

Soil Classification

The system of soil classification used by the National Cooperative Soil Survey has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. This survey was mapped to the family level. In table 3, the soils of the survey area are listed alphabetically and are classified according to the system. Table 4 lists the soil major components of each map unit. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences between orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in "sol". An example is Alfisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Xeralf (Xer meaning dry, plus alf, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haploxeralf (Hapl, meaning minimal hori-

zation, plus xeralf, the suborder of the Alfisols that have a xeric moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group, but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective Lithic identifies the subgroup that has hard parent rock within 50 centimeters of the surface. An example is Lithic Haploxeralfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is loamy, mixed, thermic Lithic Haploxeralfs.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Orders in Survey Area

Five soil orders are represented in the Inyo National Forest westside survey area: Entisols, Inceptisols, Aridisols, Mollisols and Alfisols.

The soils in the survey area have xeric and torric moisture regimes and thermic, mesic, frigid or cryic temperature regimes. The xeric moisture regime is typical in Mediterranean climates, where summers are warm and dry and winters are cool and moist. Therefore, unless the soil is irrigated, its moisture control section is dry in all parts for 45 consecutive days or more from July until October in six out of ten years. The moisture control section is moist in all parts for 45 consecutive days or more from December until May. A soil with a torric moisture regime normally occur in arid environments. Generally, unless a soil is irrigated, its moisture control section is dry for more than half the year and moist in some or all parts for less than 90 consecutive days.

The temperature regime is thermic at lower elevations, particularly on south and southwest-facing aspects. In a thermic temperature regime, the soil temperature at a depth of 20 inches ranges from 59 to 72°F. At slightly higher elevations, the temperature regime is mesic. In a mesic temperature regime, the soil temperature at a depth of 20 inches ranges from 47 to 59°F. In frigid and cryic temperature regimes, which occur at the highest elevation, particularly on north-facing aspects for the cryic regime, the soil temperature at a depth of 20 inches ranges from 32 to 47°F. A soil with a frigid regime is warmer in the summer than a soil with a cryic regime.

Entisols are immature soils that have little or no evidence of development of pedogenic horizons. Entisols in the survey area are Aquent, Fluvent, Orthent and Psamment suborders. Generally, these soils do not have a subsurface (B) horizon, and have in most cases, less than one percent organic matter.

Aquents have wet conditions in some part of the profile in most years, have a texture of loamy fine sand or coarser and enough active ferrous iron to be evident in prominent reddish or yellowish hue. These soils are found in wet meadows and near saline water bodies.

Fluvents have a slope of less than 25 percent, an irregular decrease on organic-carbon content from a depth of 10 inches to a depth of 100 inches. The organic carbon reaches a level of 0.2 percent carbon or more within a depth of 100 inches. Conversely, Orthents have a slope of greater than 25 percent or have an

organic carbon content that decrease regularly with increasing depth. In the Orthent subgroup, organic carbon reaches a level of 0.2 percent or less within a depth of 100 inches. Orthents have a particle-size class that is loamy or finer in texture in some horizon below the Ap. Meanwhile, Psamments are loamy fine sand or coarser in the textural control section. These soils are found on alluvial fans and are deep to very deep. The Fluvents, Orthents and Psamments have been placed in the Xerofluvents, Xerorthents, Torriorthents, Cryorthents, Torripsamments and Cryopsamments great groups since they have Xeric or Torric moisture regimes or a cryic temperature regime.

Inceptisols are soils in which weakly-developed altered horizons have developed but have retained some weatherable minerals. These soils do not have an illuvial horizon enriched either with silicate clay that contains aluminum or with an amorphous mixture of aluminum and organic carbon.

The Inceptisols in the survey area are in the Ochrept and Umbrept suborders. Soils in the Ochrept suborder have a ochric epipedon, basically a light-colored surface layer with little organic matter, and a weakly-developed B horizon or cambic horizon. Soils in the Umbrept suborder have a umbric epipedon and a cambic horizon. An umbric epipedon is a surface layer which has a dark color, at least one percent organic matter, is more than seven inches thick, has less than 50 percent base saturation and is not both hard and massive. The texture is coarse sandy loam or finer. These soils have a xeric soil moisture regime or a cryic temperature regime and thus have been placed in the Xerochrept, Cryochrept and Cryumbrept great groups.

Aridisols are soils which have an aridic (torric) soil moisture regime and have a ochric epipedon. Aridisols in the survey area are Durids, Argids and Cambids. Durids are soils which have a duripan, which is a subsurface horizon, cemented by illuvial silica and has its upper boundary within 38 inches of the soil surface. Argids are Aridisols that have illuvial horizon enriched with silicate clay or sodium and an epipedon that is not both hard and massive when dry. Conversely, Cambids do not have illuvial horizons enriched in silicate clay, but have may have horizons enriched in calcium carbonate, magnesium carbonate, or gypsum.

Mollisols typically have a dark-colored surface layer or epipedon which is more than seven inches thick, has more than one percent organic matter, and more than 50 percent base saturation and is not both hard and massive.

In the survey area, the Mollisols are in the Aquoll, Boroll, and Xeroll suborders. Aquolls have wet conditions for some time in most years and may have a histic epipedon or high sodium percentage in the upper part of the surface layer or a distinct redox concentration in the lower part of the mollic epipedon. Borolls have either a frigid, cryic or peregelic temperature regime. Finally, Xerolls are Mollisols that have a xeric moisture regime.

Borolls are divided into two great groups: Cryoborolls and Paleborolls. Cryoborolls are soils that do not have a clay-enriched B horizon and have a cryic temperature regime. Soils that have a clay-enriched B horizon and a texture finer than loamy fine sand are classified as Paleborolls.

Xerolls are also divided into two great groups: Argixerolls and Haploxerolls. In this comparison, Argixerolls have a B horizon enriched with silicate clay and Haploxerolls do not.

Alfisols are soils that have a massive and hard surface horizon and an argillic (clay accumulation) B horizon. They have high base saturation, and water is held at less than 15 bar tension during at least three months of each year when the soil is warm enough for plants to grow. Alfisols in this area have been placed in the Boralf and Xeralf suborders. Boralfs have either a frigid, cryic or peregelic temperature regime and Xeralfs have a xeric soil moisture regime.

TABLE 3. - Classification of the Soils

Soil Name	Family or Higher Taxonomic Class
Abgese family	Fine-loamy, mixed, mesic Lithic Xeric Haplargids
Aeric Endoaquents	Aeric Endoaquents
Alamedawell family	Ashy, calcareous, mesic Vitrandic Torriorthents
Aquandic Endoaquolls	Aquandic Endoaquolls
Aquic Cryoborolls	Aquic Cryoborolls
Aquic Haploxerolls	Aquic Haploxerolls
Arizo family	Sandy-skeletal, mixed, thermic Typic Torriorthents
Artray family	Coarse-loamy, mixed, mesic Cumulic Endoaquolls
Atter family	Sandy-skeletal, mixed, mesic Typic Xerorthents
Avalmount family	Ashy-skeletal, mesic Vitrixerandic Haplocambids
Bairs family	Loamy-skeletal, mixed, mesic Xeric Haplargids
Basket family	Loamy-skeletal, mixed, frigid Xeric Haplargids
Bearskin family	Loamy, mixed, frigid Lithic Argixerolls
Berent family	Mixed, mesic Xeric Torripsamments
Biglake family	Sandy-skeletal, mixed, frigid Typic Haploxerolls
Brantel family	Ashy, mesic Vitrandic Torripsamments (86P0976)
Buscones family	Ashy, mesic Vitrandic Torripsamments
Cajon family	Mixed, thermic Typic Torripsamments
Calpine family	Coarse-loamy, mixed, mesic Aridic Haploxerolls
Cartago family	Sandy, mixed, thermic Xeric Torriorthents
Charcol family	Loamy-skeletal, mixed Cryic Pachic Paleborolls
Chesaw family	Sandy-skeletal, mixed, frigid Entic Haploxerolls
Corbett family	Mixed, frigid Typic Xeropsamments
Cowood family	Loamy-skeletal, mixed Lithic Cryochrepts

Soil Name	Family or Higher Taxonomic Class
Cozetica family	Ashy, frigid Vitrandic Torripsamments (86P0979)
Credo family	Fine-loamy, frigid Xeric Haplargids
Cumulic Haploxerolls	Cumulic Haploxerolls
Dechambeau family	Coarse-loamy-skeletal, mixed (nonacid), mesic Xeric Torriorthents
Deepwell family	Ashy, mesic Vitrandic Torripsamments
Delaney family	Ashy, mesic Vitrandic Xeropsamments
Fez family	Ashy, frigid Vitrandic Haploxerolls
Garlet family	Loamy-skeletal, mixed Typic Cryochrepts
Glean family	Loamy-skeletal, mixed, frigid Pachic Haploxerolls
Goodale family	Sandy-skeletal, mixed, thermic Xeric Torriorthents
Guiser family	Loamy-skeletal, mixed Mollic Cryoboralfs
Haypress family	Sandy, mixed, frigid Entic Haploxerolls
Jaybee family	Loamy, mixed, mesic Lithic Xeric Haplargids
Kilburn family	Loamy-skeletal, mixed, mesic Typic Haploxerolls
Kiona family	Loamy-skeletal, mixed, mesic Xeric Haplocambids
Koehler family	Sandy, mixed, mesic Xeric Haplodurids
Labshaft family	Loamy-skeletal, mixed Lithic Cryoborolls
Lakash family	Ashy-pumiceous, mesic Vitrandic Torriorthents (86P0977)
Lithic Cryorthents	Lithic Cryorthents
Lubkin family	Loamy-skeletal, mixed, thermic Xeric Haplargids
Mascamp family	Loamy-skeletal, mixed, frigid Lithic Argixerolls
Mottsville family	Sandy, mixed, mesic Torripsammentic Haploxerolls
Nanamkin family	Sandy-skeletal, mixed, frigid Typic Xerorthents
Neuske family	Fine-loamy, mixed, frigid Mollic Haploxeralfs
Ola family	Coarse-loamy, mixed, frigid Pachic Haploxerolls

Soil Name	Family or Higher Taxonomic Class
Orecart family	Ashy, mesic Vitrandic Torripsamments
Pass Canyon family	Loamy, mixed, mesic Lithic Argixerolls
Pizona family	Loamy-skeletal, mixed, mesic Xeric Haplargids
Poole family	Fine-silty, mixed (calcareous), mesic Typic Endoaquents
Powment family	Sandy-skeletal, mixed, frigid, shallow Typic Xerorthents
Preston family	Mixed, mesic Typic Xeropsamments
Railcity family	Sandy-skeletal, mixed, frigid Typic Xerorthents
Salt Chuck family	Sandy-skeletal, mixed Entic Cryumbrepts
Sherwin family	Ashy, nonacid, mesic Lithic Xeric Torriorthents
Sonoma family	Fine-silty, mixed (calcareous), mesic Aerlic Fluvaquents
Spainhower family	Clayey-skeletal, mixed, thermic Xeric Haplargids
Springmeyer family	Fine-loamy, mixed, mesic Aridic Argixerolls
Stacy family	Coarse-loamy, mixed, mesic Aridic Duric Haploxerolls
Stecum family	Sandy-skeletal, mixed Typic Cryorthents
Sumine family	Loamy-skeletal, mixed, frigid Aridic Argixerolls
Sur family	Loamy-skeletal, mixed, mesic Entic Haploxerolls
Taboose family	Ashy-skeletal, thermic Vitrandic Torriorthents
Tinemaha family	Loamy-skeletal, mixed thermic Xeric Haplargids
Toquerville family	Mixed, thermic Lithic Torripsamments
Torriorthentic Haploxerolls	Torriorthentic Haploxerolls
Typic Fluvaquents	Typic Fluvaquents
Vitrandic Cryopsamments	Vitrandic Cryopsamments
Vitrandic Cryorthents	Vitrandic Cryorthents
Vitrandic Haplodurids	Vitrandic Haplodurids
Vitrandic Haploxerolls	Vitrandic Haploxerolls (86P0975)

Soil Name	Family or Higher Taxonomic Class
Vitrandic Torriorthents	Vitrandic Torriorthents
Vitrandic Torripsamments	Vitrandic Torripsamments
Vitrandic Xerochrepts	Vitrandic Xerochrepts
Vitrandic Xerofluvents	Vitrandic Xerofluvents
Vitrandic Xerorthents	Vitrandic Xerorthents (86P0978, 86P0981, 86P0982, 86P0983)
Vitrandic Xeropsamments	Vitrandic Xeropsamments (86P0984)
Waterman family	Sandy-skeletal, mixed, mesic Lithic Xerorthents
Watterson family	Loamy-skeletal, mixed, mesic Pachic Haploxerolls
Whitewolf family	Mixed, thermic Xeric Torripsamments
Wrango family	Sandy-skeletal, mixed, mesic Xeric Torriorthents
Xeric Torriorthents	Xeric Torriorthents
Xerofluvents	Xerofluvents
Yellowhills family	Ashy, mesic Vitritorrandic Haploxerolls

Table 4 - Soil Components in Map Units
(Miscellaneous area and minor components are not included)

Soil Name	Map Unit
Abgese family	302, 303, 304
Aeric Endoaquents	381
Alamedawell family	379
Aquandic Endoaquolls	155
Aquic Cryoborolls	159
Aquic Haploxerolls	374
Arizo family	404
Artray family	406, 409
Atter family	312, 313, 346
Avalmount family	386
Bairs family	402
Basket family	326, 335
Bearskin family	323, 333, 334, 368
Berent family	322, 341, 353, 354, 361, 362
Biglake family	110, 332, 349, 352
Brantel family	139, 142, 146, 163, 310, 315, 317, 382
Buscones family	411, 412
Cajon family	404
Calpine family	172, 175, 176
Cartago family	400
Charcol family	156, 158, 206
Chesaw family	108, 110, 203, 406
Corbett family	111, 131, 132, 133, 204, 345
Cowood family	156, 363
Cozetica family	140 144
Credo family	336
Cumulic Haploxerolls	384
Dechambeau family	378, 408
Deepwell family	375, 379, 383
Delaney family	305, 306, 316, 341
Fez family	173, 318, 324
Garlet family	363, 365, 387
Glean family	205, 215, 338
Goodale family	400
Guiser family	157
Haypress family	114, 116, 160
Jaybee family	325, 357
Kilburn family	348, 355, 356
Kiona family	350, 370
Koehler family	331

Soil Name	Map Unit
Labshaft family	371, 373
Lakash family	146
Lithic Cryorthents	201, 342, 369
Lubkin family	405
Mascamp family	326, 336, 368
Mottsville family	172, 177, 351
Nanamkin family	149, 200, 204, 205, 217, 323, 345, 347, 355, 356, 369, 372
Neuske family	301, 335
Ola family	338
Orecart family	378, 383
Pass Canyon family	302, 303, 304, 325, 343
Pizona family	413
Poole family	377, 381, 382
Powment family	359, 360, 372
Preston family	343, 364
Railcity family	108, 132, 133, 216, 218
Salt Chuck family	148, 340, 352, 371
Sherwin family	411
Sonoma family	377
Spainhower family	405
Springmeyer family	170
Stacy family	331
Stecum family	148, 157, 158, 201, 206, 213, 342, 365, 366, 367, 387
Sumine family	171
Sur family	319, 320, 350
Taboose family	401
Tinemaha family	405
Toquerville family	403
Torriorthentic Haploxerolls	161, 162, 174, 177, 328, 329, 330, 410
Typic Fluvaquents	384
Vitrantic Cryopsamments	136, 150, 152, 153
Vitrantic Cryorthents	101, 122, 126, 127, 145, 150, 154
Vitrantic Haplodurids	380
Vitrantic Haploxerolls	105, 115, 121, 124, 149
Vitrantic Torriorthents	314, 316, 317, 380, 385
Vitrantic Torripsamments	375
Vitrantic Xerochrepts	164
Vitrantic Xerofluvents	169
Vitrantic Xerorthents	101, 107, 115, 122, 124, 126, 137, 138, 143, 308, 337, 344
Vitrantic Xeropsamments	106, 107, 111, 121, 122, 131, 134, 138, 143, 145, 151, 173, 307, 309, 311, 324, 337

Soil Name	Map Unit
Waterman family	319, 320
Watterson family	410
Whitewolf family	403
Wrango family	312, 313, 327, 328, 329, 330, 339, 353, 358, 361, 413
Xeric Torriorthents	362
Xerofluvents	407
Yellowhills family	163, 321

Taxonomic Unit Descriptions

In this section, each soil family or higher category recognized in the survey area is described. The descriptions are arranged in alphabetical order. Characteristics of the soil and the material in which it formed are identified for each family. The pedon, a small three-dimensional area of the soil that is typical of the soil profile in the survey area, is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual.

Many of the technical terms used in the descriptions are defined in *Keys to Soil Taxonomy*. The soil moisture conditions at the time soil colors were described are given. Following the pedon description is the range of important characteristics of the soils in each family. The map units of each soil family are described in the section "Detailed Soil Map Units".

ABGESE FAMILY

The Abgese family consists of moderately deep, well drained soils forming in material weathering from granitic rock. These soils are on mountainsides, and have slopes of 15 to 90 percent. Elevation is 6,600 to 9,600 feet. The mean annual precipitation is about 5 to 25 inches, and the mean annual temperature is about 45°F.

Taxonomic Class: Fine-loamy, mixed, mesic Xeric Haplargids

Typical Pedon: The representative profile for this soil is on a northwest-facing mountainside, under pinyon pine and big sagebrush, at an elevation of 7,600 feet. Colors are for dry soil unless otherwise noted.

- A1 – 0 to 3 inches; grayish brown (10YR 5/2) cobbly coarse sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine, and few medium roots; many medium interstitial pores; 15 percent gravel, 10 percent cobbles and 5 percent stones; slightly acid (pH 6.5); clear wavy boundary.
- A2 – 3 to 7 inches; grayish brown (10YR 5/2) loamy coarse sand, dark brown (10YR 3/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine, and few medium roots; many medium interstitial pores; 5 percent gravel and 5 percent cobbles; neutral (pH 6.8); clear wavy boundary.
- BE – 7 to 10 inches; brown (10YR 5/3) gravelly loamy sand, dark brown (10YR 4/3) moist; weak fine subangular blocky structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; many very fine and fine, and few medium roots; many medium interstitial pores; 25 percent gravel and 5 percent cobbles; neutral (pH 6.8); abrupt smooth boundary.
- 2Bt1 – 10 to 17 inches; yellowish brown (10YR 5/4) gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure, parting to moderate very fine and fine subangular blocky; slightly hard, firm, sticky and slightly plastic; few very fine, fine and medium roots; few very fine, fine and medium interstitial pores; few thin clay films on ped faces and lining interstitial pores; 15 percent gravel; neutral (pH 6.6); clear wavy boundary.

2Bt2 – 17 to 26 inches; yellowish brown (10YR 5/4) very gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure, parting to moderate fine and medium subangular blocky; hard, firm, sticky and plastic; few very fine and fine roots; few very fine and fine interstitial pores; few moderately thick clay films bridging mineral sand grains; 40 percent gravel; neutral (pH 6.6); abrupt smooth boundary.

Cr – 26 inches; weathered granitic bedrock, which can be cut with a tilespade.

Type Location: About 660 feet east and 165 feet south of the apparent center of Section 23, T.1S., R.30E., MDBM, Glass Mountain SW Quadrangle.

Range in Characteristics: Soil depth is 20 to 40 inches to paralithic or lithic contact. The mean annual soil temperature at 20 inches is about 53°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is all of the argillic horizon. It is sandy clay loam with 27 to 32 percent clay. Rock fragments are 5 to 40 percent gravel and 0 to 20 percent cobbles, and average 25 to 29 percent by volume.

Some pedons lack BE horizons. Other pedons have C horizons underlying the argillic horizon.

The surface A horizon has dry color of 10YR 5/2 or 6/3; moist color is 10YR 3/2 or 3/3. It is loamy sand or coarse sand, with 1 to 3 percent clay. Rock fragments are 15 to 55 percent gravel, 10 to 20 percent cobbles and 5 to 10 percent stones by volume. Reaction is slightly acid to neutral.

The underlying A horizons have dry color of 10YR 5/2, 5/3 or 6/3; moist color is 10YR 3/3 or 4/3. They are sandy loam, loamy sand or loamy coarse sand, with 1 to 5 percent clay. Rock fragments are 5 to 25 percent gravel, 5 to 20 percent cobbles and 0 to 10 percent stones by volume. Reaction is neutral.

The B horizon has dry color of 10YR 5/3 or 5/4; moist color is 10YR 4/3 or 4/4. It is sandy clay loam, with 27 to 32 percent clay. Rock fragments are 5 to 40 percent gravel and 0 to 20 percent cobbles by volume. Reaction is neutral.

AERIC ENDOAQUENTS

These Aeric Endoaquents consist of deep, poorly drained soils forming in alluvium and lake sediments weathered from mixed rocks which includes a high percentage of volcanic ash. These soils are on lake terraces, and have slopes of 0 to 2 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Aeric Endoaquents

Typical Pedon: The representative profile for this soil is on a southeast-facing lake terrace, under saltgrass, sedges with some greasewood and rabbitbrush, at an elevation of 6,400 feet. Colors are for dry soil unless otherwise noted.

A1 - 0 to 3 inches; light olive gray (5Y 6/2) sandy loam, olive gray (5Y 5/2) moist; weak coarse platy structure to massive; slightly hard, very friable, slightly sticky and plastic; few very fine and fine roots; common very fine and fine vesicular and irregular pores; strongly effervescent; moderately alkaline (pH 8.4); abrupt smooth boundary.

C1 - 3 to 12 inches; light olive gray (5Y 6/2) coarse sandy loam, olive (10YR 4/3) moist; massive and single grain; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine, few medium and coarse roots; common fine irregular pores; strongly effervescent; very strongly alkaline (pH 9.2); abrupt smooth boundary.

C2 - 12 to 20 inches; pale olive (5Y 6/3) silty clay loam, olive (5Y 4/3) moist; massive; slightly hard, very friable, sticky and plastic; many very fine and fine, few medium and coarse roots; few very fine tubular pores; strongly effervescent; very strongly alkaline (pH 9.4); abrupt smooth boundary.

C3 - 20 to 40 inches; light gray (5Y 7/2) silty clay loam,

olive gray (5Y 4/2) moist; massive to weak fine platy structure; slightly hard, very friable, sticky and plastic; common very fine and fine, few medium and coarse roots; common very fine and fine tubular pores; strongly effervescent; strongly alkaline (pH 9.0); abrupt smooth boundary.

C4 - 40 to 60 inches; olive gray (5Y 5/2) silt loam, olive gray (5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and plastic; few very fine, fine and medium roots; very few very fine and fine pores interstitial pores; strongly effervescent; strongly alkaline (pH 9.0).

Type Location: The representative pedon is from the Bodie-Coleville survey, at northeast corner of the northeast corner, Sec., 32, T.3N., R.27E., Mono County, Bodie SW Quadrangle.

Range in Characteristics: Soil depth ranges from 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The texture of the control section is silty clay loam or silt loam, and clay content ranges from 20 to 35 percent. The soil is strongly calcareous and strongly or very strongly alkaline (pH 9.0 to 9.4). Hue is mostly 5Y but strata with 2.5Y hue are in some pedons. Value is mostly 6 or 7 dry and 4 or 5 moist but ranges to 5 dry and 3 moist in strata of some pedons. Chroma is 2, 3, or 4.

The A horizon has color of 5Y 6/3, 5/3, 7/2, 5/3, and 5/2 dry; and 5Y 5/2, 5/3, 5/4, 4/2, 4/3 and 4/4 moist. It is sandy loam, with 4 to 18 percent clay. Reaction is moderately alkaline.

The C horizon has color of 5Y 7/2, 7/3, 7/4, 6/2, 6/3, 6/4, 5/4, 5/3 and 5/2 dry; and 5Y 5/2, 5/3, 5/4, 4/2, 4/3 and 4/4 moist. It is silty clay loam silt loam or coarse sandy loam, with 4 to 35 percent clay. Reaction is strongly alkaline.

ALAMEDAWELL FAMILY

The Alamedawell family consists of very deep, somewhat excessively drained soils forming from ashy alluvium or aeolian deposits underlain by old lake sediments. These soils are on hummocky lake terraces, and have slopes of 2 to 15 percent. Elevation is 6,400 to 6,700 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 47°F.

Taxonomic Class: Ashy, calcareous, mesic Vitrandic Torriorthents

Typical Pedon: The representative profile for this soil is on a northeast-facing lake terrace, in an interdune, under Douglas rabbitbrush, Wyoming big sagebrush, gray horsebrush, little horsebrush, greasewood, annual forbs, Indian ricegrass, inland saltgrass, Nevada dalea and common pricklygilia, at an elevation of 6,660 feet. Slope is 3 percent. When described (6/3/80), the soil was moist throughout. Colors are for dry soil unless otherwise noted.

A – 0 to 3 inches; light gray (10YR 7/2) loamy sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; 5 percent fine pumice gravel; moderately alkaline (pH 8.2); clear smooth boundary.

C1 – 3 to 32 inches; light gray (10YR 7/2) loamy sand, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; strongly effervescent; moderately alkaline (pH 8.3); abrupt smooth boundary.

