March 1981. Lower. The Aridic Haplustalf, Keeney, at Site 47. Several inches of spoil are below the 0 mark at top. Scale is in feet.

and coarser-textured than the underlying A12 horizon, which is 12 cm thick, 10YR 2/2, moist, and a fine sandy loam. The sandy clay loam Bt horizon of Hale age occurs beneath the A12 horizon. The youthful-appearing A11 horizon is likely of Muleshoe age, since Muleshoe sediments occur nearby. The boundary between the A11 and A12 is abrupt, although it is broken in places by crotovinas, and illustrates a feature common along the margins of many blowouts; the accumulation of younger sand over an existing A1 horizon.

Site 48

Site 48 (figs. 88, 91, 117) consists of a study trench in a small depression bordered by high Birdwell dunes. Although content of organic carbon could be high enough for a mollic epipedon, values and chroma in the lower part of the epipedon do not quite meet the requirements. The site illustrates another situation with colluvium: a small depression, with run-in from dunes on the west and south.

Particle size data (table 57) illustrate silicate clay maxima in sediments of different ages. The surface horizon is unusually high in silt and clay, and apparently represents a colluvial deposit of Muleshoe and Longview age. Occurring as it does in the lee of high Birdwell ridges, Site 48 may have been largely protected from strong erosion.

Site 49

Site 49 is also in a small depression. Slopes that border the depression are slightly steeper and more distinct than at Site 48, but the depression at Site 49 lacks the bordering high dunes that are present at Site 48. Possibly because high dunes are absent, Birdwell colluvium does not occur at Site 49.

A photograph of Site 49 was shown earlier (see fig. 24). The soil has dark upper horizons, and organic carbon content would easily be high enough for a mollic epipedon. However, the soil lacks a mollic epipedon because the high-chroma Bt horizon is shallow. Some Bt horizons of Hale age are underlain by buried soils and others by C horizon (see Gile, 1981, for characteristics of soils of Hale age in exposures along Farm Road 1731).

Particle size data (table 57) show a prominent maximum in silicate clay. Clay increases in the lowermost horizon, a buried Bt horizon thought to be of early Hale age.

ARIDIC ARGIUUSTOLLS AND HAPLUSTALFS DOMINANT: MAPPING UNIT J, NEWELL-EXTEE COMPLEX

MAPPING UNIT COMPOSITION

<u>Series or variant</u>	<u>Subgroup</u>	<u>Particle-size family</u>	<u>Percentage of mapping unit</u>
NEWELL, CALCIC			
VARIANT.	ARIDIC ARGIUUSTOLLS.	FINE-LOAMY.	35
NEWELL.	ARIDIC ARGIUUSTOLLS.	FINE-LOAMY.	30
EXTEE.	ARIDIC HAPLUSTALFS.	FINE-LOAMY.	30
Other inclusions (Farwell, SND-2).			5

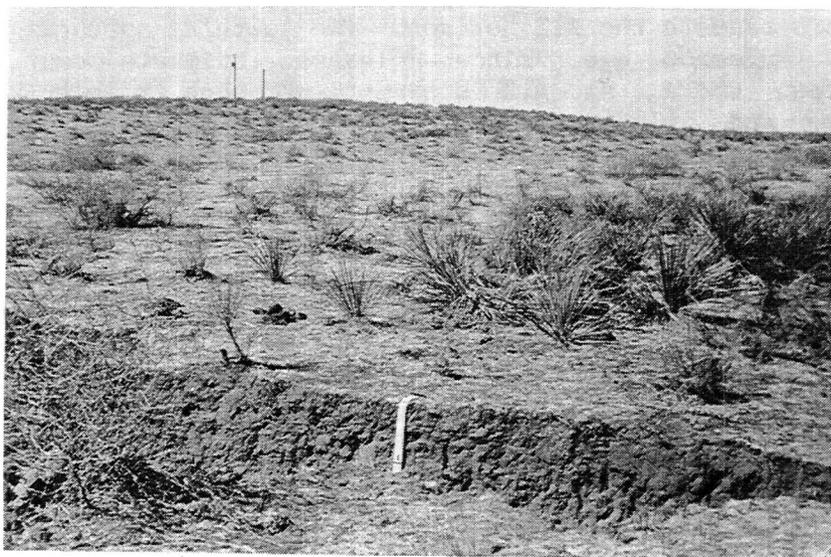


Figure 117. Above. Landscape at Site 48. Birdwell ridges are on the skyline. The view is northwest. Photographed March 1977.

Below. The Aridic Haplustalf, Keeney, Pedon 48. The base of Birdwell sediments is about at the 4 ft (1.2 m) mark. Scale is in feet.