2Cq2 – 32 to 38 inches; light gray (2.5Y 7/2) silt loam, light brownish gray (2.5Y 6/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; discontinuous 1/8 inch thick silica-cemented laminar capping, violently effervescent; strongly alkaline (pH 8.8); abrupt smooth boundary.

2C3 – 38 to 39 inches; light gray (10YR 7/1) silt loam, light gray (10YR 6/1) moist; strong medium platy structure; hard, firm, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; violently effervescent; strongly alkaline (pH 8.8); abrupt smooth boundary.

2C4 – 39 to 42 inches; light gray (2.5Y 7/2) silt loam, light brownish gray (2.5Y 6/2) moist; massive; soft,

very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; violently effervescent; strongly alkaline (pH 8.8); abrupt smooth boundary.

2C5 – 42 to 45 inches; light gray (10YR 7/1) silt loam, light gray (10YR 6/1) moist, with bands of light gray (2.5Y 7/2) and light brownish gray (2.5Y 6/2) moist; strong medium platy structure; hard, firm, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; strongly effervescent; strongly alkaline (pH 8.9); abrupt smooth boundary.

3C6 – 45 to 46 inches; light gray (2.5Y 7/2) sand, light brownish gray (2.5Y 6/2) moist; with yellow (2.5Y 7/6) mottles, olive yellow (2.5Y 6/6) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; strongly effervescent; strongly alkaline (pH 8.9); abrupt smooth boundary.

4C7 – 46 to 60 inches; light olive gray (5Y 6/2) silt loam, olive gray (5Y 5/2) moist; moderate medium and coarse subangular blocky structure; hard, firm, nonsticky and nonplastic; few very fine roots; few very fine interstitial and tubular pores; violently effervescent; strongly alkaline (pH 8.9).

Type Location: In the Bodie-Coleville Soil Survey Area, about 14 miles east by northeast of Lee Vining, California, 0.2 mile west of a prominent drainageway and 20 feet north of jeep trail, between two dunes; about 1,250 feet west and 2,750 feet north of the southeast corner of Section 36, T.3N., R.28E., MDBM, Trench Canyon Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. Depth to the stratified lacustrine sediments is 20 to 36 inches. Ash content is 60 to 80 percent by weight in the A and upper C horizon, and 30 to 50 percent in the lower C horizon lake sediments. The moist bulk density of the A and the upper C horizons is 1.3 to 1.45 g/cc and the dry bulk density is 1.1 to 1.25 g/cc. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F.

The A horizon has dry color of 10YR 7/2 or 6/2; moist color is 10YR 5/2 or 4/2. It is loamy sand. Rock fragments are 5 to 10 percent fine pumice gravel by

volume. Reaction is mildly or moderately alkaline.

The upper C horizon has dry color of 10YR 7/2 or 6/2; moist color is 10YR 5/2 or 4/2. It is loamy sand or sand, with 1 to 5 percent clay. Rock fragments are 0 to 5 percent fine pumice gravel by volume. It is slightly to strongly effervescent. Lime is disseminated and the soil contains slightly more soluble salts and exchangeable sodium than the A horizon. Reaction is slightly to moderately alkaline.

The 2C, 3C and 4C horizons have dry color of 5Y 5/2

or 6/2, or 2.5Y 6/2 or 7/2, or 10YR 7/1, 7/2 or 8/1; moist color is 5Y 4/2 or 5/2, or 2.5Y 4/2, 5/2 or 6/2, or 10YR 5/1, 5/2 or 6/1. Mottles with bright chroma are present in some horizons. These horizons consist of thin strata of silt loam, loam or sand. Typically, the strata range from 1 to 7 inches thick, but some may be as thick as 15 inches. Gravelly substratum soils are recognized, with textures of stratified very gravelly loamy sand through gravelly sand. Sandy substratum phases are also recognized. The exchangeable sodium percentage ranges from 15 to 30 ds/m. Reaction is moderately to strongly alkaline.

AQUANDIC ENDOAQUOLLS

These Aquandic Endoaquolls consist of deep, poorly drained soils forming in alluvium derived from pyroclastic deposits which include pumice and volcanic ash. These soils are in bottomlands and concave sand flats, and have slopes of 0 to 5 percent. Elevation is 7,800 to 8,100 feet. The mean annual precipitation is about 10 to 15 inches, and the mean annual temperature is about 45°F.

Taxonomic Class: Aquandic Endoaquolls

Typical Pedon: The representative profile for this soil is on a southeast-facing sand flat, under big sagebrush, various sedges and grasses, at an elevation of 7,800 feet. Slope is 4 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 1 inch; gray (10YR 5/1) gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few fine roots; many fine interstitial pores; 15 percent gravel; neutral (pH 7.0); clear smooth boundary.

A2 – 1 to 10 inches; gray (10YR 5/1) gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; weak very fine and fine granular & single grain structure; soft, very friable, nonsticky and nonplastic; many very fine, fine and medium roots; many very fine and fine interstitial pores; 15 percent gravel; moderately acid (pH 5.8); clear wavy boundary.

C1 – 10 to 29 inches; gray (10YR 6/1) gravelly coarse sand, gray (10YR 5/1) moist, with many medium distinct yellowish brown (10YR 5/4) mottles; single grain; loose, nonsticky and nonplastic; common fine

roots; many very fine and fine interstitial pores; 25 percent gravel; neutral (pH 7.0); gradual wavy boundary.

C2 – 29 to 60 inches; gray (10YR 6/1) gravelly coarse sand, gray (10YR 5/1) moist, with many medium distinct yellowish brown (10YR 5/4) mottles; single grain; loose, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; 25 percent gravel; neutral (pH 7.0).

Type Location: About 300 feet northwest of Highway 120 in Big Sand Flat, at the northwest quarter of Section 9, T.1S., R.28E., MDBM, Cowtrack Mtn NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 48°F. The mean summer temperature is about 67°F, and the mean winter soil temperature is about 35°F. The 10 to 40 inch textural control section is coarse sand, sand or loamy coarse sand, with 0 to 4 percent clay. Rock fragments are 5 to 40 percent gravel.

The A horizon has dry color of 10YR 4/1, 5/1 or 6/1; moist color is 10YR 3/2, 4/1, 4/2 or 5/1. It is coarse sand, sand or loamy coarse sand, with 0 to 4 percent clay. Rock fragments are 5 to 25 percent gravel. Reaction is moderately acid to neutral.

The C horizon has dry color of 10YR 5/1 or 6/1; moist color is 10YR 3/2, 4/1, 4/2 or 5/1, with many medium distinct mottles that have 10YR 5/4 color. It is coarse sand, sand or loamy coarse sand, with 0 to 4 percent clay. Rock fragments are 15 to 40 percent gravel. Reaction is neutral.

AQUIC CRYOBOROLLS

These Aquic Cryoborolls consist of moderately deep to deep, poorly drained soils forming in alluvial and colluvial materials weathering from mixed rocks. These soils are in mountain basins, and have slopes of 5 to 30 percent slopes. Elevation is 7,300 to 10,600 feet. The mean annual precipitation is about 10 to 25 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Aquic Cryoborolls

Typical Pedon: The representative profile for this soil is on an east by southeast-facing mountain basin, under lodgepole pine, willows and grasses, at an elevation of 9,520 feet. Slope is 12 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 3 inches; brown (10YR 5/3) sand, dark brown (10YR 3/3) moist; single grain; soft, very friable, nonsticky and nonplastic; many very fine, fine and medium roots; many very fine and fine interstitial pores; slightly acid (pH 6.5); abrupt smooth boundary.

2A – 3 to 4 inches; brown (10YR 4/3) loamy sand, very dark brown (10YR 2/2) moist; single grain; soft, very friable, nonsticky and nonplastic; few very fine and fine and common medium roots; many very fine and fine interstitial pores; slightly acid (pH 6.5); abrupt smooth boundary.

3A – 4 to 15 inches; grayish brown (10YR 5/2) sand, dark brown (10YR 3/3) moist; single grain; soft, very friable, nonsticky and nonplastic; common very fine, fine and medium roots; many very fine and fine interstitial pores; neutral (pH 7.0); clear smooth boundary.

4A – 15 to 21 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; single grain; soft, very friable, nonsticky and nonplastic; common fine, medium and coarse roots; many very fine and fine interstitial pores; 2 percent gravel and 2 percent cobbles; slightly acid (pH 6.5); clear smooth boundary.

4C – 21 to 27 inches; brown (10YR 5/3) loamy sand, brown (10YR 4/3) moist, with few fine and medium prominent brownish yellow (10YR 6/6) mottles, yellowish red (5YR 4/6) moist; single grain; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium and coarse roots; many very

fine and fine interstitial pores; 2 percent gravel; moderately acid (pH 6.0); abrupt wavy boundary.

5C – 27 to 34 inches; brown (10YR 5/3) extremely gravelly sand, very dark grayish brown (10YR 3/2) moist, with many fine and medium prominent brownish yellow (10YR 6/6) mottles, yellowish red (5YR 5/8) moist; single grain; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine and common medium interstitial pores; 50 percent gravel, 15 percent cobbles and 10 percent stones; strongly acid (pH 5.5); abrupt wavy boundary.

6C – 34 to 43 + inches; variegated dark gray (10YR 4/1) and pale brown (10YR 6/3) very gravelly coarse sand, variegated very dark gray (10YR 3/1) and yellow (10YR 7/6) moist; single grain; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine and common medium interstitial pores; 55 percent gravel and 5 percent cobbles; strongly acid (pH 5.5).

Type Location: About 0.65 miles north on Log Cabin road from its intersection with Highway 120, directly north of Mono Lake Ranger Station, then 3.4 miles on west fork, then 0.25 miles on west-forking trail, and 50 feet south of trail, at northeast quarter of the southwest quarter of Section 1, T.1N., R.25E., MDBM, Mono Craters NW Quadrangle.

Range in Characteristics: Soil depth ranges from 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 43°F. The mean summer soil temperature is about 58°F, and the mean winter soil temperature is about 33°F. The 10 to 40 inch textural control section is coarse sand, sand, loamy coarse sand or loamy sand, with 0 to 5 percent clay. Rock fragments are 0 to 60 percent gravel, 0 to 15 percent cobbles and 0 to 10 percent stones, and average 0 to 80 percent by volume.

The A horizon has dry color of 10YR 4/3, 5/2, 5/3 or 6/3; moist color is 10YR 2/2, 3/2, 3/3, 4/2 or 4/3. It is sand or loamy sand, with 1 to 5 percent clay. Rock fragments are 0 to 5 percent gravel and 0 to 2 percent cobbles, and 0 to 8 percent by volume. Reaction is slightly acid to neutral.

The C horizon has dry color of 10YR 4/1, 4/3, 5/2, 5/3, 6/3 or 6/4; moist color is 10YR 3/1, 3/2, 3/3, 4/2,

6/6, or 7/6. It is coarse sand, sand, loamy coarse sand or loamy sand, with 0 to 5 percent clay. Mottles are present and tend to be 10YR 6/6, 6/7 or 6/8 dry, and 5YR 4/6, 5/6 or 5/8 moist. Rock fragments are 0 to

60 percent gravel, 0 to 15 percent cobbles and 0 to 10 percent stones, and 0 to 80 percent by volume. Reaction is strongly acid.

AQUIC HAPLOXEROLLS

These Aquic Haploxerolls soils consist of deep, poorly drained soils forming in material weathering from mixed alluvium. These soils are in upland meadows, and have slopes of 0 to 9 percent. Elevation is 7,200 to 8,800 feet. The mean annual precipitation is about 13 to 18 inches, and the mean annual temperature is about 45°F.

Taxonomic Class: Aquic Haploxerolls.

Typical Pedon: The representative profile for this soil is in an upland meadow, under grasses and sedges, at an elevation of 7,500 feet. Colors are for dry soil unless otherwise noted.

Oa – 3 to 0 inches; grass litter and a thick matting of grass roots; clear smooth boundary.

A1 – 0 to 10 inches; gray (10YR 5/1) gravelly loamy sand, very dark gray (10YR 3/1) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; few very fine interstitial pores; 20 percent gravel; slightly acid (pH 6.3); clear wavy boundary.

A2 – 10 to 28 inches; gray (10YR 6/1) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many fine and medium roots; many fine interstitial pores; 20 percent gravel and 5 percent cobbles; slightly acid (pH 6.5), abrupt wavy boundary.

2Ab – 28 to 60 inches; brown (10YR 5/3) gravelly loamy coarse sand, dark brown (10YR 3/3) moist, with common to many fine distinct yellowish and reddish brown mottles (5YR 4/6 and 5YR 4/4 moist); single

grain; loose, nonsticky and nonplastic; common fine and medium roots; many fine interstitial pores; 30 percent gravel and 5 percent cobbles; neutral (pH 6.7).

Type Location: About 550 feet south and 75 feet east of the northwest corner of the northeast quarter of the northwest quarter of Section 17, T.1S., R.26E., MDBM, Mono Craters SW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 38°F, and the mean summer soil temperature is about 55°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. Depth to the apparent water table is 8 to 28 inches. The 10 to 40 inch textural control section is loamy sand or loamy coarse sand, with 1 to 3 percent clay. Rock fragments are 10 to 30 percent gravel and 0 to 5 percent cobbles, and average 12 to 26 percent by volume.

Some pedons have C horizons.

The surface A horizon has dry color of 10YR 5/1 or 5/2; moist color is 10YR 3/1 or 3/2. It is loamy sand, with 1 to 3 percent clay. Rock fragments are 10 to 20 percent gravel by volume. Reaction is slightly acid.

The other A horizons have dry color of 10YR 5/3 or 6/1; moist color is 10YR 3/2, 3/3 or 4/3, and mottles are 5YR 4/6 dry and 5YR 4/4 moist. They are loamy sand or loamy coarse sand, with 1 to 3 percent clay. Rock fragments are 10 to 30 percent gravel and 0 to 5 percent cobbles by volume. Reaction is slightly acid to neutral.

ARIZO FAMILY

The Arizo family consists of very deep, excessively drained soils forming in mixed alluvium. These soils are on alluvial fans and fan terraces, and have slopes of 0 to 15 percent. Elevation is 3,700 to 4,000 feet. The mean annual precipitation is about 4 to 7 inches, and the mean annual temperature is about 57 to 71°F.

Taxonomic Class: Sandy-skeletal, mixed, thermic Typic Torriorthents

Typical Pedon: The representative profile for this soil is on an east-facing alluvial fan, under white bursage, spiny hopsage, schadscale and desert needlegrass, at an elevation of 3,800 feet. Slope is 4 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 4 inches; pale brown (10YR 6/3) gravelly loamy sand, brown (10YR 4/3) moist; weak medium sub-angular blocky structure; soft, very friable, non-sticky and nonplastic; few very fine roots; many very fine interstitial pores; 15 percent gravel, 5 percent cobbles, 1 percent stones and 2 percent boulders; slightly alkaline (pH 7.5); clear wavy boundary.

C – 4 to 60 inches; pale brown (10YR 6/3) very stony loamy sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine interstitial and few very fine tubular pores; 10 percent gravel, 15 percent cobbles and 15 percent stones; slightly alkaline (pH 7.5).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 3.5 miles north of Olancho, and 30

feet north of the dirt road branching off the aqueduct road; about 2,600 feet east and 1,200 feet north of the southwest corner of Section 25, T.18S., R.36E., MDBM, Olancho Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 63°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. Rock fragments tend to be rounded or have rounded edges. The surface rock fragment coverage ranges from 20 to 90 percent, with 20 to 50 percent gravel, 1 to 20 percent cobbles and 3 to 15 percent stones and boulders. Some boulders exceed 6 feet in diameter. The 10 to 40 inch textural control section is loamy sand. Rock fragments are 5 to 30 percent gravel, 10 to 20 percent cobbles and 0 to 50 percent boulders, and average 35 to 60 percent by volume. The soil is slightly to moderately alkaline.

Some pedons have disseminated carbonates that weakly effervesce.

The A horizon has dry color of 10YR 7/2 or 6/3; moist color is 10YR 4/2, 4/3 or 5/3. Rock fragments range from 0 to 35 percent by volume, and include 0 to 3 percent cobbles. Texture is gravelly loamy sand. Some profiles have thin fragile layers just below the surface that have vesicular pores.

The C horizon has dry color of 10YR 7/2, 7/3, 6/3 or 6/4; moist color is 10YR 4/3, 4/4 or 5/3. Textures are loamy sand, with gravelly, very gravelly or very stony modifiers. Some pedons have a stratified C horizon.

ARTRAY FAMILY

The Artray family consists of very deep, poorly drained soils forming in mixed alluvium influenced by volcanic ash. These soils are on alluvial fans and lakeshore terraces, and have slopes of 0 to 9 percent. Elevation is 6,900 to 8,400 feet. The mean annual precipitation is about 8 to 16 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Coarse-loamy, mixed, mesic Cumulic Endoaquolls

Typical Pedon: The representative profile for this soil is on a south-facing alluvial fan, under grasses, sedges, willows and wildrose, at an elevation of 6,800 feet. Slope is 5 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 4 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine tubular and interstitial pores; 5 percent gravel; slightly acid (pH 6.2); abrupt smooth boundary.

A2 – 4 to 12 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; many very fine, fine and medium interstitial, and common very fine tubular pores; 15 percent gravel; neutral (pH 6.7); clear wavy boundary.

A3 – 12 to 28 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark brown (10YR 2/2) moist; few fine distinct dark yellowish brown (10YR 4/4) masses of iron accumulations lining roots and pores; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine, and few medium roots; many very fine and fine interstitial, and common very fine tubular pores; 15 percent gravel; neutral (pH 6.8); clear wavy boundary.

C1 – 28 to 42 inches; light brownish gray (10YR 6/2) gravelly sandy loam, olive gray (5Y 4/2) moist;

massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine interstitial, and common very fine tubular pores; 20 percent gravel; neutral (pH 6.6); abrupt wavy boundary.

C2 – 42 to 60 inches; white (5Y 8/1) gravelly coarse sandy loam, greenish gray (5GY 5/1) moist; common medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulations; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many fine and medium interstitial pores; 25 percent gravel; slightly alkaline (pH 7.6).

Type Location: In the Bodie-Coleville Soil Survey Area, about 0.25 mile southwest of Conway Ranch; 530 feet east and 530 feet south of the northwest corner of Section 6, T.2N., R.26E., MDBM, Bodie Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 53°F. The mean summer soil temperature is about 69°F and the mean winter soil temperature is about 36°F. Depth to the apparent watertable is 6 inches to 4 feet. The 10 to 40 inch textural control section is loam, sandy loam or coarse sandy loam. Rock fragments are mostly gravel, and average 5 to 30 percent by volume.

The A horizon has dry color of 10YR 4/2 or 5/2; moist color is 10YR 2/2 or 3/2. It has few to common, distinct to prominent masses of iron accumulations. It is loam, very fine sandy loam, sandy loam, gravelly sandy loam or cobbly sandy loam. Rock fragments are 0 to 25 percent gravel by volume. Reaction is slightly acid to neutral.

The C horizon has dry color of 10YR 6/2, or 2.5Y 6/2 or 5Y 8/1; moist color is 10YR 4/2, or 2.5Y 4/2, or 5Y 4/2 or 5GY 5/1. This horizon has common or many masses of iron accumulations. It is gravelly sandy clay loam, loam, sandy loam, gravelly sandy loam or gravelly coarse sandy loam. Rock fragments, mostly gravel, are 10 to 30 percent by volume. Strata of loamy sand to very cobbly loamy sand are common. Cobbly substratum soils have very gravelly coarse sandy loam textures. Rock fragments are 35 to 60 percent by volume, and include 15 to 25 percent cobbles. Reaction is neutral to slightly alkaline.

ATTER FAMILY

The Atter family consists of moderately deep and deep, somewhat excessively drained soils forming in material weathering from granitic and mixed rocks. These soils are on mountainsides, hillsides and canyon sideslopes, and have slopes of 15 to 90 percent. Elevation is 5,900 to 10,200 feet. The mean annual precipitation is about 4 to 25 inches, and the mean annual temperature is about 43°F.

Taxonomic Class: Sandy-skeletal, mixed, mesic Typic Xerorthents.

Typical Pedon: The representative pedon for this soil is on an east-facing terminal moraine, under big sagebrush, antelope bitterbrush, rabbitbrush, Indian ricegrass and buckwheat, at an elevation of 6,800 feet. Slope is 40 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 2 inches; brown (10YR 5/3) extremely stony sandy loam, very dark brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial and many fine tubular pores; 20 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulder; slightly acid (pH 6.4); clear wavy boundary.

C1 – 2 to 10 inches; weak red (2.5YR 5/2) extremely stony loamy sand, weak red (2.5YR 4/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine tubular and many medium interstitial pores; 20 percent gravel, 15 percent cobbles, 30 percent cobbles and 15 percent boulders; neutral (pH 6.6); gradual smooth boundary.

C2 – 10 to 16 inches; pale red (2.5YR 6/2) extremely stony loamy sand, olive (5Y 5/3) moist; strong medium subangular blocky grading to strong fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine and common fine roots; few fine tubular and many medium interstitial pores; 20 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulders; neutral (6.6); gradual smooth boundary.

C3 – 16 to 29 inches; pale red (2.5YR 6/2) extremely stony loamy sand, olive (5Y 4/3) moist; strong coarse subangular blocky grading to strong fine

and medium subangular blocky structure; hard, friable, nonsticky and nonplastic; many very fine and common fine roots; few fine tubular and many medium interstitial pores; 20 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulders. slightly acid (pH 6.5); clear wavy boundary.

C4 – 29 to 44 inches; pale red (2.5YR 6/2) extremely stony loamy sand, olive (5Y 4/3) moist; massive; loose, nonsticky and nonplastic; many very fine roots; few fine tubular and many medium interstitial pores; 20 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulders; slightly acid (pH 6.4); gradual wavy boundary.

Cr – 44 inches; granitic glacial till

Type Location: About 0.6 miles south on Lower Rock Creek road from intersection with Highway 395; at 200 feet west of road shoulder; northwest corner of northwest corner of Sec. 2, T.5S., R.30E., MDBM, Casa Diablo SW Quadrangle.

Range in Characteristics: Soil depth can range from 30 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 48°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil is usually dry from mid-April to late November, and is usually moist in some parts for the rest of the year. The 10 to 40 inch textural control section is loamy sand, with 1 to 3 percent clay. Rock fragments are 10 to 30 percent gravel, 0 to 20 percent cobbles, 0 to 40 percent stones and 0 to 25 percent boulders, and average 40 to 90 percent by volume.

The A horizon has dry color of 10YR 4/3, 5/2, 5/3, 6/2 or 6/3; moist color is 10YR 3/2, 3/3, 4/2, 4/3 or 4/4. It is a sandy loam, with 2 to 5 percent clay. Rock fragments are 10 to 30 percent gravel, 0 to 20 percent cobbles, 0 to 40 percent stones and 0 to 25 percent boulders by volume. Reaction is slightly acid to neutral.

The C horizon has dry color of 2.5YR 4/2, 5/2, 5/3, 6/2 or 6/3; moist color is 5Y 3/3, 4/3, 4/2, 5/3, 5/2 or 6/3. It is loamy sand, with 1 to 3 percent clay. Rock fragments are 10 to 30 percent gravel, 0 to 20 percent cobbles, 0 to 40 percent stones and 0 to 25 percent boulders by volume. Reaction is slightly acid to neutral.

AVALMOUNT FAMILY

The Avalmount family consists of very deep, well drained soils forming in volcanic cinders and lava. These soils are on cinder cones and lava flows, and have slopes of 5 to 30 percent. Elevation is 6,400 to 6,700 feet. The mean annual precipitation is about 6 to 10 inches, and mean annual temperature is about 50°F.

Taxonomic Class: Ashy-skeletal, mesic Vitrixerandic Haplocambids

Typical Pedon: The representative profile for this soil is on a northeast-facing lava flow, under big sagebrush and buckwheat, at an elevation of 5,150 feet. Slope is 14 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 10 inches; brown (10YR 5/3) very gravelly fine sandy loam, dark brown (10YR 3/3) moist; weak coarse and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine and medium roots; common very fine interstitial and few very fine tubular pores; 35 percent pebbles, 15 percent cobbles, and 2 percent stones; neutral (pH 7.3); gradual wavy boundary.

2Bw1 – 10 to 30 inches; dark yellowish brown (10YR 4/4) very cobbly loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and nonplastic; few very fine, fine, and medium roots; common very fine and fine tubular pores; 20 percent pebbles, 25 percent cobbles, and 10 percent stones; neutral (pH 7.2); clear wavy boundary.

3Bw2 – 30 to 60 inches; yellowish brown (10YR 5/4) extremely stony very fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky

structure; slightly hard, very friable, slightly sticky and nonplastic; few very fine, fine and medium roots; common very fine interstitial and tubular pores; 20 percent pebbles, 20 percent cobbles, and 25 percent stones; neutral (pH 7.1).

Type Location: In the Benton-Owens Soil Survey Area, about 3 miles southwest of Big Pine on Crater Mountain lava flow; 1,400 feet north and 650 feet east of the SW corner of Sec. 9, T.9S., R.33E., MDBM, Big Pine Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual temperature at 20 inches is about 57°F. The difference between the mean summer and mean winter soil temperature is greater than 9°F. The soil from a depth of 10 to 40 inches contains 35 to 80 percent cinders. Rock fragments constitute 35 to 80 percent of the textural control section by volume. These are low intensity basalt cinders which are very jagged and interlock to some extent. A gravel, cobble, and stone pavement covers 40 to 60 percent of the soil surface. Reaction is neutral.

The A horizon has color of 10YR 6/3 or 5/3 and moist color of 10YR 4/3 or 3/3. It is very gravelly fine sandy loam. It contains 35 to 60 percent cinders consisting of 30 to 50 percent pebbles, 5 to 20 percent cobbles, and 1 to 3 percent stones. The organic carbon content is 0.6 percent.

The Bw horizon has color of 10YR 4/4, 5/4; 7.5YR 4/4 or 5/4 and moist color of 10YR 4/3, 3/3 or 3/4. It is very cobbly loam or extremely stony very fine sandy loam. Rock fragments are 20 to 40 percent pebbles, 15 to 40 percent cobbles, and 0 to 30 percent stones. Thin clay films are evident in some pedons.

BAIRS FAMILY

The Bairs family consists of very deep, well drained soils forming from granitic and mixed alluvium. These soils are on bouldery or stony alluvial fans and fan terraces, and have slopes of 15 to 50 percent. Elevation is 4,600 to 6,800 feet. The mean annual precipitation is about 6 to 12 inches, and the mean annual temperature is about 55°F.

Taxonomic Class: Loamy-skeletal, mixed, mesic Xeric Haplagrids

Typical Pedon: The representative profile for this soil is on east-facing alluvial fan, under big sagebrush, desert bitterbrush and desert needlegrass, at an elevation of 6,100 feet. Slope is 8 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 7 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; common fine roots; many very fine interstitial pores; 20 percent gravel and 1 percent cobbles; slightly acid (pH 6.5); abrupt smooth boundary.

A2 – 7 to 20 inches; brown (10YR 5/3) gravelly loamy coarse sand, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine interstitial pores; 20 percent gravel, 2 percent stones and 1 percent boulders; neutral (pH 7.0); clear wavy boundary.

Bt1 – 20 to 31 inches; brown (10YR 5/3) very stony sandy loam, dark brown (10YR 3/3) moist; weak coarse angular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; few very fine interstitial and tubular pores; few thin clay films bridging mineral grains; 10 percent gravel, 10 percent cobbles, 15 percent stones and 1 percent boulders; neutral (pH 7.0); clear wavy boundary.

Bt2 – 31 to 44 inches; yellowish brown (10YR 5/4) very stony sandy loam, dark yellowish brown (10YR 3/4) moist; weak coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and medium roots; few very fine tubular pores; common thin clay films bridging mineral grains; 10 percent gravel, 10 percent cobbles, 20 percent stones and 2 percent boulders; neutral (pH 7.0); clear wavy boundary.

C – 44 to 60 inches; very pale brown (10YR 7/4) very stony loamy coarse sand, yellowish brown (10YR 5/4) moist; massive; hard, friable, nonsticky and nonplastic; few very fine roots; 10 percent gravel, 45 percent stones and 5 percent boulders; slightly acid (pH 6.5).

Type Location: In the Benton-Owens Soil Survey Area, about 20 yards southeast of Hogback Creek Road; about 650 feet west and 1,150 feet north of the southeast corner of Section 19, T.15S., R.35E., MDBM, Lone Pine Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. Depth of the solum is 23 to 45 inches. The mean annual soil temperature at 20 inches is about 57°F. The difference between the mean summer and mean winter soil temperature is greater than 9°F. The textural control section is the whole argillic, if less than 20 inches thick and upper 20 inches of argillic, if greater than 20 inches thick. It is sandy loam or sandy clay loam, with 10 to 18 percent clay. Rock fragments are 10 to 20 percent gravel, 10 to 20 percent cobbles and 5 to 30 percent stones and boulders, and averages 35 to 65 percent by volume. Base saturation is 90 to 100 percent. Reaction is slightly acid to neutral.

The A horizon has dry color of 10YR 5/2, 5/3 or 6/3; moist color is 10YR 3/2, 3/3 or 4/3. It is very gravelly sandy loam or gravelly loamy coarse sand. Rock fragments are 15 to 30 percent gravel and 3 to 15 percent cobbles, stones and boulders, and average 15 to 35 percent by volume. The organic carbon content is 0.4 to 0.6 percent.

The Bt horizon has dry color of 10YR 7/3, 7/4, 6/4, 5/3 or 5/4; moist color is 10YR 3/3, 3/4, 4/3, 4/4 or 5/4. It is very cobbly or very stony sandy loam or sandy clay loam, with 10 to 18 percent clay. Clay films are thin to moderately thick and are few to many. Rock fragments are 10 to 20 percent gravel, 10 to 20 percent cobbles and 5 to 30 percent stones and boulders, and average 35 to 65 percent by volume.

The C horizon has dry color of 10YR 6/3, 7/3 or 7/4; moist color is 10YR 5/4. It is very stony or extremely stony loamy coarse sand. Rock fragment content is similar to that in the Bt horizon.

BASKET FAMILY

The Basket family consists of moderately deep to deep, well drained soils forming in material weathering from metasedimentary rock. These soils are on hillsides, and have slopes of 30 to 60 percent. Elevation is 6,400 to 8,600 feet. The mean annual precipitation is about 10 to 20 inches, and the mean annual temperature is about 47°F.

Taxonomic Class: Loamy-skeletal, mixed, frigid Xeric Haplargids.

Typical Pedon: The representative profile for this soil is on a northeast-facing hillside, under pinyon pine, antelope bitterbrush and big sagebrush, at an elevation of 6,750 feet. Slope is 35 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 2 inches; brown (10YR 5/3) extremely gravelly sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure, parting to weak very fine and fine subangular blocky; soft, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine interstitial pores; 60 percent gravel and 20 percent cobbles; slightly acid (pH 6.4); clear wavy boundary.

BE – 2 to 4 inches; brown (10YR 4/3) very gravelly clay loam, brown (10YR 4/3) moist; massive; soft, friable, slightly sticky and slightly plastic; few very fine roots; many very fine interstitial pores; 45 percent gravel and 15 percent cobbles; neutral (pH 6.6); clear wavy boundary.

Bt1 – 4 to 11 inches; dark yellowish brown (10YR 4/4) extremely gravelly clay loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; many very fine and fine, common medium, and few coarse roots; many very fine interstitial pores; few thin clay films on ped faces; 55 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); gradual irregular boundary.

Bt2 – 11 to 25 inches; dark yellowish brown (10YR 4/4) extremely gravelly clay loam, dark yellowish brown (10YR 4/4) moist; massive; hard, firm, sticky and plastic; common very fine and few medium roots;

many very fine interstitial pores; few moderately thick clay films on ped faces; 55 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); gradual irregular boundary.

Bt3 – 25 to 38 inches; yellowish brown (10YR 5/6) very gravelly clay loam, yellowish brown (10YR 5/6) moist; massive; hard, firm, sticky and plastic; few very fine and coarse, and common medium roots; many very fine interstitial pores; common moderately thick clay films on ped faces; 35 percent gravel; slightly acid (pH 6.1); gradual irregular boundary.

Cr – 38 inches; weathering marine sediments, which can be cut with a tile spade.

Type Location: About 660 feet west and 330 feet north of the apparent center of Section 4, T.4S., R.31E., MDBM, Casa Diablo NE Quadrangle.

Range in Characteristics: Soil depth to the paralithic contact is greater than 38 inches. The mean annual soil temperature at 20 inches is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The textural control section is all of the argillic horizon, or the upper 20 inches of the argillic, whichever is less. It is clay loam, with 27 to 32 percent clay. Rock fragments are 45 to 55 percent gravel and 0 to 10 percent cobbles, and average 45 to 58 percent by volume.

The A horizon has dry color of 10YR 5/3 or 6/3; moist color is 10YR 3/3, 4/2 or 4/3. It is sandy loam, with 2 to 20 percent clay. Rock fragments are 5 to 60 percent gravel, 5 to 20 percent cobbles, and 0 to 5 percent stones by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 4/3, 4/4, 5/6, 5/8, 6/3, 6/4 or 6/6, or 7.5YR 5/6; moist color is 10YR 4/3, 4/4, 5/4, 5/6, or 5/8, or 5YR 5/6. It is clay loam, sandy clay loam or sandy loam, with 18 to 35 percent clay. Rock fragments are 20 to 55 percent gravel and 0 to 25 percent cobbles by volume. Reaction is slightly acid to neutral.

BEARSKIN FAMILY

The Bearskin family consists of shallow, well drained soils forming from granitic, metasedimentary and basalt rocks. These soils are on hillsides and basalt flows, and have slopes of 0 to 90 percent. Elevation is 6,800 to 9,300 feet. The mean annual precipitation is 10 to 20 inches, and the mean annual temperature is about 45°F.

Taxonomic Class: Loamy, mixed frigid Lithic Argixerolls.

Typical Pedon: The representative profile for this soil is on a hilltop, under mountain mahogany and bitterbrush, at an elevation of 8,960 feet. Slope is 1 percent. Colors are for dry soil unless otherwise noted.

A - 0 to 2 inches; brown (10YR 5/3) gravelly loamy fine sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; 25 percent gravel; slightly acid (pH 6.4); clear smooth boundary.

Bt1 - 2 to 5 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine, fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine and fine interstitial pores; few thin clay films on ped faces; 25 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt2 - 5 to 10 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; moderate very fine, fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine interstitial pores; few thin clay films on ped faces and in pores; 40 percent gravel; slightly acid (pH 6.4); abrupt smooth boundary.

R - 10 inches; hard metasedimentary bedrock.

Type Location: About 825 feet east and 500 feet north of the southwest corner of the southeast quarter of Section 11, T.2S., R.30E., MDBM, Glass Mountain SW Quadrangle.

Range in Characteristics: Soil depth to bedrock is 10 to 20 inches. The mean annual soil temperature at 20 inches or bedrock, whichever is deeper, is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The textural control section is the whole soil for pedons 14 inches or less deep, and is the whole argillic horizon for pedons deeper than 14 inches. It is clay, sandy clay loam, loam, sandy loam, loamy fine sand, loamy sand, sand or coarse sand, with 2 to 40 percent clay, and a weighted average of 11 to 30 percent clay. Rock fragments are 0 to 55 percent gravel, 0 to 15 percent cobbles and 0 to 15 percent stones, and average 11 to 31 percent by volume.

Some pedons have surface layers with sand or loamy sand textures. Other pedons have C horizons.

The A horizon has dry color of 10YR 4/3, 5/2, 5/3; moist color is 10YR 3/1, 3/2 or 3/3. It is loamy fine sand, loamy sand, loamy coarse sand or coarse sand, with 2 to 4 percent clay. Rock fragments are 10 to 55 percent gravel, 0 to 15 percent cobbles and 0 to 15 percent stones by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 4/3, 4/4, 5/2, 5/3 or 5/4; moist color is 10YR 3/2, 3/3, 3/4, 4/2 or 4/3. It is clay, sandy clay loam, loam or sandy loam, with 8 to 40 percent clay. Rock fragments are 0 to 40 percent gravel, 0 to 15 percent cobbles and 0 to 15 percent stones by volume. Reaction is slightly acid to neutral.

BERENT FAMILY

The Berent family consists of deep, somewhat excessively drained soils forming in material weathering from granitic and basalt rocks. These soils are on mountainsides, hillsides, bench terraces, dissected alluvial fans, toeslopes, depressions and valley bottoms, and have slopes of 0 to 60 percent. Elevation is 4,000 to 8,800 feet. The mean annual precipitation is about 4 to 20 inches, and the mean annual temperature is about 50°F.

Taxonomic Class: Mixed, mesic Xeric Torripsamments

Typical Pedon: The representative profile for this soil is on a hillside, under a community of rabbitbrush, Mormon tea, fourwing saltbrush, spiny hopsage, and scattered bunchgrasses, at an elevation of 5,850 feet. Slope is 27 percent. Colors are for dry soil unless otherwise noted.

- A1 - 0 to 4 inches; light yellowish brown (10YR 6/4) loamy sand, brown (10YR 4/3) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 13 percent gravel; slightly alkaline (pH 7.4); clear smooth boundary.
- C1 - 4 to 26 inches; light yellowish brown (10YR 6/4) loamy sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 10 percent gravel; neutral (pH 7.2); gradual smooth boundary.
- C2 - 26 to 60 inches; light yellowish brown (10YR 6/4) sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores;

5 percent gravel; neutral (pH 7.1).

Type Location: About 100 feet past the road junction and 1/4 mile past the Forest Service boundary; about 900 feet east and 1,325 feet south of the northwest corner of Section 29, T.7S., R.32E., MDBM, Bishop Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil moisture control section is 13 to 60 inches. It is usually dry in all parts from late April to late November, and is usually moist in some parts the rest of the year. The 10 to 40 inch textural control section is loamy sand, loamy coarse sand, loamy fine sand, or sand, with 1 to 5 percent clay. Rock fragments are 5 to 25 percent gravel, 0 to 5 percent cobbles and 0 to 5 percent stones, and average 7 to 18 percent by volume.

Some pedons have sand surface textures.

The A horizon has dry color of 10YR 5/3, 5/4, 6/3, or 6/4; moist color is 10YR 3/2, 4/3, or 5/4. It is loamy sand or loamy coarse sand, with 1 to 3 percent clay. Rock fragments are 5 to 35 percent gravel, 0 to 20 percent cobbles, and 0 to 5 percent stones by volume. Reaction is neutral to slightly alkaline.

The C horizon has dry color of 10YR 5/4, 5/6, 6/3, or 6/4; moist color is 10YR 3/3, 4/3, 4/4, or 5/4. It is loamy fine sand, loamy sand, loamy coarse sand or sand, with 1 to 5 percent clay. Rock fragments are 5 to 25 percent gravel, 0 to 5 percent cobbles, and 0 to 5 percent stones by volume. Reaction is neutral.

BIGLAKE FAMILY

The Biglake family consists of moderately deep to deep, somewhat excessively drained soils forming from rhyolite, mixed and glacial till rock sources. These soils are on mountainsides, moraines and alluvial bottoms, and have slopes of 0 to 70 percent. Elevation is 6,800 to 11,000 feet. The mean annual precipitation is 12 to 25 inches, and the mean annual temperature is about 44°F.

Taxonomic Class: Sandy-skeletal, mixed, frigid Typic Haploxerolls

Typical Pedon: The representative profile for this soil is on a west by southwest-facing mountainside, under Jeffrey pine, red fir, antelope bitterbrush and big sagebrush, at an elevation of 8,080 feet. Slope is 22 percent. When described (8/22/85), the soil was moist throughout. Colors are for dry soil unless otherwise noted.

A1 - 0 to 2 inches; grayish brown (10YR 5/2) coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; 7 percent gravel; moderate acid (pH 6.0); clear wavy boundary.

A2 - 2 to 11 inches; brown (10YR 5/3) coarse sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many very fine and fine interstitial pores; 8 percent gravel; neutral (pH 7.0); gradual wavy boundary.

A3 - 11 to 15 inches; brown (10YR 5/3) coarse sand, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium, coarse and very coarse roots; many very fine and fine, and common medium interstitial pores; 13 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bw1 - 15 to 33 inches; brown (10YR 5/3) gravelly coarse sand, brown (10YR 4/3) moist; weak and moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium, coarse and very coarse roots; many very fine and fine interstitial pores; 18 percent gravel and 10 percent cobbles; neutral (pH 7.0); clear wavy boundary.

Bw2 - 33 to 60 inches; yellowish brown (10YR 5/4) ex-

tremely cobbly coarse sand, dark yellowish brown (10YR 4/4) moist; weak and moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine, and common medium and coarse roots; many very fine and fine interstitial pores; 32 percent gravel, 40 percent cobbles and 15 percent stones; neutral (pH 7.0).

Type Location: About 1.95 miles north on Forest Service Road 3S25, from its intersection with Highway 203, then 0.45 mile on the east fork, then 1.0 mile on the east fork, then 0.15 mile on the east fork, then 0.35 mile on the south fork, and 120 feet upslope, on the east side of the road; about 330 feet west and 500 feet north of the southeast corner of the southwest quarter of Section 24, T.3S., R.27E., MDBM, Mt. Morrison NW Quadrangle.

Range in Characteristics: Soil depth is 36 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The textural control section is from 10 inches to the paralithic contact in pedons shallower than 40 inches, and is the 10 to 40 inch section in pedons deeper than 40 inches. It is sandy loam, loamy sand or coarse sand, with 1 to 8 percent clay. Rock fragments are 8 to 40 percent gravel, 0 to 40 percent cobbles, 0 to 40 percent stones and 0 to 20 percent boulders, and average 36 to 80 percent by volume.

Some pedons have surface layers with sand textures. Other pedons have C horizons, and some have duripans at depths greater than 40 inches.

The surface A horizon has dry color of 10YR 4/2, 5/2 or 5/3; moist color is 10YR 3/1, 3/2 or 3/3. It is very fine sandy loam, loamy sand or coarse sand, with 1 to 4 percent clay. Rock fragments are 2 to 35 percent gravel, 0 to 20 percent cobbles, 0 to 30 percent stones and 0 to 20 percent boulders by volume. Reaction is moderate to slightly acid.

The underlying A horizons have dry color of 10YR 4/2, 5/3 or 5/4; moist color is 10YR 3/1, 3/2, 3/3, 3/4 or 4/3. They are sandy loam, loamy sand or coarse sand, with 1 to 6 percent clay. Rock fragments are 8 to 35 percent gravel, 0 to 25 percent cobbles, 0 to 40 percent stones and 0 to 20 percent boulders by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 5/3, 5/4, 6/3 or 6/4, or 2.5Y 6/4; moist color is 10YR 3/4, 4/3 or 4/4, or 2.5Y 3/2. It is loamy sand or coarse sand, with 2 to 8 percent clay. Rock fragments are 10 to 40 percent gravel, 0 to 40 percent cobbles, 0 to 30 percent stones and 0 to 20 percent boulders by volume. Reaction is slightly acid to neutral.

The pedons with C horizons have dry color of 10YR 4/3, 5/3, 5/4, 6/3 or 6/4; moist color is 10YR 3/2 or 4/4, or 2.5Y 3/2. It is loamy sand or coarse sand, with 1 to 3 percent clay. Rock fragments are 10 to 37 percent gravel, 0 to 25 percent cobbles, 0 to 40 percent stones and 0 to 20 percent boulders by volume. Reaction is slightly acid to neutral.

BRANTEL FAMILY

The Brantel family consists of deep, somewhat excessively drained soils forming in material weathering from pumice and tuff. These soils are on hillsides, hilltops, lake terraces, upland flats, upland valleys and depressions, and on dissected alluvial fans, and have slopes of 0 to 60 percent. Elevation is 6,400 to 9,300 feet. The mean annual precipitation is about 6 to 25 inches, and the mean annual temperature is about 45°F

Taxonomic Class: Ashy, mesic Vitrandic Torripsamments

Typical Pedon: The representative profile for this soil is on a north-by-northeast-facing lake terrace under basin big sagebrush and antelope bitterbrush, at an elevation of 6,600 feet. Slope is 7 percent. When described (7/22/85), the soil was slightly moist in the 49 to 53 inch section, and dry in the remainder of the profile. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; light brownish gray (10YR 6/2) coarse sand, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 8 percent pumice and obsidian gravel, 2 to 40 mm in diameter; very strongly acid (pH 5.0); clear wavy boundary.

A2 – 3 to 9 inches; light gray (10YR 7/2) gravelly loamy coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium, and common coarse and very coarse roots; many very fine and fine interstitial pores; 20 percent pumice and obsidian gravel, 2 to 20 mm in diameter; very strongly acid (pH 4.9); abrupt wavy boundary.

2C1 – 9 to 25 inches; white (10YR 8/1) gravelly coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 18 percent pumice and obsidian gravel; 2 to 20 mm in diameter; strongly acid (pH 5.5); abrupt wavy boundary.

3C2 – 25 to 42 inches; white (10YR 8/1) gravelly loamy coarse sand, gray (10YR 6/1) moist; very weak very fine and fine platy structure; soft, very friable, nonsticky and nonplastic; few fine and medium, and common coarse and very coarse roots; many very fine and fine interstitial pores; 29 percent pumice

gravel, 2 to 20 mm in diameter; strongly acid (pH 5.5); abrupt smooth boundary.

4C3 – 42 to 47 inches; variegated white (10YR 8/1) and black (N2/0) pumice and obsidian gravel, 2 to 40 mm in diameter, light gray (10YR 7/1) and very dark gray (N3/0) moist; single grain; loose, nonsticky and nonplastic; many coarse interstitial pores; neutral (pH 7.2); abrupt smooth boundary.

5C4 – 47 to 48 inches; light gray (10YR 7/1) gravelly loamy coarse sand, grayish brown (10YR 5/2) moist; moderate coarse and very coarse platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine interstitial pores; 15 percent pumice and obsidian gravel, 2 to 20 mm in diameter; slightly acid (pH 6.1); abrupt smooth boundary.

6C5 – 48 to 49 inches; variegated white (10YR 8/1) and dark gray (N4/0) pumice and obsidian gravel, 2 to 40 mm in diameter, light gray (10YR 7/1) and very dark gray (N3/0) moist; single grain; loose, nonsticky and nonplastic; many coarse interstitial pores; slightly acid (pH 6.1); abrupt smooth boundary.

7C6 – 49 to 53 inches; light gray (10YR 7/1) gravelly loamy coarse sand, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine interstitial pores; 25 percent pumice and obsidian gravel, 2 to 20 mm in diameter; slightly acid (pH 6.1); abrupt smooth boundary.

8C7 – 53 to 60 inches; variegated white (10YR 8/1) and dark gray (N4/0) very gravelly coarse sand, light gray (10YR 7/1) and very dark gray (N3/0) moist; single grain; loose, nonsticky and nonplastic; many fine and medium interstitial pores; 44 percent pumice and obsidian gravel, 2 to 40 mm in diameter; slightly acid (pH 6.1).

Type Location: About 5.15 miles east on Highway 120, from its intersection with Highway 395, on the south shoulder of the road; about 1,650 feet west of the northeast corner of Section 29, T.1N., R.27E., MDBM, Mono Craters NE Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil

temperature is about 65°F, and the mean winter soil temperature is about 36°F. It is usually dry from May to late November, and is usually moist in some part the rest of the year. The 10 to 40 inch textural control section is loamy fine sand, loamy sand, loamy coarse sand, sand or coarse sand, with 0 to 8 percent clay. Rock fragments are pumice, obsidian and some rhyolitic and tuff gravel, and average 3 to 30 percent by volume.

Some pedons have surface layers with loamy fine sand textures. Other pedons are less than 40 inches deep to bedrock.

The A1 horizon has dry color of 10YR 5/1, 5/2, 6/2 or 6/3; moist color is 10YR 3/2, 3/3, 4/1, 4/2 or 4/3. It is loamy sand, sand or coarse sand, with 0 to 3 percent clay. Rock fragments are 3 to 35 percent pumice and obsidian gravel by volume, and are dominated by

pumice. Reaction is very strongly to slightly acid.

The other A horizons have dry color of 10YR 5/2, 5/3, 6/2, 7/2, 7/3 or 8/2; moist color is 10YR 3/2, 3/3, 4/2, 4/3 or 5/3. It is loamy sand, loamy coarse sand, sand or coarse sand, with 1 to 8 percent clay. Rock fragments are 3 to 25 percent pumice and obsidian gravel by volume. Reaction is very strongly acid to neutral.

The C horizon has dry color of N2/0 or N4/0, or 10YR 5/3, 5/4, 6/2, 6/3, 7/1, 7/2, 7/3, 8/1 or 8/2; moist color is N3/0, or 10YR 3/2, 3/3, 4/2, 4/3, 4/4, 5/2, 5/3, 6/1, 6/2, 7/1, 7/2 or 7/4. It is loamy fine sand, loamy sand, loamy coarse sand, sand, coarse sand or gravel, with 0 to 6 percent clay. Rock fragments are 3 to 100 percent pumice and obsidian, and some rhyolitic and tuff gravel, by volume. Reaction is strongly acid to slightly alkaline.

BUSCONES FAMILY

The Buscones family consists of moderately deep, somewhat excessively drained soils forming from soft rhyolitic tuff and volcanic ash. These soils are on hillsides and volcanic flows, and have slopes of 0 to 15 percent. Elevation is 5,700 to 7,600 feet. The mean annual precipitation is about 6 to 12 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Ashy, mesic Vitrandic Torripsamments

Typical Pedon: The representative profile for this soil is on a southwest-facing hillside, under big sagebrush, desert needlegrass and rabbitbrush, at an elevation of 5,800 feet. Slope is 10 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 1 inch; light gray (10YR 7/2) very gravelly loamy sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; 40 percent pumice gravel; neutral (pH 6.9); abrupt smooth boundary.

A2 – 1 to 2 inches; light gray (10YR 7/2) loamy sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; 5 percent pumice gravel; neutral (pH 6.9); clear wavy boundary.

A3 – 2 to 18 inches; light gray (10YR 7/2) loamy sand, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine interstitial pores; 5 percent pumice gravel; neutral (pH 6.9); gradual smooth boundary.

C – 18 to 31 inches; white (10YR 8/2) gravelly loamy sand, light brownish gray (10YR 6/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial

pores; 15 percent fine and medium pumice gravel; neutral (pH 6.8); abrupt wavy boundary.