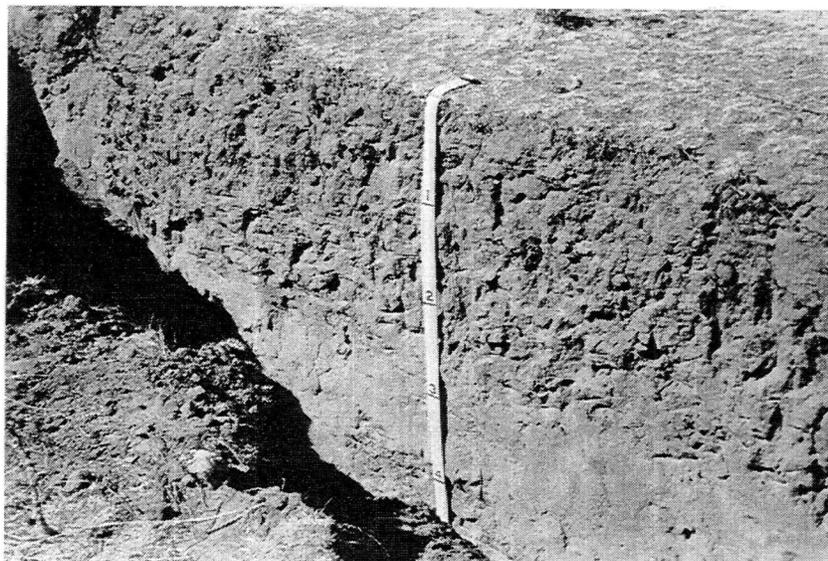


Table 57. Characteristics of Aridic Haplustalfs (Keeney) in depressions at Sites 48 and 49

Sedi- ment	Horizon	Depth, cm	Hue	Value/chroma		Struc- ture	Dry consis- tence	pH	Lower bound- ary	Tex- tural class	Sand	Silt	Clay
				Dry	Moist						2.0- 0.05 mm	0.05- 0.002 mm	< 0.002 mm
<u>Pedon 48^{2/}</u>													
M, L	A1	0-3	7.5YR	4/3	2.5/2		sh,h	6.8	as	scl	51.6	28.9	19.5
B-II	Ab	3-13	7.5YR	4/2	2/2	lmsbk	sh,h	6.4	as	fs1	78.5	10.6	10.9
	B1tb	13-20	5YR	5/4	3.5/4	lcpr- lmsbk	h	6.6	aw	fs1	78.2	11.4	10.4
	B21tb	20-31	5YR	4.5/4	3/4	2mpr- lmsbk	vh	6.4	cw	fs1	70.3	10.6	19.1
	B22tb	31-46	2.5YR	4/4	3/4	2mpr- 2msbk	vh	6.6	as	scl	53.0	14.0	33.0
B-I	B2tb2	46-74	4YR	5/5	4/5	lcpr	vh	6.8	cw	fs1	75.9	5.5	18.6
	B3tb2	74-90	5YR	5/5	4/5	lcpr	h	6.8	cw	lfs	85.1	4.0	10.9
	Cb2	90-113	5YR	5.5/4	4/4	m	sh	6.8	as	fs	91.2	3.0	5.8
R?	B1tb3	113-128	5YR	5.5/4	4/4	lmsbk	sh,h	6.8	cw	fs1	81.2	6.4	12.4
	B2tb3	128-142	5YR	5.5/4	4/4	lmsbk	h	6.8		fs1	81.2	6.9	11.9
<u>Pedon 49^{3/}</u>													
M, L	A1	0-4	7.5YR	5/3	3/3	lf,mp1	sh	6.8	as	fs1	66.7	20.0	13.3
H	Ab	4-16	7.5YR	4.5/2	3/2	lcsbk	h	6.8	as	fs1	76.5	12.8	10.7
	B21tb	16-26	4YR	5/6	4/6	lcpr	vh	6.8	as	fs1	68.9	11.7	19.4
	B22tb	26-42	2.5YR	5/6	4/6	lcpr- lcsbk	vh	6.8	cw	fs1	75.9	4.8	19.3
	B23tb	42-82	2.5YR	5/6	4/6	2cpr- lcsbk	vh	6.8	cw	scl	72.1	4.9	23.0
	B31tb	82-113	2.5YR	5.5/7	4/7	lcpr- lcsbk	h	6.8	cw	lfs	84.1	2.2	13.7
	B32tb	113-153	5YR	6/6	4.5/6	lcpr- lcsbk	sh	7.0	cw	lfs	84.5	3.4	12.1
	Btb2	153-170	5YR	6/6	4.5/6	lcpr- lcsbk	h	7.0		fs1	82.1	3.2	14.7

1/ Subordinate colors and additional characteristics are footnoted to pertinent soils. Sediments identified as M = Muleshoe, L = Longview, B-II = Birdwell II, B-I = Birdwell I, R = Roosevelt, H = Hale.