Cr – 31 inches; white (N 8/0) weakly consolidated rhyolitic tuff; slightly hard; 25 percent pumice gravel.

Type Location: In the Benton-Owens Valley Soil Survey Area, about 1.75 miles north of the Benton Hot Springs; about 2,700 feet east and 100 feet north of the southwest corner of Section 26, T.1S., R.31E., MDBM, Glass Mountain Quadrangle.

Range in Characteristics: Soil depth to soft tuff is 20 to 40 inches. The mean annual soil temperature at 20 inches is about 55°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is the 10 inch to paralithic contact or the 40 inch depth, whichever is deeper. It is gravelly loamy sand, with 0 to 3 percent clay. Rock fragments are pumice gravel, and average 5 to 15 percent by volume. Base saturation is 90 to 100 percent throughout the soil profile. The moist bulk density is 1.3 to 1.45 g/cc and the dry bulk density is 1.1 to 1.25 g/cc. Ash content is 60 to 100 percent by weight.

The A horizon has dry color of 10YR 6/2, 6/3 or 7/2; moist color is 10YR 4/2, 4/3 or 5/2. It is loamy sand, gravelly loamy sand or very gravelly loamy sand. Rock fragments are mostly gravel, and average 15 to 50 percent for the surface and 5 to 15 percent by volume in the lower A horizon. The gravel is mostly pumice. The organic carbon content is 0.1 to 0.3. Reaction is neutral.

The C horizon has dry color of 7.5YR 8/2, or 10YR 8/1, 8/2, 7/2 or 6/4; moist color is 7.5YR 6/2, or 10YR 6/1, 6/2, 5/2 or 4/3. It is loamy sand or gravelly loamy sand. Rock fragments are gravel, and average 5 to 30 percent by volume. The gravel is mostly pumice. Reaction is neutral.

CAJON FAMILY

The Cajon family consists of very deep, somewhat excessively drained soils forming in alluvium from granitic rocks. These soils are on alluvial fans and bench terraces, and have slopes of 0 to 15 percent. Elevation is 3,700 to 4,000 feet. The mean annual precipitation is about 4 to 7 inches, and the mean annual temperature is about 59°F.

Taxonomic Class: Mixed, thermic Typic Torripsamments

Typical Pedon: The representative profile for this soil is on an east-facing alluvial fan, under schadscale and desert needlegrass, at an elevation of 3,700 feet. Slope is 10 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 1 inch; very pale brown (10YR 7/3) gravelly loamy sand, brown (10YR 5/3) moist; weak fine platy structure; loose, nonsticky and nonplastic; few very fine roots; 30 percent gravel, 2 to 20 mm in diameter; moderately alkaline (pH 8.0); abrupt smooth boundary.

A2 – 1 to 3 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 4/3) moist; weak fine subangular blocky structure, parting to single grain; loose, nonsticky and nonplastic; common very fine and few medium roots; 5 percent gravel, 2 to 20 mm in diameter; moderately alkaline (pH 8.0); clear wavy boundary.

A3 – 3 to 11 inches; pale brown (10YR 6/3) gravelly loamy sand, brown (10YR 4/3) moist; weak fine and medium subangular blocky structure, parting to single grain; loose, nonsticky and nonplastic; common very fine and fine, and few medium roots; 15 percent gravel, 2 to 20 mm in diameter; slightly alkaline (pH 7.8); gradual wavy boundary.

C1 – 11 to 19 inches; light yellowish brown (10YR 6/4) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky and nonplastic; common fine and medium roots; 20 percent gravel, 2 to 20 mm in diameter; slightly alkaline (pH 7.8); gradual wavy boundary.

C2 – 19 to 36 inches; light gray (10YR 7/2) gravelly loamy coarse sand, yellowish brown (10YR 5/4) moist; single grain; loose, nonsticky and nonplastic;

common fine and medium roots; 30 percent gravel, 2 to 20 mm in diameter; slightly alkaline (pH 7.6); gradual wavy boundary.

C3 – 36 to 55 inches; light gray (10YR 7/2) loamy sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; few fine and medium roots; 12 percent gravel, 2 to 20 mm in diameter; slightly alkaline (pH 7.8); clear wavy boundary.

C4 – 55 to 70 inches; variegated light gray, brownish yellow and yellow (10YR 7/2, 6/6 and 8/8) sand, variegated brown, brownish yellow and light gray (10YR 5/3, 6/6 and 7/2) moist; single grain; loose, nonsticky and nonplastic; few fine roots; 5 percent gravel, 2 to 20 mm in diameter; slightly alkaline (pH 7.8).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 13 miles south of Lone Pine via Highway 395; about 0.4 mile south of bridge over Cottonwood Creek, turn east on dirt road, take north fork at the Y, travel about 0.45 miles to an intersection with another dirt road, turn north, travel about 0.20 mile, and pit is 20 yards east; about 100 feet west and 3,700 feet south of the northeast corner of projected Section 36, T.17S., R.36E., in an unsectioned area, MDBM, Olancho Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The thickness of the solum is 2 to 25 inches. The mean annual soil temperature at 20 inches is about 62°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The 10 to 40 inch textural control section is gravelly loamy sand, with 0 to 3 percent clay. Rock fragments are 15 to 25 percent gravel by volume. Reaction is slightly to moderately alkaline. Effervescence commonly is absent or slight with disseminated lime.

Some pedons are strongly effervescent in the lower profile. Other pedons have sandy loam textures or very gravelly or cobbly strata below 40 inches.

The A horizon has dry color of 10YR 5/2, 5/3, 6/2, 6/3 or 7/3; moist color is 10YR 3/4, 4/2, 4/3, 4/4 or 5/3. It is loamy sand, sand, gravelly loamy sand, sand or coarse sand. Rock fragments are 0 to 35 percent by volume, and consist mostly of fine gravel. Salinity ranges from 2 to 16 ds/m.

The C horizon has dry color of 10YR 5/4, 6/3, 6/4, 6/6, 7/2, 7/3 or 8/8; moist color is 10YR 3/4, 4/3, 4/4, 5/2, 5/3, 5/4, 6/6 or 7/2. It is loamy fine sand, loamy sand, loamy coarse sand, cobbly loamy coarse sand, fine sand,

sand, coarse sand or their gravelly equivalents. Rock fragments are 5 to 35 percent by volume, and consist mostly of fine gravel. Weak to strong stratification with varying sand size distributions and rock fragment content is common. Salinity ranges from 2 to 16 ds/m.

CALPINE FAMILY

The Calpine family consists of moderately deep to very deep, well drained soils forming from sedimentary rocks. These soils are on terraces and in valley fill areas, and have slopes of 0 to 30 percent. Elevation is 6,800 to 7,500 feet. The mean annual precipitation is about 8 to 15 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Coarse-loamy, mixed, mesic Aridic Haploxerolls.

Typical Pedon: The representative profile for this soil is on an east-facing terrace, under big sagebrush and grasses, at an elevation of 7,080 feet. Slope is 15 percent. Colors are for dry soil unless otherwise noted.

Oi – 1/4 to 0 inch; decomposed and decomposing big sagebrush leaves and twigs; abrupt wavy boundary.

A – 0 to 9 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine and medium roots; many fine interstitial pores; 20 percent gravel; neutral (pH 6.8); clear wavy boundary.

AC – 9 to 15 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 20 percent gravel; neutral (pH 6.7); abrupt wavy boundary.

Bw1 – 15 to 23 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; massive; hard, friable, nonsticky and nonplastic; few coarse roots; few very fine interstitial pores; 20 percent gravel and 5 percent stones; slightly acid (pH 6.5); clear wavy boundary.

Bw2 – 23 to 39 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; massive; hard, friable, nonsticky and nonplastic; few coarse roots; few very fine interstitial pores; 30

percent gravel and 5 percent stones; slightly acid (pH 6.5); clear wavy boundary.

C1 – 39 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; massive; hard, friable, nonsticky and nonplastic; few coarse roots; few very fine interstitial pores; 30 percent gravel and 5 percent stones; slightly acid (pH 6.5).

Type Location: About 500 feet east and 330 feet north of the southwest corner of the northeast quarter of the northwest quarter of Section 24, T.3S., R.28E., MDBM, Mt. Morrison NE Quadrangle.

Range in Characteristics: Soil depth to bedrock is 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The 10 to 40 inch textural control section is loam or sandy loam, with 5 to 18 percent clay. Rock fragments are 10 to 30 percent gravel and 0 to 5 percent stones, and average 14 to 30 percent by volume. Depths below 15 inches are compacted.

Some pedons lack thin surface organic layers. Other pedons lack C horizons.

The A horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/2 or 7.5YR 3/2. It is loam or sandy loam, with 3 to 5 percent clay. Rock fragments are 10 to 20 percent gravel by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 5/3 or 6/3, or 2.5Y 6/2; moist color is 10YR 3/3 or 4/3, or 2.5Y 4/2. It is loam or sandy loam, with 5 to 18 percent clay. Rock fragments are 15 to 30 percent gravel and 0 to 5 percent stones by volume. Reaction is slightly acid to neutral.

The C horizon has dry color of 10YR 6/3; moist color is 10YR 4/3. It is sandy loam, with 5 percent clay. Rock fragments are 30 percent gravel and 5 percent stones by volume. Reaction is slightly acid.

CARTAGO FAMILY

The Cartago family consists of very deep, somewhat excessively drained soils forming in granitic alluvium. These soils are on alluvial fans and fan terraces, and have slopes of 5 to 15 percent. Elevation is 3,900 to 6,800 feet. The mean annual precipitation is about 4 to 10 inches, and the mean annual temperature is about 61°F.

Taxonomic Class: Sandy, mixed, thermic Xeric Torriorthents

Typical Pedon: The representative profile for this soil is on an east-facing alluvial fan, under blackbrush, spiny hopsage and desert needlegrass, at an elevation of 4,900 feet. Slope is 7 percent. Colors are for dry soil unless otherwise noted.

A - 0 to 10 inches; light yellowish brown (10YR 6/4) gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine interstitial pores; 15 percent gravel; slightly alkaline (pH 7.8); clear wavy boundary.

C1 - 10 to 27 inches; light yellowish brown (10YR 6/4) loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine and coarse roots; many very fine interstitial pores; 10 percent gravel; slightly alkaline (pH 7.8); gradual wavy boundary.

C2 - 27 to 44 inches; light yellowish brown (10YR 6/4) gravelly loamy coarse sand, with some very gravelly lenses present, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few coarse roots; common very fine interstitial pores; 25 percent gravel and 2 percent cobbles; slightly alkaline (pH 7.8); clear wavy boundary.

C3 - 44 to 60 inches; light yellowish brown (10YR 6/4) very gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 40 percent gravel and 5 percent cobbles; slightly alkaline (pH 7.8).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 4 miles southwest of Lone Pine, California, and 20 feet north of dirt road; about 900 feet east and 2,200 feet north of the southwest corner of Section 7, T.16S., R.36E., MDBM, Lone Pine Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 61°F. The mean summer and mean winter soil temperatures differ by more than 9°F. The 10 to 40 inch textural control section averages loamy coarse sand or coarser. Rock fragments are 10 to 40 percent gravel and 0 to 5 percent cobbles, and average 10 to 45 percent by volume. Reaction is neutral to slightly alkaline.

The A horizon has dry color of 10YR 5/3, 6/2, 6/3, 6/4, 6/5 or 7/3; moist color is 10YR 3/3, 4/2, 4/3, 4/4 or 5/3. It is loamy fine sand, loamy sand, loamy coarse sand, gravelly loamy sand and gravelly loamy coarse sand. Rock fragments are 5 to 35 percent gravel, 0 to 10 percent cobbles and 0 to 3 percent stones and boulders, and average 5 to 35 percent by volume.

The C horizon has dry color of 10YR 5/3, 6/2, 6/3, 6/4 or 7/4; moist color is 10YR 4/3, 4/4 or 5/4. It is loamy stratified loamy sand, loamy coarse sand, gravelly loamy fine sand, gravelly loamy sand, gravelly loamy coarse sand, very gravelly loamy coarse sand and very cobbly loamy coarse sand. Rock fragments are 25 to 40 percent gravel and 2 to 5 percent cobbles, and average 25 to 45 percent by volume. Some very gravelly or very cobbly lenses are present above the 40 inch depth.

CHARCOL FAMILY

The Charcol family consists of deep, well drained soils forming from metasedimentary rock. These soils are on mountainsides, mountain benches, moraines and upland basins, and have slopes of 2 to 70 percent. Elevation is 6,800 to 10,000 feet. The mean annual precipitation is about 10 to 25 inches, and the mean annual temperature is about 42 °F.

Taxonomic Class: Loamy-skeletal, mixed Cryic Pachic Paleborolls

Typical Pedon: The representative profile for this soil is on a south by southeast-facing mountain bench, under low sagebrush and scattered whitebark pine, at an elevation of 9,620 feet. Slope is 12 percent. When described (7/20/87), the soil was dry in the upper 10 inches, and slightly moist throughout the rest of the profile. Colors are for dry soil unless otherwise noted.

Oe – 1 to 0 inch; decomposing big sagebrush plant parts; abrupt smooth boundary.

A1 – 0 to 2 inches; brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak to moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine and fine interstitial pores; 25 percent gravel and 3 percent cobbles; neutral (pH 7.0); clear wavy boundary.

A2 – 2 to 10 inches; brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 25 percent gravel; neutral (pH 7.0); clear wavy boundary.

A3 – 10 to 19 inches; brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine, and few medium and coarse roots; many very fine and fine interstitial pores; 25 percent gravel; neutral (pH 7.0); gradual wavy boundary.

A4 – 19 to 23 inches; brown (10YR 4/3) very gravelly sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine, and few medium and coarse roots; many very fine and fine interstitial pores; 40 percent gravel; neutral (pH 7.0); abrupt wavy boundary.

BE – 23 to 30 inches; brown (10YR 4/3) very gravelly heavy sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine and fine, common medium, and few coarse roots; many very fine and fine interstitial pores; 35 percent gravel and 10 percent cobbles; neutral (pH 7.0); clear wavy boundary.

Bw – 30 to 36 inches; dark yellowish brown (10YR 4/4) very gravelly heavy sandy loam; brown (10YR 4/3) moist; massive, soft, very friable, slightly sticky and slightly plastic; few very fine, fine, medium and coarse roots; many very fine and fine interstitial pores; 40 percent gravel; neutral (pH 7.0); clear wavy boundary.

Bt1 – 36 to 50 inches; yellowish brown (10YR 5/4) very gravelly heavy sandy loam, brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine and fine tubular pores; very few thin clay films bridging mineral sand grains; 40 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

Bt2 – 50 to 60 inches; yellowish brown (10YR 5/4) gravelly heavy sandy loam, brown (10YR 4/3) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine roots; few very fine and fine tubular pores; very few thin clay films bridging mineral sand grains; 30 percent gravel; slightly acid (pH 6.5).

Type Location: About 0.65 mile north on Log Cabin Road, from its intersection with Highway 120, then 3.95 miles on the west fork, and 300 feet west of the road; about 500 feet west and 330 feet south of the apparent center of Section 1, T.1N., R.25E., MDBM, Mono Craters NW Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The Pachic epipedon is 30 to 40 inches thick. The mean annual soil temperature at 20 inches is about 35°F, and the mean summer soil temperature is about 43°F. The textural control section is the whole argillic horizon, or the upper 20 inches of the argillic horizon. It is sandy loam, with 16 to 18 percent clay. Rock fragments are 30 to 50 percent gravel and 0 to 15 percent cobbles, and average 37 to 65 percent by volume.

Some pedons do not have organic surface horizons.

The A horizon has dry color of 10YR 4/3, 5/2 or 5/3; moist color is 10YR 3/2 or 3/3. It is sandy loam, with 2 to 3 percent clay. Rock fragments are 25 to 50 percent gravel and 0 to 15 percent cobbles by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 4/3, 4/4 or 5/4; moist color is 10YR 3/3 or 4/3. It is sandy loam, with 2 to 18 percent clay. Rock fragments are 30 to 50 percent gravel and 0 to 15 percent cobbles by volume. Reaction is slightly acid to neutral.

CHESAW FAMILY

The Chesaw family consists of deep, somewhat excessively drained soils forming in material weathering from granitic, andesitic, rhyolitic and mixed rocks. They are on mountainsides, on slopes of 15 to 80 percent. Elevation is 7,400 to 10,400 feet. The mean annual precipitation is about 10 to 35 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Sandy-skeletal, mixed, frigid Entic Haploxerolls.

Typical Pedon: The representative profile for this soil is on a south by southwest-facing mountainside, under antelope bitterbrush, big sagebrush, Jeffrey pine and grasses, at an elevation of 7,800 feet. Slope is 28 percent. Colors are for dry soil unless otherwise noted.

Oi - 1/2 to 0 inch; decomposing bitterbrush and sagebrush leaves and grass stems; abrupt broken boundary.

A1 - 0 to 2 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, and common medium, coarse and very coarse roots; many very fine and fine interstitial pores; 3 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

A2 - 2 to 13 inches; brown (10YR 5/3) gravelly loamy coarse sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many very fine and fine interstitial pores; 18 percent gravel and 5 percent cobbles; neutral (pH 7.0); gradual wavy boundary.

C1 - 13 to 32 inches; pale brown (10YR 6/3) gravelly loamy coarse sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 18 percent gravel and 5 percent cobbles; neutral (pH 7.0); clear wavy boundary.

C2 - 32 to 60 inches; light yellowish brown (10YR

6/4) very cobbly loamy sand, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 25 percent gravel, 40 percent cobbles and 15 percent stones; neutral (pH 7.0).

Type Location: About 0.85 mile northwest on Forest Service Road 3S25, from its intersection with Highway 203, then 0.15 mile east on east fork of road, then 0.5 mile north on north fork, on upslope side of road; about 330 feet north of the apparent center of the southwest quarter of Section 30, T.3S., R.28E., MDBM, Mt. Morrison NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 38°F, and the mean summer soil temperature is about 60°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is loamy sand, loamy coarse sand, sand or coarse sand, with 2 to 12 percent clay. Rock fragments are 12 to 50 percent gravel, 0 to 40 percent cobbles, 0 to 60 percent stones and 0 to 40 percent boulders, and average 36 to 87 percent by volume.

Some pedons have A horizons with coarse sand textures. Other pedons do not have an organic surface layer.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2 or 5/3; moist color is 10YR 2/1, 2/2, 3/1, 3/2 or 3/3. It is loamy fine sand, loamy sand or loamy coarse sand, with 3 to 12 percent clay. Rock fragments are 3 to 40 percent gravel, 0 to 27 percent cobbles, 0 to 5 percent stones and 0 to 20 percent boulders by volume. Reaction is strongly acid to neutral.

The C horizon has dry color of 10YR 5/3, 5/4, 6/3 or 6/4; moist color is 10YR 3/2, 3/3, 3/4, 4/3 or 4/4. It is loamy sand, loamy coarse sand, sand or coarse sand, with 2 to 12 percent clay. Rock fragments are 13 to 50 percent gravel, 0 to 40 percent cobbles, 0 to 60 percent stones and 0 to 40 percent boulders by volume. Reaction is strongly acid to neutral.

CORBETT FAMILY

The Corbett family consists of deep, somewhat excessively drained soils forming in material weathering from rhyolitic, andesitic and granitic rocks. These soils are on mountainsides and hillsides, and have slopes of 3 to 70 percent. Elevation is 7,100 to 10,200 feet. The mean annual precipitation is about 10 to 35 inches, and the mean annual temperature is about 42 °F.

Taxonomic Class: Mixed, frigid Typic Xeropsamments.

Typical Pedon: The representative profile for this soil is on a northwest-facing mountainside, under Jeffrey pine, red fir, big sagebrush, and bitterbrush, at an elevation of 7,680 feet. Slope is 31 percent. When described (8/16/84), the soil was dry in the 3 to 16 inch section, and slightly moist in the rest of the profile. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; light brownish gray (10YR 6/2) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 20 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

C1 – 3 to 16 inches; light gray (10YR 7/2) gravelly loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and common fine roots; many very fine and fine interstitial pores; 25 percent gravel; slightly acid (pH 6.5); gradual wavy boundary.

C2 – 16 to 36 inches; light gray (10YR 7/1) gravelly loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 25 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

C3 – 36 to 46 inches; white (10YR 8/1) gravelly loamy sand, grayish brown (10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine, medium, coarse and very coarse roots; many very fine and fine interstitial pores; 25 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

C4 – 46 to 52 inches; white (N 8/0) extremely gravelly loamy sand, light brownish gray (10YR 6/2) moist; massive; soft, very friable, nonsticky and nonplastic;

few fine and medium roots; common very fine and fine, and many medium interstitial pores; 75 percent gravel; slightly acid (pH 6.5); abrupt wavy boundary.

Cr – 52 inches; rhyolitic tuff, which can be cut with a tilespade.

Type Location: About 2.25 miles southwest on Forest Service Road 3S08, from its intersection with Forest Service Road 2S07, then 1.15 miles north on intersecting road, on the south shoulder of the road; about 330 feet west and 165 feet south of the northeast quarter of the northwest quarter of Section 31, T.2S., R.28E., MDBM, Mount Morrison Quadrangle.

Range in Characteristics: Soil depth to the paralithic or lithic contact is 52 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The soil moisture control section is 13 to 60 inches. It is usually dry in all parts from mid-June to late September, and moist in some or all parts the rest of the year. The 10 to 40 inch textural control section is loamy fine sand, loamy sand, loamy coarse sand, sand or coarse sand, with 1 to 5 percent clay. Rock fragments, are 1 to 30 percent gravel, 0 to 5 percent cobbles and 0 to 5 percent stones, and average 7 to 34 percent by volume.

Some pedons are weakly cemented with silica at depths of 33 to 40 inches. Some pedons have O horizons up to one inch thick. Other pedons have surface horizons with coarse sand textures.

The A horizon has dry color of 10YR 4/2, 5/1, 5/2 or 6/2; moist color is 10YR 3/2, 4/1 or 4/2. It is loamy fine sand, loamy sand or loamy coarse sand, with 1 to 5 percent clay. Rock fragments are 1 to 30 percent gravel by volume. Reaction is moderately to slightly acid.

The C horizon has dry color of 10YR 5/3, 6/2, 6/3, 7/1, 7/2, 7/3 or 8/1, or N8/0, or 2.5Y 6/1 or 7/1; moist color is 10YR 3/2, 3/3, 4/2, 4/3, 5/1, 5/2, 5/3 or 6/2, or 2.5Y 4/1 or 5/1. It is loamy fine sand, loamy sand, loamy coarse sand, sand, or coarse sand, with 1 to 5 percent clay. Rock fragments are 0 to 75 percent gravel, 0 to 15 percent cobbles, and 0 to 15 percent stones by volume. Reaction is moderately acid to neutral.

COWOOD FAMILY

The Cowood family consists of shallow, well drained soils forming from granitic and metasedimentary rocks. These soils are on mountainsides, mountain benches and ridges, and have slopes of 2 to 60 percent. Elevation is 7,400 to 11,000 feet. The mean annual precipitation is about 10 to 25 inches, and the mean annual temperature is about 41 °F.

Taxonomic Class: Loamy-skeletal, mixed Lithic Cryochrepts.

Typical Pedon: The representative profile for this soil is on an east-facing mountain ridge, under mountain mahogany and sagebrush, at an elevation of 10,693 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; dark grayish brown (10YR 4/2) extremely stony loamy coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, non-sticky and nonplastic; common very fine and few fine roots; many very fine interstitial pores; 35 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulders; slightly acid (pH 6.4); clear smooth boundary.

A2 – 2 to 5 inches; dark grayish brown (10YR 4/2) extremely stony sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure, parting to weak very fine and fine subangular blocky; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine and common fine tubular pores; 35 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulders; slightly acid (pH 6.3); clear smooth boundary.

Bw – 5 to 11 inches; yellowish brown (10YR 5/4) extremely stony sandy loam, brown (10YR 4/3) moist; moderate medium and coarse subangular

blocky structure, parting to moderate fine subangular blocky; soft, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; few very fine tubular pores; 5 percent gravel, 15 percent cobbles, 30 percent stones and 15 percent boulders; slightly acid (pH 6.3); abrupt smooth boundary.

R – 11 inches; hard adamellite bedrock.

Type Location: About 165 feet south of the apparent center of the southeast quarter of Section 1, T.9S., R.32E., MDBM, Big Pine NW Quadrangle.

Range in Characteristics: The soil depth to bedrock is less than 20 inches. The mean annual soil temperature at the lithic contact is 41°F, and the mean summer soil temperature is 53°F. The textural control section is either the whole soil for pedons 14 inches or less deep to bedrock, or the 10 inch to lithic contact section for soils deeper than 14 inches to bedrock. It is loam, sandy loam or loamy coarse sand, with 1 to 15 percent clay. Rock fragments are 5 to 60 percent gravel, 10 to 15 percent cobbles, 0 to 30 percent stones and 0 to 15 percent boulders, and average 70 to 79 percent by volume.

The A horizon has dry color of 10YR 4/2 or 5/2; moist color is 10YR 3/2. It is sandy loam or loamy coarse sand, with 2 to 8 percent clay. Rock fragments are 35 percent gravel, 5 to 15 percent cobbles, 0 to 30 percent stones and 0 to 15 percent boulders by volume. Reaction is slightly acid.

The Bw horizon has dry color of 10YR 5/4 or 5/6; moist color is 10YR 4/3 or 4/4. It is loam or sandy loam, with 10 to 15 percent clay. Rock fragments are 5 to 60 percent gravel, 10 to 15 percent cobbles, 0 to 30 percent stones and 0 to 15 percent boulders by volume. Reaction is slightly acid to neutral.

COZETICA FAMILY

The Cozetica family consists of deep, somewhat excessively drained soils forming from ash and pumice. These soils are on mountainsides, moraines, mountain flats, mountain toeslopes, and on edges of mountain basins, and have slopes of 0 to 60 percent. Elevation is 7,200 to 9,200 feet. The mean annual precipitation is about 10 to 25 inches, and the mean annual soil temperature is about 44°F.

Taxonomic Class: Ashy, frigid Vitrandic Torripsamments.

Typical Pedon: The reference profile for this soil is on a west by southwest-facing mountainside, under big sagebrush and antelope bitterbrush, at an elevation of 7,040 feet. Slope is 43 percent. When described (5/8/85), the soil was slightly moist from the 2 to 19 inch depth and the 24 to 60 inch depth, and dry in the remainder of the profile. Colors are for dry soil unless otherwise noted.

- A1 – 0 to 2 inches; grayish brown (10YR 5/2) gravelly sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 28 percent pumice and obsidian gravel; strongly acid (pH 5.5); clear wavy boundary.
- A2 – 2 to 6 inches; light brownish gray (10YR 6/2) gravelly sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 15 percent pumice and obsidian gravel; slightly acid (pH 6.2); clear wavy boundary.
- C1 – 6 to 16 inches; light brownish gray (10YR 6/2) loamy sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine and medium roots; 8 percent pumice and obsidian gravel; slightly acid (pH 6.1); abrupt wavy boundary.
- 2A – 16 to 24 inches; light gray (10YR 7/2) gravelly coarse sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 15 percent pumice and obsidian gravel; moderately acid (pH 5.7); clear wavy boundary.
- 2C2 – 24 to 36 inches; very pale brown (10YR 7/3) grav-

elly coarse sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 28 percent pumice and obsidian gravel; moderately acid (pH 5.7); gradual wavy boundary.

3C3 – 36 to 42 inches; very pale brown (10YR 7/3) gravelly coarse sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 15 percent pumice and obsidian gravel; strongly acid (pH 5.4)

4C4 – 42 to 60 inches; light gray (10YR 7/2) gravelly coarse sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 34 percent pumice and obsidian gravel; strongly acid (pH 5.5).

Type Location: About 1.15 miles south on road at the intersection of Highway 120 and Panum Crater Road, then 0.1 mile east on mining road, on east shoulder of road; about 0.2 mile south of the apparent center of Section 31, T.1N., R.27E., MDBM, Mono Craters NE Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is loamy sand, loamy coarse sand or coarse sand, with 0 to 2 percent clay. Rock fragments are 3 to 30 percent pumice and obsidian gravel, dominated by pumice, and average 17 to 29 percent by volume.

The surface A horizon has dry color of 10YR 5/2, 6/2 or 7/2; moist color is 10YR 3/2 or 4/2. It is sand or coarse sand, with 0 to 1 percent clay. Rock fragments are 2 to 30 percent pumice and obsidian gravel, and average 17 to 29 percent by volume. Reaction is strongly to slightly acid.

The other A horizons have dry color of 10YR 5/2, 6/2, 6/3, 6/4, 7/1 or 7/2; moist color is 10YR 3/2, 3/3, 4/2, 4/3, 4/4 or 5/2. They are loamy coarse sand, sand or coarse sand, with 0 to 1 percent clay. Rock fragments are

3 to 25 percent pumice and obsidian gravel by volume. Reaction is moderately acid to neutral.

The C horizons have dry color of 10YR 5/3, 6/2, 6/3, 7/2 or 7/3; moist color is 10YR 3/3, 4/3, 5/2 or 5/3.

They are loamy sand, loamy coarse sand or coarse sand, with 0 to 2 percent clay. Rock fragments are 8 to 34 percent pumice and obsidian gravel by volume. Reaction is strongly acid to neutral.

CREDO FAMILY

The Credo family consists of moderately deep to very deep, well drained soils forming in material weathering from granitic and mixed rocks. These soils are on mountainsides and hillsides, and have slopes of 15 to 60 percent. Elevation is 7,500 to 8,800 feet. The mean annual precipitation is about 12 to 20 inches, and the mean annual temperature is about 45°F.

Taxonomic Class: Fine-loamy, frigid Xeric Haplargids

Typical Pedon: The representative profile for this soil is on a north-facing hillside, under big sagebrush, bitterbrush, Indian ricegrass, squirreltail and bunchgrasses, at an elevation of 7,600 feet. Slope is 45 percent. Colors are for dry soil unless otherwise noted.

Oi – 1 to 0 inches; decomposed and decomposing big sagebrush and bitterbrush leaves and twigs; abrupt wavy boundary.

A – 0 to 5 inches; grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2) moist; weak medium grading to weak very fine and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine and fine interstitial and tubular pores; 15 percent gravel, 10 percent cobbles and 2 percent stones; neutral (pH 6.6); clear wavy boundary.

Bt1 – 5 to 13 inches; brown (10YR 5/3) gravelly loam, dark grayish brown (2.5Y 4/2) moist; moderate fine grading to moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, common fine and few medium and coarse roots; common very fine and few fine tubular pores; few thin clay films line tubular pores; 20 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

Bt2 – 13 to 23 inches; light olive brown (2.5Y 5/4) loam, olive brown (2.5Y 4/4) moist; moderate medium, coarse grading to moderate fine subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few fine and medium roots; common very fine and fine, and few medium tubular pores; common moderately thick clay films line tubular pores; 5 percent gravel and 5 percent cobbles;

slightly acid (pH 6.4); gradual wavy boundary.

Bt3 – 23 to 29 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; weak medium and coarse grading to weak very fine and fine subangular blocky structure; hard, firm, sticky and plastic; few fine roots; few very fine tubular pores; few thin clay films line tubular pores; 5 percent gravel; slightly acid (pH 6.4); abrupt wavy boundary.

Cr – 29 to 57 inches; highly weathered granite & metasedimentary rock; light yellowish brown (2.5Y 6/4), olive brown (2.5Y 4/4) moist; massive; hard, firm, slightly sticky and slightly plastic; 15 percent cobbles; slightly acid (pH 6.4).

Type Location: About 500 feet east of the northwest corner of the northwest quarter of the northeast quarter of Section 6, T.3S., R.31E., MDBM, Casa Diablo Mtn NE Quadrangle. Roadcut on Wildrose grade.

Range in Characteristics: Soil depth ranges from 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 48°F. The mean summer soil temperature is about 68°F. The 10 to 40 inch textural control section is fine-loamy, and is loam or clay loam, with 25 to 30 percent clay. Rock fragments are 0 to 20 percent gravel, 0 to 20 percent cobbles and 0 to 5 percent stones, and average 40 to 85 percent by volume.

Some pedons are 20 to 40 inches deep to lithic or paralithic contact.

The A horizon has dry color of 10YR 4/3, 5/2, 5/3, 5/4, 6/2 or 6/3; moist color is 10YR 3/2, 3/3, 4/2, 4/3 or 4/4. It is sandy loam or loam, with 6 to 15 percent clay. Rock fragments are 0 to 20 percent gravel, 0 to 15 percent cobbles and 0 to 5 percent stones. Reaction is slightly acid to neutral.

The Bt horizon has dry color of 10YR 5/3, 5/4, 6/2, 6/3, 2.5Y 4/4, 5/4 or 6/4; moist color is 2.5Y 4/2, 4/4 or 5/4. It is loam or clay loam, with 20 to 32 percent clay. Rock fragments are 0 to 10 percent gravel, 0 to 20 percent cobbles and 0 to 3 percent stones. Reaction is slightly acid to neutral.

CUMULIC HAPLOXEROLLS

These Cumulic Haploxerolls consist of deep, somewhat poorly drained soils forming in drainage bottoms from alluvium weathered from mixed rocks, and have slopes of 0 to 9 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Cumulic Haploxerolls

Typical Pedon: The representative profile for this soil is on a southeast-facing relict shoreline, under grasses and sedges, at an elevation of 6,450 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 4 inches; gray (10YR 5/1 and 6/1) loam, very dark grayish brown (10YR 3/2) moist; massive to weak very fine granular structure; hard, friable, slightly sticky and slightly plastic; common very fine, fine and medium roots; common very fine vesicular and tubular and few medium tubular pores; noneffervescent; neutral (pH 7.1); abrupt wavy boundary.

C1 – 4 to 16 inches; gray (10YR 6/1 and 5/1) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic to moderate fine and medium platy structure; hard, friable, slightly sticky and plastic; common very fine and fine roots; many very fine tubular and common medium and coarse tubular pores; noneffervescent; neutral (pH 7.2); clear wavy boundary.

C2 – 16 to 29 inches; gray (10YR 6/1) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine, fine and medium roots; common very fine and few medium and coarse tubular pores; noneffervescent; neutral (pH 7.2) clear wavy boundary.

C3 – 29 to 43 inches; gray (10YR 6/1 and 5/1) silty clay loam, very dark grayish brown (10YR 3/2) moist; with few fine distinct yellowish brown (10YR 5/4) iron stains on faces of peds, yellowish brown (10YR 5/6) moist; moderate fine and medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots; many very fine and fine and

common medium and coarse tubular pores; noneffervescent; neutral (pH 7.2); clear wavy boundary.

C4 – 43 to 56 inches; gray (10YR 6/1 and 5/1) clay loam, very dark grayish brown (10YR 3/2) moist; with faint yellowish brown (10YR 5/4) iron stains on faces of peds, yellowish brown (10YR 5/6) moist; moderate medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; very few very fine roots; common very fine, fine and few medium and coarse tubular pores; noneffervescent; neutral (pH 7.2); clear wavy boundary.

C5 – 56 to 60 inches; gray (10YR 6/1) clay loam, very dark grayish brown (10YR 3/2), with common iron stains on faces of peds, light olive brown (2.5Y 5/4) moist; massive to weak medium subangular blocky structure; hard, friable, sticky and plastic; no roots; 10 percent very fine gravel; noneffervescent; neutral (pH 7.2); clear wavy boundary.

Type Location: About 0.5 miles east of Dechambeau Ranch, 1,500 feet east from shoulder of dirt road; at 2.1 miles south of the southeast corner of Sec. 27, T.2N., R.26E., MDBM, Bodie SE Quadrangle.

Range in Characteristics: Soil depth is usually greater than 60 inches. The mean annual soil temperature at 20 inches is about 45°F. The mean annual summer and winter soil temperatures differ by more than 9°F. The textural control section is 10 to 40 inches, and is fine-loamy, with 18 to 35 percent clay. Rock fragments are gravel, and range from 0 to 15 percent, and average 0 to 18 percent by volume.

The A horizon has dry color of 10YR 6/1, 6/2, 5/1 or 5/2; moist color is 10YR 3/2 or 3/1. Textures is loam, with 12 to 20 percent clay. Gravel-size rock fragments average 0 to 2 percent by volume.

The C horizon has dry color of 10YR 6/1, 6/2, 6/3, 5/1, 5/2 or 5/3; moist color is 10YR 5/1, 5/2, 5/3, 4/1, 4/2, 4/3, 3/1, 3/2 or 3/3. Textures are silty clay loam, sandy clay loam or clay loam, with 18 to 35 percent clay. Gravel-size rock fragments average 0 to 15 percent by volume.

DECHAMBEAU FAMILY

The Dechambeau family consists of very deep, well drained soils forming from mixed alluvium influenced by volcanic ash. These soils are on alluvial fans and lakeshore terraces, and have slopes of 1 to 15 percent. Elevation is 6,400 to 7,300 feet. The mean annual precipitation is about 6 to 12 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Coarse-loamy, mixed (nonacid), mesic Xeric Torriorthents

Typical Pedon: The representative profile for this soil is on a south-by-southwest-facing lakeshore terrace, under big sagebrush and rabbitbrush, at an elevation of 6,800 feet. Slope is 6 percent. When described (9/27/74), the soil was dry throughout. Colors are for dry soil unless otherwise noted.

- A1 – 0 to 3 inches; light brownish gray (10YR 6/2) gravelly sandy loam, dark brown (10YR 3/3) moist; weak thick platy structure; soft; very friable, nonsticky and nonplastic; common fine and very fine roots; common very fine tubular and fine interstitial pores; 20 percent angular gravel; slightly acid (pH 6.4); abrupt smooth boundary.
- A2 – 3 to 7 inches; light brownish gray (10YR 6/2) gravelly sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure, parting to massive; soft, very friable, nonsticky and nonplastic; many very fine and fine, and common medium and coarse roots; common very fine tubular and fine interstitial pores; 20 percent angular gravel; neutral (pH 6.6); clear wavy boundary.
- C1 – 7 to 17 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine, and common medium and coarse roots; few very fine and fine tubular and interstitial pores; 20 percent angular gravel; neutral (pH 6.6); clear wavy boundary.
- C2 – 17 to 25 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, very friable,

nonsticky and nonplastic; common very fine and fine, and few medium and coarse roots; common very fine and fine interstitial, and common very fine, fine, medium and coarse tubular pores; 20 percent angular gravel; neutral (pH 6.6); clear wavy boundary.

C3 – 25 to 60 inches; yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine, and few medium and coarse roots; common fine interstitial, and common very fine, fine, and few medium and coarse tubular pores; 25 percent angular gravel; neutral (pH 6.6)

Type Location: In the Bodie-Coleville Soil Survey Area, about 0.75 mile north of Poleline Road and 50 feet northeast of the unimproved dirt road to Conway Ranch; about 350 feet west and 1,000 feet south of the northeast corner of Section 5, T.2N., R.26E., MDBM, Bodie Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer and mean winter soil temperatures differ by more than 9°F. The 10 to 40 inch textural control section is gravelly sandy loam, with 3 to 15 percent clay. Rock fragments are 15 to 35 percent gravel and 0 to 15 percent stones, and average 15 to 25 percent by volume. Reaction is slightly acid to neutral throughout.

The A horizon has dry color of 10YR 5/2, 5/3, 6/2, 6/3, 7/2 or 7/3; moist color is 10YR 3/2, 3/3, 4/2 or 4/3. It is gravelly sandy loam, very gravelly sandy loam, sandy loam or loamy sand. Rock fragments are 0 to 35 percent gravel and 0 to 10 percent cobbles, and average 0 to 50 percent by volume.

The C horizon has dry color of 10YR 5/3, 5/4, 6/3 or 6/4; moist color is 7.5YR 4/4, 2.5Y 4/4, 10YR 3/3, 3/4, 4/3 or 4/4. It is gravelly sandy loam or gravelly fine sandy loam. Strata of loamy sand are present in some pedons. Rock fragments are 15 to 35 percent gravel and 0 to 15 percent cobbles by volume.

DEEPWELL FAMILY

The Deepwell family consists of very deep, somewhat excessively drained soils forming from windblown rhyolitic volcanic ash. These soils are on sand dunes on basin floors and lake terraces, and have slopes of 2 to 30 percent. Elevation is 6,300 to 6,800 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Ashy, mesic calcareous Vitrandic Torripsamments

Typical Pedon: The representative profile for this soil is on a southwest-facing lake terrace, under rubber rabbitbrush, hairy horsebrush, fourwing saltbush and black greasewood, at an elevation of 6,500 feet. Slope is 10 percent. Colors are for dry soil unless otherwise noted.

C1 - 0 to 3 inches; light gray (10YR 7/1) sand, grayish brown (10YR 5/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; slightly alkaline (pH 7.6); clear smooth boundary.

C2 - 3 to 60 inches; light gray (10YR 7/1) sand, grayish brown (10YR 5/2) moist; single grain; loose, non-

sticky and nonplastic; common very fine, and few fine and medium roots; many very fine interstitial pores; slightly alkaline (pH 7.6).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 7 miles northwest of Benton, California, in Adobe Valley, and 1 mile northwest of Antelope Mountain; about 1,100 feet east and 2,800 feet north of the southwest corner of Section 33, T.1N., R.31E., MDBM, Glass Mountain Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 62°F. The difference between the mean annual summer and mean winter soil temperature is greater than 9°F. The 10 to 40 inch textural control section is sand, with 0 to 3 percent clay. Rock fragments are pumice gravel, and are 0 to 10 percent by volume. The ash content ranges from 60 to 100 percent by weight.

The C horizon has dry color of 10YR 6/2, 7/1 or 7/3; moist color is 10YR 4/2, 5/2 or 5/3. It is sand or fine sand. Rock fragments are pumice gravel, and are 0 to 10 percent by volume. Base saturation is 90 to 100 percent. Reaction is neutral to moderately alkaline.

DELANEY FAMILY

The Delaney family consists of moderately deep to deep, somewhat excessively drained soils forming in material weathering from pumice and tuff. These soils are on mountainsides and alluvial fans, on slopes of 0 to 60 percent. Elevation is 5,800 to 8,800 feet. The mean annual precipitation is about 6 to 18 inches, and the mean annual temperature is about 46°F.

Taxonomic Class: Ashy, mesic Vitrandic Xeropsamments.

Typical Pedon: The representative profile for this soil is on a northwest-facing mesa, under big sagebrush, rabbitbrush, antelope bitterbrush, Jeffrey pine and pinyon pine, at an elevation of 7,500 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; light brownish gray (10YR 6/2) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many medium interstitial pores; 15 percent pumice gravel; slightly acid (pH 6.4); clear wavy boundary.

A2 – 3 to 10 inches; light brownish gray (10YR 6/2) loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure, parting to weak fine granular; soft, very friable, nonsticky and nonplastic; many very fine, and common medium interstitial pores; slightly acid (pH 6.4); abrupt smooth boundary.

2C1 – 10 to 15 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; few fine and medium interstitial pores; 10 percent pumice gravel; slightly acid (pH 6.4); clear smooth boundary.

2C2 – 15 to 23 inches; brown (10YR 5/3) gravelly loamy sand, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; few fine and

medium interstitial pores; 30 percent pumice gravel; slightly acid (pH 6.5); abrupt smooth boundary.

R – 23 inches; hard rhyolitic bedrock.

Type Location: About 0.3 mile west and 0.05 mile north of the southeast corner of Section 10, T.4S., R.30E., MDBM, Casa Diablo Quadangle.

Range in Characteristics: Soil depth to the lithic or paralithic contact is 23 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil moisture control section is 12 to 35 inches. It is usually dry from mid-April to late November, and is usually moist in some part the rest of the year. The textural control section is from 10 inches to the lithic or paralithic contact in pedons shallower than 40 inches, and is the 10 to 40 inch section in pedons deeper than 40 inches. It is loamy fine sand, loamy sand or coarse sand, with 0 to 5 percent clay. Rock fragments are 0 to 30 percent pumice gravel and 0 to 5 percent tuff cobbles, and average 16 to 29 percent by volume.

The surface A horizon has dry color of 10YR 5/2, 6/2 or 6/3; moist color is 10YR 3/2, 4/2 or 4/4. It is loamy sand, loamy coarse sand or sand, with 0 to 4 percent clay. Rock fragments are 10 to 45 percent pumice gravel by volume. Reaction is slightly acid.

The other A horizons have dry color of 10YR 5/2, 5/3, 6/2, 6/3 or 7/2; moist color is 10YR 3/2, 3/3, 4/2, 5/2, 5/3 or 6/3. They are loamy fine sand, loamy sand, loamy coarse sand or coarse sand, with 0 to 4 percent clay. Rock fragments are 0 to 20 percent pumice gravel by volume. Reaction is moderately to slightly acid.

The C horizon has dry color of 10YR 5/3, 6/3, 7/1 or 7/3; moist color is 10YR 3/3, 4/3, 4/4, 5/2, 5/3, 5/4 or 6/2. They are loamy fine sand, loamy sand or coarse sand, with 0 to 5 percent clay. Rock fragments are 0 to 30 percent pumice gravel and 0 to 5 percent rhyolite or tuff cobbles by volume. Reaction is moderately acid to neutral.

FEZ FAMILY

The Fez family consists of moderately deep to very deep, somewhat excessively drained soils forming in material weathering from pumice. They are on mountainsides, hillsides and upland drainages and depressions, and have slopes of 0 to 60 percent. Elevation is 8,000 to 9,800 feet. The mean annual precipitation is about 15 to 25 inches, and the mean annual temperature is about 39°F.

Taxonomic Classification: Ashy, frigid Vitrandic Haploxerolls.

Typical Pedon: The representative profile for this soil is on a north by northeast-facing hillside, under quaking aspen, at an elevation of 8,760 feet. Slope is 32 percent. When described (8/27/86), the soil was dry in the upper 34 inches and moist in the rest of the profile. Colors are for dry soil unless otherwise noted.

Oe – 1 to 0 inch; decomposing aspen leaves and twigs; abrupt smooth boundary.

A1 – 0 to 4 inches; grayish brown (10YR 5/2) sand, very dark gray (10YR 3/1) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine, and common medium roots; many very fine and fine interstitial pores; 3 percent pumice and granitic gravel; moderately acid (pH 6.0); gradual wavy boundary.

A2 – 4 to 10 inches; brown (10YR 5/3) sand, very dark gray (10YR 3/1) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium and coarse roots; many very fine and fine interstitial pores; 8 percent pumice and granitic gravel; moderately acid (pH 6.0); clear wavy boundary.

C1 – 10 to 34 inches; brown (10YR 5/3) sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, and few fine, medium and coarse roots; many very fine and fine interstitial pores; 5 percent pumice and granitic gravel; moderately acid (pH 6.0); gradual smooth boundary.

C2 – 34 to 47 inches; variegated brown and light yellowish brown (10YR 5/3 and 10YR 6/4) sand, very dark grayish brown and yellowish brown (10YR 3/2 and 10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, and common fine, medium and coarse roots; many very fine

and fine interstitial pores; 13 percent pumice and granitic gravel; moderately acid (pH 6.0); gradual smooth boundary.

C3 – 47 to 60 inches; variegated yellowish brown and light yellowish brown (10YR 5/4 and 10YR 6/4) gravelly sand, dark yellowish brown and yellowish brown (10YR 4/2 and 10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 15 percent pumice and granitic gravel; moderately acid (pH 6.0).

Type Location: About 550 feet east and 880 feet north of the apparent center of Section 30, T.1S., R.29E., MDBM, Cowtrack Mountain SE Quadrangle.

Range in Characteristics: Soil depth to hard bedrock is 24 to greater than 60 inches. The mean annual soil temperature at 20 inches is 37°F, and the mean summer soil temperature is 53°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The textural control section is from 10 inches to bedrock in pedons shallower than 40 inches, and is the 10 to 40 inch section in pedons deeper than 40 inches. It is loamy fine sand, loamy sand, loamy coarse sand, sand or coarse sand, with 2 to 5 percent clay. Rock fragments are 0 to 30 percent gravel, 0 to 15 percent cobbles and 0 to 5 percent stones, and average 5 to 21 percent by volume. The gravel is mostly pumice, with minor amounts of granitic, obsidian or mixed rock. The cobbles and stones are basalt rock.

Some pedons have surface mineral horizons with loamy very fine sand or coarse sand textures. Other pedons do not have an organic surface layer. A few pedons have duripans at soil depths greater than 40 inches.

The surface A horizon has dry color of 10YR 4/2, 5/1, 5/2 or 5/3; moist color is 10YR 3/1 or 3/2. It is loamy sand or sand, with 2 to 7 percent clay. Rock fragments are 3 to 30 percent gravel by volume, and are mostly pumice, with minor amounts of obsidian, granitic and mixed rocks. Reaction is strongly to slightly acid.

The other A horizons have dry color of 10YR 5/2, 5/3, 5/4 or 6/3; moist color is 10YR 3/1, 3/2, 3/3, 4/2 or 4/4. They are loamy fine sand, loamy sand, loamy coarse sand, sand or coarse sand, with 1 to 3 percent clay. Rock fragments are 0 to 30 percent gravel by volume, and are mostly pumice, with minor amounts of obsidian,

granitic and mixed rocks. Reaction is moderately acid to moderately alkaline.

The C horizon has dry color of 10YR 5/3, 5/4, 6/3 or 6/4; moist color is 10YR 3/2, 3/3, 4/2, 4/4 or 5/4. It is loamy fine sand, loamy sand, sand or coarse sand, with 2 to 5 percent clay. Rock fragments are 0 to 25

percent gravel, 0 to 15 percent cobbles and 0 to 5 percent stones by volume. The gravel is mostly pumice, with minor amounts of obsidian, granitic and mixed rocks. The cobbles and stones are mostly basalt, with minor amounts of obsidian and granitic rock.

GARLET FAMILY

The Garlet family consists of moderately deep to deep, well drained soils forming from mixed rocks. These soils are on moraines, mountainsides, hillsides and stream channels, and have slopes of 2 to 60 percent. Elevation is 7,600 to 11,300 feet. The mean annual precipitation is about 14 to 25 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Loamy-skeletal, mixed Typic Cryochrepts.

Typical Pedon: The representative profile for this soil is on a west-facing moraine, under rabbitbrush and phlox, at an elevation of 9,800 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; brown (10YR 5/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots, many very fine interstitial pores; 15 percent gravel, 5 percent cobbles and 2 percent stones; neutral (pH 6.7); clear wavy boundary.