2/ B21tb, B22tb: have discontinuous coatings of dark organic carbon on ped faces.

3/ A1: weak fine platy in upper cm. B1tb: coatings of organic carbon on ped faces are darker and have lower chroma.

LOCATION, LANDSCAPE, SOIL OCCURRENCE, VEGETATION

Soils of unit J occur in narrow, elongate portions of depressions that border high dunes. The dunes contribute runoff to these areas, and most soils have mollic epipedons. Some soils (Extee and Farwell) lack mollic epipedons because high-chroma Bt horizons are too shallow. These areas are difficult to predict because of smooth slopes, but their occurrence is thought to be due to wind erosion of soils that once had high-chroma Bt horizons at greater depths. Newell, calcic variant has a calcic horizon within 90 cm depth and is in sediments of Bailey age. SND-2, a Vertisol, occurs in a small depression in the southeasternmost delineation of the mapping unit (see figs. 88-91).

Vegetation observed in mapping unit J consists of catclaw, blue grama, hairy grama, snakeweed, sand sagebrush, vine mesquite, and blueweed. On aerial photographs the catclaw appears as irregular dark, patchy areas. The vine mesquite occurs in small, slightly lower areas of heavier texture and occurs with blueweed in the small area of Vertisols mentioned above.

TYPICAL PEDON AND RANGES IN SELECTED PROPERTIES

A typical pedon and ranges for Newell are given in mapping unit I. Pedon 50 is a typical pedon for Newell, calcic variant. See table 58 for characteristics of Pedon 50. Ranges in color and texture follow; underlined entries are typical. Two underlined entries indicate that it is typical for both entries to occur in the stated horizon.

The A horizon has hue of 7.5YR through 10YR, value of 3.5 through 4.5 (4) dry, 2 through 3 (2.5) moist, and chroma of 2 through 3. It is fine sandy loam or loamy fine sand.

The B2t horizon has hue of 2.5YR through 7.5YR (3YR), value of 3 through 5 dry, 1.5 through 3.5 moist, and chroma of 2 through 4 (2, 3). It is sandy clay loam or clay loam.

The K2 horizon has hue of 7.5YR through 10YR, value of 8 through 9 dry, 7 through 8 moist, and chroma of 2 through 3. It is clay loam, sandy clay loam or clay.

In some soils, the K2 horizon is underlain by a C horizon. In other soils the K2 horizons are very thick and the underlying material is not known.

STUDY SITE

Site 50, blowout

Site 50 (figs. 88-91, table 58) has been illustrated (fig. 25). This area receives run-in from the high Birdwell dune to the east. Organic carbon is easily high enough for a mollic epipedon (table 58). Chromas and values qualify for a mollic epipedon, and the soil is the Aridic Argiustoll, Newell, calcic variant. These soils have a prominent calcic horizon within 90 cm depth (table 58).

Table 58. Characteristics of the Aridic Argiustoll, Newell, calcic variant, in a large blowout of Bailey age; Site 50 1/

Horizon	Depth, cm	Hue	Value/chroma		Structure	Dry consistency	pH	Lower boundary	Textural class	Sand	Silt	Clay	Organic C, %
			Dry	Moist						2.0-0.05 mm	0.05-0.002 mm	< 0.002 mm	
A1	0-6	7.5YR	4/2	2.5/2	2f,msbk	h	7.0	cs	fs1	58.8	23.2	18.5	2.51
B21t	6-13	7.5YR	3/2	1.5/2	2f,msbk	vh	7.4	cs	scl	52.2	23.4	24.4	2.34
B22tca	13-20	5YR	5/3	3.5/3	2f,msbk	vh	7.6	as	scl	45.6	21.5	32.9	1.54
K1	20-37	6YR	6/3	5/4	lfsbk	vh		cw	scl				
K21	37-60	6YR	7/4	6/4	lmsbk	vh		cw	clay				
K22	60-106	7.5YR	9/3	8/3	lfsbk	h,vh		cw	cl				
K3	106-131	7.5YR	8/3	7/4	lmsbk	h,sh		cw	fs1				
Clca	131-167	5YR	7/4	5.5/4	m	sh		s	fs1				
C2ca	167-177	5YR	7/4	5/4	m	s			lfs				

1/ B22tca: parts 5YR 7/3, dry; a few carbonate nodules; most parts effervesce weakly. K1: parts 7.5YR 8/2, dry. K21: parts 7.5YR 8/2, dry, and 6YR 6/4, dry. K22: parts 7.5YR 8/3, dry. Clca: has carbonate in the form of occasional nodules and discontinuous grain coatings. C2ca: has carbonate in the form of occasional discontinuous grain coatings; a few parts noncalcareous.