A2 – 3 to 6 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine and few fine interstitial pores; 20 percent gravel; neutral (pH 6.8); clear wavy boundary.

Bw – 6 to 14 inches; yellowish brown (10YR 5/4) very gravelly sandy loam, dark yellowish brown (10YR 3/4) moist; weak medium and coarse subangular blocky structure, parting to weak very fine and fine subangular blocky; slightly hard, friable, slightly sticky and nonplastic; many very fine and common fine roots; few very fine interstitial pores; 35 percent gravel; neutral (pH 6.9); clear smooth boundary.

C1 – 14 to 24 inches; yellowish brown (10YR 5/4) very gravelly coarse sandy loam, dark yellowish

brown (10YR 4/4) moist; massive; soft, very friable, slightly sticky and nonplastic; common very fine and few fine roots; many very fine interstitial pores; 45 percent gravel; neutral (pH 6.8).

R – 24 inches; hard granite bedrock.

Type Location: About 165 feet west and 350 feet north of the southeast corner of the northeast quarter of the southwest quarter of Section 2, T.9S., R.32E., MDBM, Big Pine NW Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 20 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 41°F, and the mean summer soil temperature is about 53°F. The textural control section is from 10 inches to the lithic contact for pedons less than 40 inches deep, and is the 10 to 40 inch section for pedons deeper than 40 inches. It is loam, sandy loam or coarse sandy loam, with 6 to 14 percent clay. Rock fragments are 35 to 55 percent gravel and 0 to 15 percent cobbles, and average 42 to 58 percent by volume.

Some pedons do not have C horizons.

The A horizon has dry color of 10YR 4/3 or 5/3; moist color is 10YR 2/2, 3/2 or 3/3. It is loam, sandy loam or loamy sand, with 3 to 12 percent clay. Rock fragments are 15 to 20 percent gravel, 0 to 5 percent cobbles and 0 to 2 percent stones by volume. Reaction is neutral.

The Bw horizon has dry color of 10YR 5/4 or 6/4; moist color is 10YR 3/4, 4/3 or 4/4. It is loam or sandy loam, with 6 to 14 percent clay. Rock fragments are 35 to 55 percent gravel and 0 to 15 percent cobbles by volume. Reaction is slightly acid to neutral.

The C horizon has dry color of 10YR 5/4 or 7/6; moist color is 10YR 4/4 or 4/6. It is loam or coarse sandy loam, with 8 to 12 percent clay. Rock fragments are 40 to 50 percent gravel and 0 to 10 percent cobbles by volume. Reaction is moderately acid to neutral.

GLEAN FAMILY

The Glean family consists of very deep, well drained soils forming in material weathering from basalt and granodiorite rock. These soils are on moraines, moraine ridges and mountainsides, and have slopes of 0 to 60 percent. Elevation is 7,600 to 10,200 feet. The mean annual precipitation is about 10 to 30 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Loamy-skeletal, mixed, frigid Pachic Haploxerolls

Typical Pedon: The representative profile for this soil is on a west-facing hillside, under big sagebrush and antelope bitterbrush, at an elevation of 9,600 feet. Colors are for dry soil unless otherwise noted.

A – 0 to 1 inch; dark grayish brown (10YR 4/2) extremely stony loam sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; many very fine roots; many medium interstitial pores; 15 percent gravel, 25 percent cobbles and 25 percent stones; slightly acid (pH 6.4); clear smooth boundary.

Bw1 – 1 to 6 inches; brown (10YR 4/3) very stony sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many medium interstitial pores; 10 percent gravel, 5 percent cobbles and 25 percent stones; neutral (pH 6.7); gradual wavy boundary.

Bw2 – 6 to 15 inches; brown (10YR 4/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine, common fine and few medium roots; many medium interstitial pores; 10 percent gravel, 40 percent cobbles and 1 percent stones; neutral (pH 6.8); gradual wavy boundary.

C1 – 15 to 29 inches; brown (10YR 5/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine, and few fine and medium roots; many medium interstitial pores; 10 percent gravel and 30 percent cobbles; neutral (pH 6.9); gradual wavy boundary.

2C2 – 29 to 60 inches; brown (10YR 5/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; many medium interstitial pores; 25 percent gravel and 20 percent cobbles; neutral (pH 6.7).

Type Location: About 0.35 miles south and 0.25 miles east of the northwest quarter of Section 34, T.2S., R.30E., MDBM, Casa Diablo NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The pachic epipedon is 30 to 38 inches thick. The mean annual soil temperature at 20 inches is about 38°F, and the mean summer temperature is about 60°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The textural control section is the 10 to 40 inch section. It is sandy loam or coarse sandy loam, with 3 to 12 percent clay. Rock fragments are 7 to 56 percent gravel, 0 to 40 percent cobbles, 0 to 25 percent stones and 0 to 25 percent boulders, and average 43 to 80 percent by volume.

Some pedons have organic surface horizons.

The A horizon has dry color of 10YR 4/2, 5/2 or 5/3; moist color is 10YR 2/2, 3/1, 3/2 or 3/3. It is sandy loam or loamy sand, with 2 to 12 percent clay. Rock fragments are 13 to 42 percent gravel, 0 to 32 percent cobbles and 0 to 25 percent stones by volume. Reaction is slightly acid to neutral.

The Bw horizon has dry color of 10YR 4/3, 5/3, 5/4 or 6/3; moist color is 10YR 3/2, 3/3 or 3/4. It is sandy loam, with 6 to 12 percent clay. Rock fragments are 7 to 56 percent gravel, 5 to 40 percent cobbles and 0 to 25 percent stones by volume. Reaction is neutral.

The C horizon has dry color of 10YR 5/3 or 6/4; moist color is 10YR 3/3 or 4/3. It is sandy loam or coarse sandy loam, with 3 to 10 percent clay. Rock fragments are 10 to 38 percent gravel, 20 to 34 percent cobbles and 0 to 25 percent boulders by volume. Reaction is slightly acid to neutral.

GOODALE FAMILY

The Goodale family consists of very deep, somewhat excessively drained soils forming in granitic alluvium. These soils are on bouldery alluvial fans and fan terraces, and have slopes of 5 to 15 percent. Elevation is 3,900 to 6,800 feet. The mean annual precipitation is about 4 to 10 inches, and the mean annual temperature is about 57°F.

Taxonomic Class: Sandy-skeletal, mixed, thermic Xeric Torriorthents

Typical Pedon: The representative profile for this soil is on an east-facing fan terrace, under blackbrush, Nevada ephedra and desert needlegrass, at an elevation of 4,200 feet. Slope is 11 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 1 inch; brown (10YR 5/3) bouldery loamy coarse sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; 15 percent gravel, 5 percent cobbles, 5 percent stones and 5 percent boulders; neutral (pH 6.8); abrupt smooth boundary.

A2 – 1 to 12 inches; pale brown (10YR 6/3) bouldery loamy coarse sand, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine interstitial pores; 15 percent gravel, 5 percent cobbles, 5 percent stones and 5 percent boulders; slightly alkaline (pH 7.4); clear smooth boundary.

C – 12 to 60 inches; pale brown (10YR 6/3) extremely stony loamy coarse sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic;

few very fine roots; many very fine interstitial pores; 20 percent gravel, 20 percent cobbles, 20 percent stones and 10 percent boulders; slightly alkaline (pH 7.4).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 8.2 miles south of Aberdeen, California, in the Owens Valley, 75 feet west of the fence intersecting the road; about 400 feet west and 1,700 feet north of the southeast corner of Section 28, T.12S., R.34E., MDBM, Mount Pinchot Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 61°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The 10 to 40 inch textural control section is extremely stony loamy coarse sand, with 0 to 3 percent clay. Rock fragments are 15 to 20 percent gravel, 5 to 20 percent cobbles, 5 to 20 percent stones and 5 percent boulders, and average 35 to 75 percent by volume. Reaction is neutral to slightly alkaline.

The A horizon has dry color of 10YR 5/3, 6/3, 6/4, 7/2 or 7/3; moist color is 10YR 3/3, 4/3, 5/2 or 5/3. It is loamy sand, gravelly loamy sand, very gravelly loamy sand, bouldery loamy coarse sand and gravelly sand. Rock fragments are 10 to 35 percent gravel, 0 to 20 percent cobbles and 0 to 25 percent stones and boulders, and average 10 to 60 percent by volume. The organic carbon content is 0.2 to 0.4.

The C horizon has dry color of 10YR 5/4, 6/3, 7/2, 7/3 or 7/4; moist color is 10YR 4/3, 4/4, 5/2, 5/3 or 5/4. It is loamy coarse sand, and loamy sand with very cobbly, very stony or extremely stony modifiers.

GUISER FAMILY

The Guiser family consists of moderately deep to very deep, well drained soils forming from metavolcanic and metasedimentary rocks. These soils are on mountainsides and mountain benches, and have slopes of 15 to 60 percent. Elevation is 7,600 to 11,200 feet. The mean annual precipitation is 12 to 30 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Loamy-skeletal, mixed Mollic Cryoboralfs.

Typical Pedon: The representative profile for this soil is on a north by northwest-facing mountainside, under lodgepole pine, whitebark pine and grasses, at an elevation of 9,880 feet. Slope is 23 percent. When described (7/16/87), the soil was dry in the upper 30 inches and slightly moist in the lower 30 inches. Colors are for dry soil unless otherwise noted.

Oe – 2 to 0 inches; decomposing lodgepole pine and whitebark pine twigs, needles and cones; abrupt smooth boundary.

A1 – 0 to 2 inches; brown (10YR 5/3) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 20 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

A2 – 2 to 9 inches; brown (10YR 5/3) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium, and common coarse roots; many very fine and fine interstitial pores; 25 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

B1 – 9 to 22 inches; yellowish brown (10YR 5/6) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 50 percent gravel and 10 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.

B2 – 22 to 30 inches; brownish yellow (10YR 6/6) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine, fine, medium and

coarse roots; many very fine and fine interstitial pores; 35 percent gravel and 5 percent cobbles; moderately acid (pH 6.0); clear wavy boundary.

Bt1 – 30 to 36 inches; reddish yellow (7.5YR 6/6) gravelly sandy loam, strong brown (7.5YR 5/6) moist; massive; soft, very friable, slightly sticky and slightly plastic; few medium roots; few very fine tubular pores; common thin clay films bridging mineral sand grains and in pores; 20 percent gravel; strongly acid (pH 5.5); clear wavy boundary.

Bt2 – 36 to 47 inches; yellowish brown (10YR 5/6) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine and medium roots; common very fine tubular pores; few thin clay films bridging mineral sand grains; 45 percent gravel and 15 percent cobbles; strongly acid (pH 5.5); gradual wavy boundary.

C – 47 to 60 inches; yellowish brown (10YR 5/6) very gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine and medium roots; many very fine and fine interstitial pores; 35 percent gravel and 10 percent cobbles; strongly acid (pH 5.5).

Type Location: About 0.65 mile north on Log Cabin Mine road, from its intersection with Highway 120, then 4.75 miles north on west fork, then 0.4 mile on west fork, and 30 feet west of the road; about 80 feet east and 160 feet north of the southeast corner of the northeast quarter of Section 2, T.1N., R.25E., MDBM, Mono Craters SW Quadrangle.

Range in Characteristics: Soil depth to bedrock is 33 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 35°F. The mean summer soil temperature is 43°F. The textural control section is the whole argillc horizon. It is sandy loam, with 7 to 16 percent clay. Rock fragments are 20 to 60 percent gravel and 0 to 15 percent cobbles, and average 44 to 60 percent by volume.

Some pedons have surface layers with sandy loam textures.

The A horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/2, 3/3 or 4/2. It is loamy sand or loamy

coarse sand, with 2 to 3 percent clay. Rock fragments are 20 to 25 percent gravel by volume. Reaction is very strongly to moderately acid.

The B horizon has dry color of 10YR 5/6, 6/4 or 6/6, or 7.5YR 6/6; moist color is 10YR 4/4, or 7.5YR 5/6. It is sandy loam, with 5 to 16 percent clay. Rock fragments are 20 to 60 percent gravel and 0 to 15 percent cobbles

by volume. Reaction is strongly to slightly acid.

The C horizon has dry color of 10YR 5/6; moist color is 10YR 4/4. It is sandy loam or gravel, with 0 to 8 percent clay. Rock fragments are 35 to 100 percent gravel and 0 to 10 percent cobbles by volume. Reaction is strongly acid.

HAYPRESS FAMILY

The Haypress family consists of very deep, somewhat excessively drained soils forming from granitic, rhyolitic, metasedimentary, basalt and mixed rocks. These soils are on mountainsides, hillsides, basalt flows, morainal debris and mountain toeslopes, and have slopes of 0 to 60 percent. Elevation is 7,500 to 9,600 feet. The mean annual precipitation is about 12 to 25 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Sandy, mixed, frigid Entic Haploxerolls.

Typical Pedon: The representative profile for this soil is on a south by southeast-facing mountainside, under aspen and willow, at an elevation of 9,200 feet. When described (7/13/87), the soil was slightly moist or moist throughout. Colors are for dry soil unless otherwise noted.

Oe – 1 to 0 inches; decomposing aspen plant parts; clear wavy boundary.

A1 – 0 to 1 inch; dark grayish brown (10YR 4/2) loamy sand, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine and coarse roots; many very fine interstitial pores; 10 percent gravel; neutral (pH 7.0); clear wavy boundary.

A2 – 1 to 11 inches; grayish brown (10YR 5/2) loamy sand, very dark gray (10YR 3/1) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium, and common coarse and very coarse roots; many very fine and fine interstitial pores; 5 percent gravel; neutral (pH 7.0); gradual wavy boundary.

A3 – 11 to 22 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few medium, and common coarse and very coarse roots; many very fine and fine interstitial pores; 2 percent gravel; slightly acid (pH 6.5); clear irregular boundary.

2Ab1 – 22 to 32 inches; brown (10YR 5/3) very bouldery loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium, and common coarse and very coarse roots; many very fine and fine interstitial pores; 3 percent gravel, 2 percent cobbles and 45 percent boulders; slightly acid (pH

6.5); clear wavy boundary.

2Ab2 – 32 to 40 inches; brown (10YR 5/3) very bouldery loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 12 percent gravel, 2 percent cobbles and 40 percent boulders; neutral (pH 7.0); abrupt wavy boundary.

2C1 – 40 to 54 inches; yellowish brown (10YR 5/4) loamy sand, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 12 percent gravel; neutral (pH 7.0); clear smooth boundary.

2C2 – 54 to 60 inches; strong brown (7.5YR 5/6) gravelly loamy sand, yellowish red (5YR 4/6) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 25 percent gravel; neutral (pH 7.0).

Type Location: About 0.65 mile north on Log Cabin Mine Road, from its intersection with Highway 395, then 1.9 miles on west fork, on the east shoulder of the road; about 330 feet east and 600 feet north of the apparent center of the northeast quarter of Section 12, T.1N., R.25E., MDBM, Mono Craters NW Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature at 20 inches is about 37°F, and the mean summer soil temperature is about 53°F. The difference between the mean summer and the mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is sandy loam, loamy fine sand, loamy sand or loamy coarse sand, with 2 to 5 percent clay. Rock fragments are 2 to 37 percent gravel, 0 to 35 percent cobbles, 0 to 40 percent stones and 0 to 45 percent boulders, and average 5 to 32 percent by volume.

Some pedons do not have surface organic layers.

The surface A horizon has dry color of 10YR 3/3, 4/2, 4/3, 4/4, 5/2 or 5/3; moist color is 10YR 2/1, 3/2, 3/3, 4/2 or 4/3. It is loamy fine sand, loamy sand or loamy coarse sand, with 1 to 4 percent clay. Rock fragments are 5 to 15 percent by volume. Reaction is strongly acid to neutral.

The other A horizons have dry color of 10YR 4/2, 4/3, 5/2, 5/3 or 6/3; moist color is 10YR 3/1, 3/2 or 3/3. It is loamy fine sand, loamy sand or loamy coarse sand, with 2 to 5 percent clay. Rock fragments are 2 to 25 percent gravel, 0 to 2 percent cobbles and 0 to 45 percent boulders by volume. Reaction is moderately acid to neutral.

The C horizon has dry color of 10YR 4/3, 5/3, 5/4, 6/3 or 6/4, or 7.5YR 5/6, or 5YR 5/3 or 6/3; moist color is 10YR 3/2, 3/3, 3/4, 4/3 or 5/4, or 5YR 3/3, 4/3 or 4/6. It is sandy loam, loamy fine sand, loamy sand or loamy coarse sand, with 2 to 5 percent clay. Rock fragments are 10 to 37 percent gravel and 0 to 35 percent cobbles by volume. Reaction is moderately acid to neutral.

JAYBEE FAMILY

The Jaybee family consists of shallow, well drained soils forming in material weathering from granitic, rhyolitic and basalt rocks. These soils are on hillsides and dissected basalt hillsides, and have slopes of 9 to 60 percent. Elevation is 6,000 to 8,000 feet. The mean annual precipitation is about 10 to 14 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Loamy, mixed, mesic Lithic Xeric Haplargids.

Typical Pedon: The representative profile for this soil is on a north-east facing hillside, under bitterbrush and Mormon tea, at an elevation of 6,540 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; brown (10YR 5/3) extremely cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure, parting to weak very fine granular; soft, friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 35 percent gravel, 25 percent cobbles and 2 percent stones; neutral (pH 7.1); clear wavy boundary.

A2 – 2 to 4 inches; pale brown (10YR 6/3) very cobbly sandy loam, dark grayish brown (10YR 4/2) moist; weak very fine and fine subangular blocky structure, parting to weak very fine granular; soft, friable, nonsticky and nonplastic; common very fine roots; few very fine tubular and interstitial pores; 10 percent gravel, 25 percent cobbles and 2 percent stones; neutral (pH 7.1); clear smooth boundary.

Bw – 4 to 8 inches; brown (10YR 5/3) gravelly loam, dark brown (10Y 3/3) moist; weak medium subangular blocky structure, parting to weak very fine and fine subangular blocky; soft, friable, slightly sticky and slightly plastic; few very fine, fine and medium roots; few very fine tubular pores; 10 percent gravel and 5 percent cobbles; neutral (pH 7.1); clear smooth boundary.

Bt1 – 8 to 11 inches; brown (10YR 5/3) gravelly clay loam, dark brown (10YR 3/3) moist; moderate coarse subangular blocky structure, parting to moderate fine and medium subangular blocky; slightly

hard, firm, sticky and plastic; common very fine, fine and medium roots; few very fine and fine tubular pores; common moderately thick clay films on ped faces; 10 percent gravel and 5 percent cobbles; neutral (pH 7.0); abrupt wavy boundary.

Bt2 – 11 to 15 inches; brown (7.5YR 5/4) gravelly clay loam, dark brown (7.5YR 4/4) moist; strong medium and coarse angular blocky structure, parting to moderate fine angular blocky; hard, firm, sticky and very plastic; few very fine, fine and medium roots; few very fine tubular pores; common moderately thick clay films on ped faces and lining tubular pores; 10 percent gravel and 5 percent cobbles; neutral (pH 7.0); abrupt smooth boundary.

R – 15 inches; hard basalt bedrock.

Type Location: About 330 feet east and 500 feet south of the northwest corner of the northeast quarter of the southeast quarter of Section 29, T.7S., R.32E., MDBM, Bishop SW Quadrangle.

Range in Characteristics: Soil depth to bedrock is 15 to 20 inches. The mean annual soil temperature at 20 inches is about 53°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is all of the argillic horizon. It is clay loam or sandy clay loam, with 20 to 40 percent clay. Rock fragments are 10 percent gravel and 0 to 5 percent cobbles by volume.

Some pedons have thin ash surface horizons.

The A horizon has dry color of 10YR 5/3 or 6/3; moist color is 10YR 3/2, 3/3 or 4/2. It is sandy loam or loamy sand, with 2 to 16 percent clay. Rock fragments are 10 to 35 percent gravel, 10 to 25 percent cobbles and 0 to 2 percent stones by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 5/3, 6/3 or 6/4, or 7.5YR 5/4; moist color is 10YR 3/3 or 4/3, or 7.5YR 4/4. It is clay loam, sandy clay loam, loam or sandy loam, with 16 to 40 percent clay. Rock fragments are 10 percent gravel and 0 to 5 percent cobbles by volume. Reaction is slightly acid to neutral.

KILBURN FAMILY

The Kilburn family consists of moderately deep to very deep, well drained soils forming in undifferentiated till, metasedimentary and mixed rocks. These soils are on hillsides, alluvial fans and moraines, and have slopes of 5 to 30 percent. Elevation is 5,600 to 9,300 feet. The mean annual precipitation is about 6 to 20 inches, and the mean temperature is about 46°F.

Taxonomic Class: Loamy-skeletal, mixed, mesic Typic Haploxerolls.

Typical Pedon: The representative profile for this soil is on an east-facing alluvial fan, under big sagebrush and antelope bitterbrush, at an elevation of 7,140 feet. Slope is 10 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 1 inch; brown (10YR 5/3) gravelly loamy sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; common very fine interstitial pores; 25 percent gravel; neutral (pH 6.9); clear smooth boundary.

2A1 – 1 to 3 inches; grayish brown (10YR 5/2) cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure, parting to weak very fine granular; soft, very friable, nonsticky and nonplastic; common very fine and fine, and few medium roots; common very fine interstitial pores; 10 percent gravel, 15 percent cobbles and 5 percent stones; neutral (pH 6.9); abrupt smooth boundary.

2A2 – 3 to 12 inches; brown (10YR 5/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure, parting to weak very fine and fine subangular blocky; soft, very friable, nonsticky and nonplastic; common very fine, fine and medium roots; few very fine and fine interstitial pores; 15 percent gravel and 30 percent cobbles; neutral (pH 6.9); clear wavy boundary.

EB – 12 to 25 inches; yellowish brown (10YR 5/4) extremely cobbly coarse sandy loam, brown (10YR 4/3) moist; moderate medium and coarse subangular blocky structure, parting to moderate fine and medium subangular blocky; slightly hard, friable, nonsticky and nonplastic; few very fine roots; many very fine, and common fine and medium intersti-

tial pores; 45 percent gravel and 25 percent cobbles; neutral (pH 7.0); clear wavy boundary.

Bw – 25 to 60 inches; light yellowish brown (10YR 6/4) extremely cobbly coarse sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; extremely hard, friable, slightly sticky and nonplastic; few very fine roots; many very fine, and common fine and medium pores; 45 percent gravel, 25 percent cobbles and 5 percent stones; neutral (pH 6.8).

Type Location: About 165 feet east, and 500 feet south of the apparent center of the northwest quarter of Section 29, T.7S., R.31E., MDBM, Mt. Tom SE Quadrangle.

Range in Characteristics: Soil depth to hard bedrock is 35 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is the 10 to 40 inch section in pedons deeper than 40 inches, and is from the 10 inch depth to the lithic contact in pedons shallower than 40 inches. It is sandy loam, coarse loamy sand or loamy sand, with 1 to 18 percent clay. Rock fragments are 15 to 45 percent gravel, 3 to 35 percent cobbles and 0 to 5 percent stones, and average 38 to 71 percent by volume.

The surface A horizon has dry color of 10YR 5/3 or 5/4; moist color is 10YR 3/2, 3/3 or 4/4. It is loamy sand, with 1 to 5 percent clay. Rock fragments are 5 to 85 percent gravel, 0 to 5 percent cobbles and 0 to 6 percent stones by volume. Reaction is slightly acid to neutral.

The other A horizons have dry color of 10YR 5/2, 5/3 or 5/4; moist color is 10YR 3/2, 3/3 or 4/4. It is sandy loam or loamy sand, with 1 to 8 percent clay. Rock fragments are 10 to 40 percent gravel, 5 to 35 percent cobbles and 0 to 5 percent stones by volume. Reaction is neutral.

The B horizon has dry color of 10YR 5/3, 5/4, 6/3, 6/4 or 6/6; moist color is 10YR 3/2, 4/3, 4/4 or 5/4. It is sandy loam or coarse sandy loam, with 5 to 18 percent clay. Rock fragments are 20 to 50 percent gravel, 0 to 25 percent cobbles and 0 to 5 percent stones by volume. Reaction is slightly acid to neutral.

KIONA FAMILY

The Kiona family consists of very deep, well drained soils forming in material weathering from granitic, basalt and sandstone rocks. These soils are on moraine sideslopes, basalt flows and sedimentary terraces, and have slopes of 5 to 60 percent. Elevation is 4,000 to 9,000 feet. The mean annual precipitation is about 4 to 20 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Loamy-skeletal, mixed mesic Xeric Haplocambids

Typical Pedon: The representative profile for this soil is on an east-facing lateral moraine sideslope, under bitterbrush, rabbitbrush and big sagebrush, at an elevation of 5,280 feet. Slope is 40 percent. Colors are for dry soil unless otherwise noted.

A- 0 to 4 inches; light yellowish brown (2.5Y 6/4) extremely stony sandy loam, very dark grayish brown (10YR 3/2) moist; weak thick platy structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine interstitial, and common fine tubular pores; 10 percent gravel, 30 percent cobbles, 35 percent stones and 15 percent boulders; neutral (pH 7.0); clear wavy boundary.

Bw - 4 to 13 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure, parting to moderate very fine subangular blocky; slightly hard, friable, nonsticky and nonplastic; common very fine, and few fine, medium and coarse roots; few fine interstitial and tubular pores; 30 percent gravel, 10 percent cobbles and 5 percent stones; neutral (pH 7.0); clear irregular boundary.

BC - 13 to 35 inches; pale brown (10YR 6/3) extremely cobbly sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; few very fine interstitial pores; 25 percent gravel, 50 percent cobbles and 5 percent stones; neutral (pH 7.0); gradual smooth boundary.

C1 - 35 to 44 inches; pale brown (10YR 6/3) gravelly loamy sand, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 10 percent gravel, 5 percent cobbles and 2 percent stones; neutral (pH 7.0); clear wavy boundary.

C2 - 44 to 55 inches; pale brown (10YR 6/3) loamy sand, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine interstitial pores; 5 percent gravel and 5 percent cobbles; neutral (pH 7.1); abrupt wavy boundary.

2C3 - 55 to 65 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; 10 percent gravel, 20 percent cobbles and 5 percent stones; neutral (pH 7.1).

Type Location: About 2,475 feet west and 2,640 feet north of the southwest corner of the irregularly shaped Section 26, T.9S., R.33E., MDBM, Big Pine NE Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature at 20 inches is 53°F. The mean summer soil temperature is 69°F, and the mean winter soil temperature is 36°F. The 10 to 40 inch textural control section is loam, sandy loam or loamy sand, with 2 to 12 percent clay. Rock fragments are 10 to 55 percent gravel, 0 to 50 percent cobbles and 0 to 30 percent stones, and average 52 to 68 percent by volume.

Some pedons are moderately deep to bedrock. Other pedons have A horizons with sand or loamy sand textures.

The A horizon has dry color of 2.5Y 6/4, or 10YR 5/3 or 6/2; moist color is 10YR 3/2, or 7.5YR 3/2 or 4/2. It is loam or sandy loam, with 4 to 12 percent clay. Rock fragments are 5 to 30 percent gravel, 5 to 30 percent cobbles, 0 to 35 percent stones and 0 to 15 percent boulders by volume. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 5/3, 6/3 or 6/4; moist color is 10YR 4/3 or 5/4. It is loam or sandy loam, with 6 to 12 percent clay. Rock fragments are 15 to 50 percent gravel, 10 to 50 percent cobbles and 4 to 30 percent stones by volume. Reaction is neutral.

The C horizon has dry color of 10YR 5/4 or 6/3, or N2/0; moist color is 2.5Y 4/2, or 10YR 5/4, or N2/0. It is sandy loam, loamy sand or sand, with 2 to 6 percent clay. Rock fragments are 5 to 55 percent gravel, 5 to 20 percent cobbles and 0 to 5 percent stones by volume. Reaction is neutral.

KOEHLER FAMILY

The Koehler family consists of moderately deep to deep, well to somewhat excessively drained soils forming in alluvium derived from mixed rocks. These soils are on alluvial fans and valley bottoms, and in depressions, and have slopes of 0 to 15 percent. Elevation is 6,500 to 8,000 feet. The mean annual precipitation is about 8 to 15 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Sandy, mixed, mesic Xeric Haplo-durids

Typical Pedon: The representative profile for this soil is on a southwest-facing alluvial fan, sagebrush, bitterbrush, rabbitbrush, Great Basin wildrye, squirreltail and Indian ricegrass, at elevation of 7,100 feet. Slope is 3 percent. Colors are for dry soil unless otherwise noted.

- A – 0 to 3 inches; light brownish gray (10YR 6/2) loamy sand, dark grayish brown (10YR 4/2) moist; weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; few medium interstitial pores; slightly acid (pH 6.4); clear smooth boundary.
- B1 – 3 to 10 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 4/3) moist; weak fine and medium grading to weak very fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine roots; few very fine interstitial pores; neutral (pH 6.7); clear wavy boundary.
- B2 – 10 to 37 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 4/3) moist; massive; hard,

friable, nonsticky and nonplastic; few very fine roots; neutral (pH 6.8); abrupt smooth boundary; durinodes are present.

B3qkm – 37 inches; Silica-calcium carbonate duripan; massive, extremely hard; opal coating on upper surface; neutral (pH 7.3).

Type Location: About 100 southeast of the northwest corner of the northwest quarter of the northeast quarter of Section 30, T.3S., R.31E., MDBM, Casa Diablo Mtn. NE Quadrangle.

Range in Characteristics: Soil depth ranges from 20 to greater than 40 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean annual summer soil temperature is about 69°F, and the mean winter soil temperature is about 50°F. The 10 to 37 inch control section is sand, loamy sand or sandy loam, with 0 to 5 percent clay. Rock fragments are 0 to 10 percent gravel. Duripan depth varies from 20 to 40 inches.

The A horizon has dry color of 10YR 5/3, 6/3 or 6/2; moist color is 10YR 4/3 or 4/2. It is a sand, loamy sand or sandy loam, with 0 to 4 percent clay. Rock fragments are 0 to 10 percent gravel. Reaction is slightly acid to neutral.

The B horizon has dry color of 10YR 6/3, 6/2 or 5/3; moist color is 10YR 4/3 or 3/3. It is sand, loamy sand or sandy loam, with 0 to 5 percent clay. Rock fragments are 0 to 10 percent gravel. Reaction is neutral to slightly alkaline.

LABSHAFT FAMILY

The Labshaft family consists of shallow, well drained soils forming in material weathering from mixed rocks. These soils are on mountainsides and hillsides, and have slopes of 15 to 60 percent. Elevation is 9,600 to 12,300 feet. The mean annual precipitation is about 20 to 30 inches, and the mean annual temperature is about 38°F.

Taxonomic Class: Loamy-skeletal, mixed Lithic Cryoborolls.

Typical Pedon: The representative profile for this soil is on a southeast-facing mountainside, under big sagebrush and bunchgrasses, at an elevation of 9,600 feet. Colors are for dry soil unless otherwise noted.

A – 0 to 2 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 35 percent gravel, 15 percent cobbles and 5 percent stones; neutral (pH 6.8); clear smooth boundary.

BA – 2 to 6 inches; brown (10YR 5/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic, many very fine, and common fine roots; many very fine interstitial pores; 25 percent gravel, 5 percent cobbles and 5 percent stones; neutral (pH 6.9); clear wavy boundary.

Bw1 – 6 to 10 inches; brown (10YR 5/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic, common very fine and few fine roots; common very fine interstitial pores; 35 percent gravel and 5 percent cobbles; neutral (pH 6.9); clear wavy boundary.

Bw2 – 10 to 13 inches; grayish brown (10YR 5/2) very gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine interstitial pores; 35 percent gravel and 15 percent cobbles; neutral (pH 6.9); clear wavy boundary.

R – 13 inches; hard adamellite bedrock.

Type Location: About 990 feet east and 660 feet north of the southwest corner of Section 17, T.8S., R.32E., MDBM, Big Pine NW Quadrangle.

Range in Characteristics: Soil depth to bedrock is 10 to 20 inches. The mean annual soil temperature at the lithic contact is about 41°F, and the mean summer soil temperature is about 53°F. The textural control section is from the 10 inch depth to the lithic contact in pedons deeper than 14 inches, or is the whole soil in pedons 14 inches or less deep to bedrock. It is sandy clay loam, loam, sandy loam or loamy sand, with 3 to 25 percent clay, and a weighted average of 8 to 24 percent. Rock fragments are 25 to 40 percent gravel, 5 to 15 percent cobbles and 0 to 5 percent stones, and average 43 to 67 percent by volume.

The A horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/2 or 3/3. It is sandy loam or loamy sand, with 3 to 6 percent clay. Rock fragments are 25 to 35 percent gravel, 5 to 15 percent cobbles and 0 to 5 percent stones by volume. Reaction is neutral.

The B horizon has dry color of 10YR 4/3, 5/2 or 5/3; moist color is 10YR 3/2 or 3/3. It is sandy clay loam, loam or sandy loam, with 6 to 25 percent clay. Rock fragments are 25 to 40 percent gravel, 5 to 30 percent cobbles and 0 to 5 percent stones by volume. Reaction is neutral.

LAKASH FAMILY

The Lakash family consists of very deep, somewhat excessively drained soils forming in materials weathering from pumice and ash. These soils are on hillsides and terraces, and have slopes of 0 to 15 percent. Elevation is 6,500 to 7,300 feet. The mean annual precipitation is about 6 to 12 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Ashy-pumiceous, mesic Vitrandic Torriorthents.

Typical Pedon: The representative profile for this soil is on an east by northeast-facing hillside, under Wyoming big sagebrush, low sagebrush, and antelope bitterbrush, at an elevation of 6,760 feet. Slope is 8 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 1 inch; light brownish gray (10YR 6/2) gravelly coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; many very fine and fine interstitial pores; 17 percent pumice and obsidian gravel, 2 to 20 mm in diameter; strongly acid (pH 5.3); clear wavy boundary.

A2 – 1 to 5 inches; pale brown (10YR 6/3) very gravelly coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, coarse and very coarse roots; many very fine and fine interstitial pores; 38 percent pumice and obsidian gravel, 2 to 20 mm in diameter; strongly acid (pH 5.5); clear wavy boundary.

C1 – 5 to 7 inches; light gray (2.5Y 7/2) gravelly loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and very coarse, and common medium and coarse roots; many very fine and fine interstitial pores; 31 percent pumice and obsidian gravel, 2 to 20 mm in diameter; moderately acid (pH 5.7); clear smooth boundary.

C2 – 7 to 12 inches; light gray (2.5Y 7/2) gravelly coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and very coarse, and common medium and coarse roots; many very fine and fine interstitial pores; 17 percent pumice and obsidian gravel, 2 to 20 mm in diameter; moderately acid (pH 5.8); clear smooth boundary.

C3 – 12 to 17 inches; light gray (2.5Y 7/2) gravelly coarse

sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and very coarse, and common medium and coarse roots; many very fine and fine interstitial pores; 25 percent pumice and obsidian gravel, 2 to 20 mm in diameter; moderately acid (pH 5.8); clear smooth boundary.

2C4 – 17 to 24 inches; light gray (2.5Y 7/2) coarse sand, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, medium and coarse roots; many very fine and fine interstitial pores; 10 percent pumice and obsidian gravel, 2 to 20 mm in diameter; moderately acid (pH 5.7); clear smooth boundary.

3C5 – 24 to 31 inches; light gray (10YR 7/2) gravelly coarse sand, light gray (10YR 7/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine, and few medium roots; few very fine, and many fine and medium interstitial pores; 30 percent pumice and obsidian gravel, 2 to 20 mm in diameter; moderately acid (pH 5.7); clear wavy boundary.

4C6 – 31 to 46 inches; variegated white and light gray (N8/0 and 2.5Y 7/2) extremely gravelly coarse sand, light brownish gray and white (10YR 6/2 and 10YR 8/1) moist; single grain, loose, nonsticky and nonplastic; few very fine, fine and medium roots; few very fine and many fine and medium interstitial pores; 80 percent pumice and obsidian gravel, 2 to 20 mm in diameter; neutral (pH 6.6); abrupt smooth boundary.

5C7 – 46 to 56 inches; white (10YR 8/1) gravelly loamy coarse sand, light gray (10YR 6/1) moist; weak very fine platy structure, parting to weak coarse platy; soft, very friable, nonsticky and nonplastic; many very fine and fine interstitial pores; 19 percent pumice and obsidian gravel, mostly 3 to 40 mm in diameter; strongly alkaline (pH 8.7); abrupt smooth boundary.

6C8 – 56 to 60 inches; variegated white and light gray (N8/0 and N6/0) extremely gravelly coarse sand, gray and white (10YR 5/1 and 10YR 8/1) moist; single grain; loose, nonsticky and nonplastic; common very fine, and many fine and medium interstitial pores; 80 percent pumice and obsidian gravel, mostly 3 to 40 mm in diameter; moderately

alkaline (pH 8.0).

Type Location: About 4.15 miles east on Highway 120, from its intersection with Highway 395, on south shoulder of road; about 330 feet west and 165 feet north of the southeast corner of Section 19, T.1N., R.27E., MDBM, Mono Craters Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil moisture control section is at 13 to 60 inches. It is usually dry from mid-April to late November, and is usually moist in some parts the rest of the year. The 10 to 40 inch textural control section is loamy sand, coarse loamy sand, sand, coarse sand or gravel, with 0 to 2 percent clay. Rock fragments are 10 to 100 percent gravel, and average 39 to 42 percent by volume. The upper part of the textural control section averages 10 to 20 percent gravel, and the lower part averages 46 to 58 percent gravel by volume.

Pumice gravel makes up 90 to 100 percent of the total rock fragments by volume in both parts. Obsidian rock fragments make up the remainder of the rock fragments.

Some pedons have coarse loamy sand surface textures.

The A horizon has dry color of 10YR 5/1, 6/1, 6/2 or 6/3; moist color is 10YR 3/1, 3/2, 4/2, 5/2, or 5/3. It is coarse sand, with 0 to 2 percent clay. Rock fragments are 10 to 38 percent gravel and 0 to 5 percent cobbles by volume. Gravel is mostly pumice, with minor amounts of obsidian, and cobbles are obsidian. Reaction is strongly acid.

The C horizon has dry color of N6/0 or N8/0, or 2.5Y 7/2, or 10YR 6/2, 7/2 or 8/1; moist color is 2.5Y 5/2 or 7/2, 10YR 4/2, 5/1, 5/2, 5/3, 6/1, 7/2 or 8/1. It is loamy sand, loamy coarse sand, sand, coarse sand or gravel, with 0 to 2 percent clay. Rock fragments are 10 to 80 percent gravel by volume. The gravel is mostly pumice, with minor amounts of obsidian. Reaction is moderately acid to strongly alkaline.

LITHIC CRYORTHENTS

These Lithic Cryorthents consist of shallow, well drained soils forming in material weathering from mixed granitic rocks. These soils are on mountainsides, and have slopes of 15 to 80 percent. Elevation is 5,000 to 13,000 feet. The mean annual precipitation is 6 to 30 inches, and the mean annual temperature is about 40°F.

Taxonomic Class: Lithic Cryorthents

Typical Pedon: The representative profile for this soil is on a southwest-facing mountainside, under antelope bitterbrush and big sagebrush, at an elevation of 11,200 feet. Colors are for dry soil unless otherwise noted.

A – 0 to 2 inches; pale brown (10YR 6/3) extremely stony loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine and medium roots; common medium interstitial pores; 35 percent gravel, 10 percent cobbles, 15 percent stones and 5 percent boulders; moderately acid (pH 6.0); abrupt smooth boundary.

C1 – 2 to 8 inches; pale brown (10YR 6/3) very stony loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; few very fine and fine tubular pores; 20 percent gravel, 15 percent stones and 5 percent boulders; slightly acid (pH 6.4); clear smooth boundary.

C2 – 8 to 18 inches; light yellowish brown (2.5Y 6/4) gravelly loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine roots; few very fine and fine tubular,

and many medium interstitial pores; 30 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); abrupt smooth boundary.

R – 18 inches; hard adamellite bedrock.

Type Location: About 165 feet west and 330 feet north of the southeast corner of Section 21, T.5S., R.30E., MDBM, Mt. Tom NW Quadrangle.

Range in Characteristics: Soil depth is 16 to 18 inches deep to the lithic contact. The mean annual soil temperature at 20 inches or bedrock, whichever is deeper, is about 41°F, and the mean summer soil temperature is about 53 °F. The textural control section is the 10 inch to lithic contact section. It is loamy sand or loamy coarse sand, with 1 to 10 percent clay. Rock fragments are 30 to 65 percent gravel, 10 to 24 percent cobbles and 0 to 2 percent boulders, and average 30 to 88 percent by volume.

The A horizon has dry color of 10YR 6/2, 6/3 or 6/4; moist color is 10YR 3/2, 4/2 or 4/4. It is loamy sand or loamy coarse sand, with 1 to 10 percent clay. Rock fragments are 35 to 45 percent gravel, 10 to 25 percent cobbles, 0 to 15 percent stones and 0 to 5 percent boulders by volume. Reaction is moderately to very strongly acid.

The C horizon has dry color of 10YR 6/3, 6/4 or 7/2, or 2.5Y 6/4; moist color is 10YR 3/3, 4/3, 4/4 or 5/3. It is loamy sand or loamy coarse sand, with 1 to 9 percent clay. Rock fragments are 20 to 65 percent gravel, 0 to 25 percent cobbles, 0 to 15 percent stones and 0 to 5 percent boulders by volume. Reaction is strongly to slightly acid.

LUBKIN FAMILY

The Lubkin family consists of very deep, well drained soils forming in alluvium, mainly from granitic sources. These soils are on alluvial fans and fan terraces, and have slopes of 5 to 15 percent. Elevation is 4,400 to 6,000 feet. The mean annual precipitation is about 4 to 8 inches, and the mean annual temperature is about 56°F.

Taxonomic Class: Loamy-skeletal, mixed, thermic Xeric Haplagrids

Typical Pedon: The representative profile for this soil is on an east-facing alluvial fan, under spiny hopsage, Nevada ephedra and desert needlegrass, at an elevation of 4,200 feet. Slope is 5 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 5 inches; light yellowish brown (10YR 6/4) gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine and few fine interstitial pores; carbonates coat rock fragments; 20 percent gravel, 5 percent cobbles, 5 percent stones and 3 percent cobbles; neutral (pH 6.8); clear wavy boundary.

Btk1 – 5 to 13 inches; light gray (2.5Y 7/2) very bouldery sandy loam, olive brown (2.5Y 4/4) moist; weak coarse and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and few fine, medium and coarse roots; common very fine and few fine and fine vesicular pores; many thick clay films in pores; carbonates coat rock fragments; 20 percent boulders; neutral (pH 7.2); clear smooth boundary.

Btk2 – 13 to 26 inches; light gray (2.5Y 7/2) very bouldery sandy loam, olive brown (2.5Y 4/4) moist; weak very coarse subangular blocky structure; hard, friable, nonsticky and nonplastic; common very fine and few fine, medium and coarse roots; common very fine tubular and interstitial pores; common thin clay films bridging sandgrains; strongly effervescent, with few medium and large soft masses; carbonates coat rock fragments; 15 percent gravel, 15 percent cobbles, 15 percent stones and 5 percent boulders; neutral (pH 7.2); diffuse smooth boundary.

Bk – 26 to 46 inches; light gray (2.5Y 7/2) very bouldery

loamy sand, olive brown (2.5Y 4/4) moist; massive; hard, friable, nonsticky and nonplastic; few very fine through medium roots; many very fine tubular and common very fine interstitial pores; strongly effervescent, with common medium and large soft carbonate masses; carbonates coat rock fragments; 15 percent gravel, 15 percent cobbles, 5 percent stones and 2 percent boulders; neutral (pH 6.8); abrupt smooth boundary.

2C1 – 46 to 69 inches; light gray (2.5Y 7/2) very gravelly loamy sand, olive brown (2.5Y 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and few fine interstitial pores, and many very fine tubular pores; strongly effervescent, with few medium and large soft carbonate masses; carbonates coat rock fragments; 35 percent gravel and 2 percent cobbles; neutral (pH 7.0); gradual smooth boundary.

2C2 – 69 to 85 inches; light gray (2.5Y 7/2) very gravelly loamy sand, olive brown (2.5Y 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine tubular and interstitial pores; carbonates coat rock fragments; 35 percent gravel and 2 percent cobbles; neutral (pH 7.2).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 5 miles south of Independence, California; about 1,700 feet east and 800 feet south of the northwest corner of Section 16, T.14N., R.35E., MDBM, Lone Pine Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. Thickness of the solum is 20 to 50 inches. The mean annual soil temperature at 20 inches is about 62°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is the whole argillic if less than 20 inches thick and the upper 20 inches of argillic if greater than 20 inches thick. The soil is neutral to slightly alkaline, and is non-effervescent to strongly effervescent.

The A horizon has dry color of 10YR 5/3, 6/3 or 6/4; moist color is 10YR 4/2, 3/3, 4/3 or 4/4. It is sandy loam, with 5 to 10 percent clay. Rock fragments are 15 to 30 percent gravel, 0 to 10 percent cobbles and 0 to 10 percent stones and boulders, and averages 15 to 35 percent by volume.

The Btk horizon has dry color of 2.5Y 7/2, 7/4 or 6/2, or 10YR 6/4 or 5/4; moist color is 2.5Y 4/4, or 10YR 4/3, 3/4 or 4/4. It is loamy sand or sandy loam, with 10 to 15 percent clay. Rock fragments are 15 to 25 percent gravel, 5 to 25 percent cobbles and 5 to 10 percent stones and boulders, and averages 35 to 60 percent by volume.

The Bk horizon has dry color of 2.5Y 6/4 or 7/2, or 10YR 5/4 or 6/4; moist color is 2.5Y 4/4, or 10YR 3/4 or 4/4. It is sandy loam, with 10 to 18 percent clay. Rock fragments are 15 to 30 percent gravel, 5 to 20 percent

cobbles and 5 to 25 percent stones and boulders, and averages 35 to 60 percent by volume.

The C horizon has dry color of 2.5Y 5/2, 6/2 or 7/2, or 10YR 5/4 or 6/4; moist color is 2.5Y 4/2 or 4/4, or 10YR 3/4, 3/6 or 4/6. It is sand, loamy sand or sandy loam, with 5 to 10 percent clay. Rock fragments are 15 to 45 percent gravel, 5 to 20 percent cobbles and 5 to 20 percent stones and boulders, and averages 35 to 60 percent by volume.

MASCAMP FAMILY

The Mascamp family consists of shallow, well drained soils forming in material weathering from granitic, meta-sedimentary and mixed rocks. These soils are on hillsides, hilltops, mountainsides and mountaintops, and have slopes of 15 to 60 percent. Elevation is 6,400 to 9,300 feet. The mean annual precipitation is about 8 to 20 inches, and the mean annual temperature is about 44°F.

Taxonomic Class: Loamy-skeletal, mixed, frigid Lithic Argixerolls.

Typical Pedon: The representative profile for this soil is on an east-facing hillside, under pinyon pine, sagebrush and bitterbrush, at an elevation of 8,000 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; brown (10YR 4/3) extremely cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many medium interstitial pores; 20 percent gravel, 65 percent cobbles and 5 percent stones; slightly acid (pH 6.3); clear wavy boundary.

A2 – 2 to 7 inches; brown (10YR 5/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; many medium interstitial pores; 5 percent gravel, 45 percent cobbles and 5 percent stones; slightly acid (pH 6.4); clear wavy boundary.

Bt1 – 7 to 11 inches; dark yellowish brown (10YR 4/4) very cobbly sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common very fine, and few fine, medium and coarse roots; common very fine, fine and medium tubular pores; few thin clay films on ped faces and lining tubular pores; 20 percent gravel and 25 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

Bt2 – 11 to 19 inches; dark yellowish brown (10YR 4/4) very cobbly sandy loam, brown (10YR 4/3) moist;

moderate very fine and fine subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine, and few medium tubular pores; few thin clay films on ped faces and lining tubular pores; 20 percent gravel and 30 percent cobbles; slightly acid (pH 6.4); abrupt wavy boundary.

R – 19 inches; hard granitic bedrock.

Type Location: About 165 feet west and 600 feet north of the southeast corner of the southwest quarter of irregular Section 6, T.3S., R.31E., MDBM, Casa Diablo Mountain NE Quadrangle.

Range in Characteristics: Soil depth to hard bedrock is 9 to 19 inches. The mean annual soil temperature at the lithic contact is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and the mean winter soil temperatures is greater than 9°F. The textural control section is the whole argillic horizon in pedons deeper than 14 inches, or the whole soil in pedons 14 inches or less deep. It is sandy loam or coarse sand, with 1 to 18 percent clay, and a weighted average of 14 to 18 percent clay. Rock fragments are 0 to 60 percent gravel, 0 to 30 percent cobbles and 0 to 2 percent stones, and average 41 to 58 percent by volume.

Some pedons have A horizons with coarse sand textures. Other pedons have transitional B horizons, and some have a C horizon underlying the argillic horizon.

The A horizon has dry color of 10YR 4/3, 5/2 or 5/3; moist color is 10YR 3/2 or 3/3. It is sandy loam or loamy sand, with 3 to 10 percent clay. Rock fragments are 5 to 55 percent gravel, 10 to 65 percent cobbles, 2 to 5 percent stones and 0 to 2 percent boulders by volume. Reaction is slightly acid to neutral.

The Bt horizon has dry color of 10YR 4/4, 5/3 or 5/4; moist color is 10YR 3/3 or 4/3, or 2.5Y 3/2. It is loam or sandy loam, with 12 to 20 percent clay. Rock fragments are 0 to 50 percent gravel and 0 to 30 percent cobbles by volume. Reaction is slightly acid to neutral.

MOTTSVILLE FAMILY

The Mottsville family consists of very deep, somewhat excessively drained soils forming from granitic rocks and alluvium derived from granitics and mixed rocks. These soils are on terrace sideslopes, mountain toeslopes and glacial outwash fans, and have slopes of 0 to 30 percent. Elevation is 4,000 to 8,500 feet. The mean annual precipitation is about 4 to 17 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Sandy, mixed, mesic Torripsamentic Haploxerolls

Typical Pedon: The representative profile for this soil is on a northwest-facing alluvial terrace sideslope, under big sagebrush, rabbitbrush and grasses, at an elevation of 6,920 feet. Slope is 5 percent. Colors are dry soil unless otherwise noted.

O_i – 1/4 to 0 inch; decomposed and decomposing big sagebrush leaves and twigs; abrupt smooth boundary.

A₁ – 0 to 4 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; 20 percent gravel; moderately acid (pH 6.0); clear wavy boundary.

A₂ – 4 to 19 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine interstitial pores; 15 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

AB – 19 to 25 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure;

soft, very friable, nonsticky and nonplastic; many fine medium roots; common very fine interstitial pores; 15 percent gravel; neutral (pH 6.8); clear smooth boundary.

C₁ – 25 to 60 inches; grayish brown (10YR 5/2) gravelly loamy sand, dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many fine, medium and coarse roots; common very fine interstitial pores; 30 percent gravel; neutral (pH 7.0).

Type Location: About 100 northeast of the southeast corner of the southwest quarter of the northeast quarter of Section 33, T.2S., R.29E., MDBM, Mt. Morrison NE Quadrangle.

Range in Characteristics: Soil depth is 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 47°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The 10 to 40 inch textural control section is loamy sand, loamy coarse sand or coarse sand, with 1 to 4p percent clay. Rock fragments are 0 to 30 percent gravel and 0 to 15 percent cobbles, and average 0 to 30 percent by volume.

Some pedons lack thin surface organic layers.

The A horizon has dry color of 10YR 5/3 or 5/2; moist color of 3/3 or 3/2. It is sandy loam, loamy coarse sand or loamy coarse sand, with 1 to 6 percent clay. Rock fragments are 0 to 20 percent gravel by volume. Reaction is moderately acid to neutral.

The C horizon has dry color of 10YR 6/4, 5/4 or 5/2; moist color is 10YR 5/4, 4/4, 4/3, 3/3 or 3/2. It is loamy sand or loamy coarse sand, with 3 to 6 percent clay. Rock fragments are 5 to 30 percent gravel and 0 to 15 percent cobbles by volume. Reaction is neutral.

NANAMKIN FAMILY

The Nanamkin family consists of moderately deep to very deep, somewhat excessively drained soils forming in materials weathering from granitic, basalt and mixed rocks. These soils are on mountainsides, moraines, alluvial fan ridges and hillsides, and have slopes of 0 to 80 percent. Elevation is 4,800 to 13,000 feet. The mean annual precipitation is about 6 to 30 inches, and the mean annual temperature is about 40°F.

Taxonomic Class: Sandy-skeletal, mixed, frigid Typic Xerorthents.

Typical Pedon: The representative profile for this soil is on a northeast-facing mountainside, under rabbitbrush, antelope bitterbrush, and timothy, at an elevation of 9,300 feet. Slope is 22 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; brown (10YR 5/3) very cobbly loamy sand, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 30 percent gravel, 20 percent cobbles, 5 percent stones, and 5 percent boulders; neutral (pH 7.0); clear smooth boundary.

A2 – 2 to 7 inches; brown (10YR 5/3) very cobbly loamy sand, dark brown (10YR 3/3) moist; weak medium subangular blocky structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; many very fine and fine, and few medium roots; many very fine interstitial pores; 25 percent gravel and 15 percent cobbles; neutral (pH 7.0); clear wavy boundary.

C1 – 7 to 24 inches; yellowish brown (10YR 5/4) very cobbly loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; 20 percent gravel and 25 percent cobbles; neutral (pH 7.0); clear wavy boundary.

C2 – 24 to 60 inches; yellowish brown (10YR 5/4) very cobbly loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine interstitial pores; 20 percent gravel and 25 percent cobbles; neutral (pH 7.1).

Type Location: About 0.3 mile east and 0.2 mile south of the northwest corner of Section 7, T.8S., R.32E., MDBM, Mt. Tom Quadrangle.

Range in Characteristics: Soil depth to bedrock is greater than 60 inches. The mean annual soil temperature at 20 inches is about 42°F, and the mean summer soil temperature is about 60°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The soil moisture control section is 15 to 60 inches. It is usually dry from early June to mid-November, and is usually moist the rest of the year. The 10 to 40 inch textural control section is loamy sand, coarse loamy sand or sand, with 3 to 13 percent clay. Rock fragments are 10 to 60 percent gravel, 0 to 35 percent cobbles, 0 to 20 percent stones and 0 to 21 percent boulders, and average 37 to 95 percent by volume.

Some pedons have fresh and decomposing organic surface layers up to 1 inch thick. Other pedons are 21 to 40 inches deep to hard bedrock.

The surface A horizon has dry color of 10YR 4/2, 5/2, 5/3 or 6/2; moist color is 10YR 3/2, 3/3, 4/2 or 4/3. It is loamy sand or coarse loamy sand, with 2 to 12 percent clay. Rock fragments are 5 to 50 percent gravel, 0 to 30 percent cobbles, 0 to 20 percent stones, and 0 to 15 percent boulders by volume. Reaction is strongly acid to neutral.

The other A horizons have dry color of 10YR 4/2, 5/3, 6/2, 6/3 or 6/4; moist color is 10YR 3/2, 3/3, 4/2, 4/3 or 5/3. They are sandy loam, loamy sand or coarse loamy sand, with 2 to 10 percent clay. Rock fragments are 10 to 35 percent gravel, 0 to 25 percent cobbles, 0 to 20 percent stones and 0 to 21 percent boulders by volume. Reaction is strongly acid to neutral.

The C horizon has dry color of 2.5Y 6/4, or 10YR 5/3, 5/4, 6/3, 6/4, 7/2, 7/3 or 8/3, or 7.5YR 5/8; moist color is 10YR 4/3, 4/4, 5/2, 5/3 or 6/3, or 7.5YR 4/4 or 4/6. It is loamy sand, coarse loamy sand or sand, with 3 to 13 percent clay. Rock fragments are 20 to 60 percent gravel, 0 to 35 percent cobbles, 0 to 25 percent stones and 0 to 21 percent boulders by volume. Reaction is strongly acid to neutral.

NEUSKE FAMILY

The Nueske family consists of moderately deep to very deep well drained soils forming from granitic, metasedimentary and basalt rocks. These soils are on mountainsides and hillsides, and have slopes of 15 to 60 percent. Elevation is 6,400 to 9,400 feet. The mean annual precipitation is about 6 to 20 inches, and the mean annual temperature is 44°F.

Taxonomic Class: Fine-loamy, mixed, frigid Mollic Haploxeralfs

Typical Pedon: The representative profile for this soil is on a northeast-facing hillside, under pinyon pine, big sagebrush and antelope bitterbrush, at an elevation of 7,800 feet. Slope is 35 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 2 inches; brown (10YR 4/3) gravelly fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft; very friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; 25 percent gravel and 5 percent cobbles; slightly acid (pH 6.2); clear wavy boundary.

BE – 2 to 5 inches; brown (10YR 4/3) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure, parting to weak fine granular; soft, very friable, slightly sticky and nonplastic; common very fine, and few fine roots; common very fine and few fine tubular pores; 15 percent gravel; slightly acid (pH 6.4); clear wavy boundary.

Bt1 – 5 to 12 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; moderate medium and coarse subangular blocky structure, parting to moderate fine subangular blocky; slightly hard, firm, slightly sticky and plastic; common very fine, and few fine, medium and coarse roots; few very fine and fine tubular pores; few thin clay films on ped faces, in pores and bridging mineral grains; 10 percent gravels; neutral (pH 6.6); clear wavy boundary.

Bt2 – 12 to 20 inches; light yellowish brown (2.5Y 6/4) clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium and coarse subangular structure, parting to moderate fine and medium angular blocky; slightly hard, firm, slightly sticky and plastic; few fine, medium and coarse roots; few very fine and fine tubular pores; few thin

clay films in pores and bridging mineral grains; 5 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

C1 – 20 to 44 inches; light yellowish brown (2.5Y 6/4) very cobbly loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; many medium interstitial pores; 15 percent gravel and 20 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

Cr – 44 inches; soft weathered granitic and metasedimentary bedrock.

Type Location: About 100 feet east and 1,600 feet south of the northwest corner of Sec. 9, T.3S., R.31E., MDBM, Casa Diablo Mountain NE Quadrangle.

Range in Characteristics: Soil depth to the paralithic contact is 38 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 44°F. The difference between the mean annual summer and winter soil temperatures is greater than 9°F. The textural control section is the whole argillic, or the upper 20 inches of the argillic in pedons where the argillic is thicker than 20 inches. It is a sandy loam, sandy clay loam or clay loam, with 8 to 34 percent clay, and a weighted average of 19 to 30 percent. Rock fragments are 5 to 25 percent gravel and 0 to 35 percent cobbles, and average 7 to 32 percent by volume. Reaction is slightly acid to neutral throughout the profile.

The A horizon has dry color of 10YR 4/3, 5/3, 5/4, 6/2 or 6/3; moist color is 10YR 3/2 or 3/3. It is a fine sandy loam and sandy loam, with 3 to 8 percent clay. Rock fragments are 5 to 50 percent gravel, 0 to 20 percent cobbles and 0 to 5 percent stones by volume.

The B horizon has dry color of 10YR 4/3, 5/4 or 6/4, or 2.5Y 6/4; moist color is 10YR 3/2, 4/4 or 4/6 or 7.5YR 3/2, or 2.5Y 4/4. It is a clay loam, sandy clay loam, loam or sandy loam, with 8 to 34 percent clay. Rock fragments are 5 to 25 percent gravel and 0 to 35 percent cobbles by volume.

The C horizon has dry color of 10YR 5/4 or 7/4, or 2.5Y 6/4; moist color is 10YR 5/6, or 5YR 3/4, or 2.5Y 4/4. It is a clay loam, loam or loamy sand, with 4 to 34 percent clay. Rock fragments are 15 to 45 percent gravel and 0 to 20 percent cobbles by volume.

OLA FAMILY

The Ola family consists of moderately deep, well drained soils forming in material weathering from basalt. These soils are on mountainsides and benches, and have slopes of 15 to 30 percent. Elevation is 7,500 to 10,200 feet. The mean annual precipitation is about 12 to 30 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Coarse-loamy, mixed, frigid Pachic Haploxerolls

Typical Pedon: The representative profile for this soil is on an east-facing bench, under bitterbrush, big sagebrush, rabbitbrush, Indian ricegrass and bunchgrasses, at an elevation of 9,000 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; dark grayish brown (10YR 4/2) sandy loam, very dark gray (10YR 3/1) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, common fine and few medium roots; many fine interstitial pores; slightly acid (pH 6.1); clear smooth boundary.

A2 – 2 to 8 inches; brown (10YR 4/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky grading to weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, common fine and few medium roots; many fine interstitial pores; slightly acid (pH 6.3); clear wavy boundary.

A3 – 8 to 12 inches; brown (10YR 4/3) sandy loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine, common fine and few medium roots; many fine interstitial pores; slightly acid (pH 6.4); abrupt smooth boundary.

B1 – 12 to 23 inches; brown (10YR 5/3) cobbly sandy loam, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; common fine interstitial pores; 10 percent gravel and 10 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

B2 – 23 to 30 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few interstitial pores; neutral (pH 6.6); gradual smooth boundary.

B3 – 30 to 38 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; neutral (pH 6.6); abrupt smooth boundary.

R – 38 inches; hard basalt bedrock

Type Location: About 200 feet from the southwest corner of the southwest quarter of the southwest quarter of Section 35, T.2S., R.30E., MDBM, Casa Diablo Mtn NW Quadrangle.

Range in Characteristics: Soil depth is 21 to 40 to lithic contact. The mollic epipedon is 18 to 25 inches thick. The mean annual soil temperature at 20 inches is about 47°F. The mean summer temperature is about 62°F, and the mean winter temperature is about 33°F. The textural control section is 10 inch to lithic contact portion in less than 40 inches to bedrock, and is 10 to 40 inch section in soils greater than 40 inches to bedrock. It is sandy loam, with 3 to 16 percent clay. Rock fragments are 0 to 15 percent gravel and 0 to 10 percent cobbles, and average 0 to 10 percent by volume.

Some pedons have organic surface horizons.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2 or 5/3; moist color is 10YR 3/1, 3/2 or 3/3. It is sandy loam, with 3 to 8 percent clay. Rock fragments are 0 to 5 percent gravel. Reaction is slightly acid.

The B horizon has dry color of 10YR 4/3, 5/3 or 6/3; moist color is 10YR 3/2, 3/3 or 4/3. It is sandy loam, with 5 to 16 percent clay. Rock fragments are 0 to 15 percent gravel and 0 to 10 percent cobbles, and average 0 to 10 percent by volume. Reaction is slightly acid to neutral.

ORECART FAMILY

The Orecart family consists of very deep, well drained soils forming in mixed alluvium influenced by volcanic ash. These soils are on old lake terraces, and have slopes of 1 to 5 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Ashy, mesic Vitrandic Torripsamments

Typical Pedon: The representative profile for this soil is on a north-facing lake terrace, in an interdune position, under big sagebrush and rabbitbrush, at an elevation of 6,400 feet. Slope is 1 percent. When described (8/18/88), the soil was dry throughout. Colors are for dry soil unless otherwise noted.

A – 0 to 4 inches; white (10YR 8/1) loamy sand, brown (10YR 5/3) moist; strong very thick and thick platy structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine vesicular and interstitial pores; violently effervescent, disseminated lime; 1 percent tuffa and mixed gravel; strongly alkaline (pH 8.5); abrupt smooth boundary.

Bk – 4 to 11 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; violently effervescent, disseminated lime; 5 percent CaCO_3 nodules which slake in water; 1 percent tuffa gravel; strongly alkaline (pH 8.5); clear wavy boundary.

Bq – 11 to 25 inches; light brownish gray (2.5Y 6/2) loamy sand, brown (10YR 4/3) moist; massive; brittle, friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; violently effervescent, disseminated lime; 25 percent CaCO_3 -cemented hard and firm nodules, which slake in water; 1 percent tuffa gravel; strongly alkaline (pH 8.5); clear wavy boundary.

C1 – 25 to 40 inches; light gray (2.5Y 7/2) loamy sand, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; violently effervescent, disseminated lime; 10 percent CaCO_3 -cemented soft nodules, which slake in water; strongly alkaline (pH 8.5); gradual wavy boundary.

C2 – 40 to 50 inches; light gray (2.5Y 7/2) loamy sand, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; violently effervescent, disseminated lime; 10 percent CaCO_3 -cemented soft nodules, which slake in water; strongly alkaline (pH 8.5); clear smooth boundary.

C3 – 50 to 56 inches; light gray (2.5Y 7/2) loamy sand, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; violently effervescent, disseminated lime; 25 percent CaCO_3 -cemented hard and firm nodules, which slake in water; strongly alkaline (pH 8.5); clear smooth boundary.

2Bqb – 56 to 60 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; brittle, firm, nonsticky and nonplastic; common very fine and fine interstitial pores; violently effervescent, disseminated lime; strongly alkaline (pH 8.5).

Type Location: In Bodie-Coleville Soil Survey Area, about 1.25 miles north and 650 feet west of the southwest corner of Sec. 24, T.3N., R.26E., Bodie SE Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 62°F, and the mean winter soil temperature is about 40°F. The 10 to 40 inch textural control section is loamy sand, with 4 to 6 percent clay. Rock fragments are 0 to 1 percent tuffa and mixed gravel. The soil is violently effervescent, with disseminated lime, throughout. Reaction is strongly alkaline throughout.

The A horizon has dry color of 10YR 8/1; moist color is 10YR 5/3. It is loamy sand, with 4 percent clay. Rock fragments are 1 percent tuffa and mixed gravel by volume.

The Bk horizon has dry color of 10YR 6/3; moist color is 10YR 5/3. It is loamy sand, with 3 to 6 percent clay. Rock fragments are 0 to 1 percent tuffa gravel.

The Bq horizon has dry color of 2.5Y 6/2 or 7/2; moist color is 10YR 4/3 or 2.5Y 5/2. It is loamy sand or silt loam, with 4 to 6 percent clay. Rock fragments are 0

to 1 percent tuffa gravel by volume. Dry consistence is hard or brittle.

The C horizon has dry color of 2.5Y 7/2 or 10YR 6/3;

moist color is 2.5Y 5/2 or 10YR 4/3. It is loamy sand, with 4 to 6 percent clay. Rock fragments are 0 to 1 percent tuffa gravel.

PASS CANYON FAMILY

The Pass Canyon family consists of shallow, well drained soils forming in material weathering from granitic rocks. These soils are on mountainsides and hillsides, and have slopes of 15 to 90 percent. Elevation is 4,800 to 9,600 feet. The mean annual precipitation is about 5 to 25 inches, and the mean annual temperature is about 51°F.

Taxonomic Class: Loamy, mixed mesic Lithic Argixerolls

Typical Pedon: The representative profile for this soil is on a southwest-facing hillside, under pinyon pine, big sagebrush and antelope bitterbrush, at an elevation of 7,400 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; brown (10YR 5/3) very cobbly loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many medium interstitial pores; 10 percent gravel, 20 percent cobbles, 3 percent stones and 2 percent boulders; slightly acid (pH 6.2); clear smooth boundary.

A2 – 2 to 5 inches; brown (10YR 5/3) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine and fine tubular, and few medium interstitial pores; 15 percent gravel; slightly acid (pH 6.4); clear wavy boundary.

BE – 5 to 11 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine, fine and medium subangular blocky structure; hard, friable, slightly sticky and nonplastic; common very fine and few fine roots; few very fine and fine interstitial pores; 5 percent gravel; neutral (pH 6.7); clear smooth boundary.

Bt2 – 11 to 13 inches; grayish brown (10YR 5/2) sandy

loam, very dark grayish brown (10YR 3/2) moist; moderate fine and very fine subangular blocky structure; hard, friable, slightly sticky and nonplastic; few very fine, fine, medium and coarse roots; few very fine, fine and medium interstitial pores; few thin clay films on ped faces; 5 percent gravel; neutral (pH 6.8); abrupt smooth boundary.

R – 13 inches; hard granitic bedrock.

Type Location: About 165 feet west and 165 feet north of the southeast corner of the southwest quarter of the northwest quarter of Section 21, T.4S., R.31E., MDBM, Casa Diablo Mtn. SE Quadrangle.

Range in Characteristics: Depth to hard bedrock is 13 to 19 inches. The mean annual soil temperature at the lithic contact is about 53°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is the whole argillic in pedons deeper than 14 inches, or the whole soil in pedons 14 inches or less deep. It is loamy sand or sandy loam, with 2 to 10 percent clay, and a weighted average of 6 to 10 percent clay. Rock fragments are 5 to 30 percent gravel, 0 to 20 percent cobbles, 0 to 3 percent stones and 0 to 2 percent boulders, and average 11 to 30 percent by volume.

Some pedons have surface organic layers.

The A horizon has dry color of 10YR 5/3; moist color is 10YR 3/1 or 3/2. It is loamy sand, with 2 to 7 percent clay. Rock fragments are 10 to 30 percent gravel, 0 to 20 percent cobbles, 0 to 10 percent stones and 0 to 2 percent boulders by volume. Reaction is slightly acid.

The B horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/2 or 4/2. It is sandy loam, with 4 to 10 percent clay. Rock fragments are 0 to 30 percent gravel, 0 to 10 percent cobbles and 0 to 5 percent stones by volume. Reaction is neutral.

PIZONA FAMILY

The Pizona family consists of deep, well drained soils forming in basaltic rock, with some volcanic overburden. These soils are on mountainsides, and have slopes of 5 to 30 percent. Elevation is 5,000 to 6,600 feet. The mean annual precipitation is about 6 to 12 inches, and the mean annual temperature is about 50°F.

Taxonomic Class: Loamy-skeletal, mixed, mesic Xeric Haplargids

Typical Pedon: The representative profile for this soil is on a southeast-facing sideslope, under pinyon pine, big sagebrush and needle and thread grass, at an elevation of 6,200 feet. Slope is 41 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; light brownish gray (10YR 6/2) cobbly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; 10 percent gravel, 10 percent cobbles and 3 percent stones; neutral (pH 6.6); abrupt irregular boundary.

A2 – 3 to 5 inches; light gray (10YR 7/2) cobbly loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine vesicular pores; 5 percent gravel, 10 percent cobbles and 3 percent stones; neutral (pH 7.3); abrupt irregular boundary.

A3 – 5 to 11 inches; light gray (10YR 7/2) cobbly loamy sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 10 percent gravel, 10 percent cobbles and 1 percent stones; neutral (pH 7.3); clear wavy boundary.

2Ab – 11 to 17 inches; pale brown (10YR 6/3) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; 20 percent gravel, 10 percent cobbles and 1 percent stones; moderately alkaline (pH 7.5); clear wavy boundary.

2Btb1 – 17 to 24 inches; light yellowish brown (10YR 6/4) very cobbly sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular and interstitial pores; few thin clay

films in pores and on peds; 25 percent gravel, 15 percent cobbles and 1 percent stones; moderately alkaline (pH 7.6); clear wavy boundary.

2Btb2 – 24 to 36 inches; light yellowish brown (10YR 6/4) very cobbly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine and fine roots; few very fine tubular and interstitial pores; many thin and moderately thick clay films in pores and on ped faces; 25 percent gravel, 15 percent cobbles and 1 percent stones; moderately alkaline (pH 7.7); clear wavy boundary.

2Btqb – 36 to 44 inches; light yellowish brown (10YR 6/4) very cobbly sandy loam, dark yellowish brown (10YR 4/4) moist; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; few very fine tubular and interstitial pores; common thin clay films on peds and in pores; slight silica cementation; 25 percent gravel, 15 percent cobbles and 1 percent stones; moderately alkaline (pH 7.6); gradual wavy boundary.

2R – 44 inches; hard, fractured basaltic bedrock; average fracture spacing is 12 inches; some clay films coat the rock surfaces.

Type Location: In the Benton-Owens Valley Soil Survey Area, about 14 miles northwest of Benton, California and 4.5 miles west of Adobe Lake, about 800 feet southwest of dirt road on east-facing hillside and 50 feet northwest of large Pinyon tree; about 2,100 feet west and 2,500 feet north of the southeast corner of Section 1, T.1N., R.29E., MDBM, Glass Mountain Quadrangle.

Range of Characteristics: Soil depth to bedrock is 40 to 60 inches. The mean annual soil temperature at 20 inches is about 51°F, and the mean summer and mean winter soil temperatures differ by more than 9 °F. The textural control section is the whole argillic if less than 20 inches thick and the upper 20 inches if greater than 20 inches thick. The bulk density of the ashy overburden is 1.1 to 1.25 g/cc and the moist bulk density is 1.3 to 1.45 g/cc. It is 6 to 14 inches thick.

The A horizon has dry color of 10YR 6/2 or 7/2; moist color is 10YR 4/2, 5/2 or 5/3. It is cobbly loamy sand or very stony loamy sand. Rock fragments are 5 to

15 percent gravel, 5 to 15 percent cobbles and 3 to 40 percent stones, and average 15 to 50 percent by volume. The organic carbon content is about 0.1 to 0.3 percent.

The 2Ab horizon has dry color of 10YR 6/2 or 6/3; moist color is 10YR 4/2, 4/3 or 4/4. It is gravelly, cobbly or very cobbly sandy loam and loamy sand. Rock fragments are 10 to 20 percent gravel, 5 to 30 percent cobbles and 3 to 20 percent stones, and average 20 to 45 percent by volume.

The 2Btb horizon has dry color of 10YR 6/2, 6/3 or 6/4;

moist color is 10YR 4/2, 4/3 or 4/4. It is very cobbly or very stony sandy loam or sandy clay loam, with 15 to 30 percent clay. Rock fragments are 10 to 25 percent gravel, 15 to 25 percent cobbles and 1 to 20 percent stones by volume.

The 2Btqb horizon has dry color of 10YR 6/2, 6/3 or 6/4; moist color is 10YR 4/2, 4/3 or 4/4. It is very cobbly sandy loam or very cobbly sandy clay loam. Rock fragments are 10 to 25 percent gravel, 15 to 25 percent cobbles and 1 to 20 percent stones, and average 35 to 60 percent by volume.

POOLE FAMILY

The Poole family consists of very deep, very strongly alkaline, poorly drained soils forming in alluvium and lake sediments weathered from mixed rocks, and includes a high percentage of volcanic ash. These soils are on lake terraces, and have slopes of 0 to 2 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Fine-silty, mixed (calcareous), mesic Typic Endoaquents

Typical Pedon: The representative profile for this soil is on a southeast-facing lake terrace, under saltgrass, sedges and greasewood, at an elevation of 6,440 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; light gray (5Y 7/1) sandy loam, olive gray (5Y 4/2) moist; strong fine to medium platy structure; slightly hard, friable, slightly sticky and plastic; few very fine roots; common very fine irregular pores; strongly effervescent; very strongly alkaline (pH 9.6); abrupt wavy boundary.

A2 – 3 to 8 inches; gray (5Y 6/1) silty clay loam, olive gray (5Y 4/2) moist; strong very fine subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine, few medium and coarse roots; common very fine irregular and very fine tubular pores; strongly effervescent; very strongly alkaline (pH 9.6); clear wavy boundary.

A3 – 8 to 15 inches; gray (5Y 6/1) silty clay loam, olive gray (5Y 4/2) moist; strong fine to medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and fine, few medium and coarse roots; common very fine irregular and fine

tubular pores; strongly effervescent; very strongly alkaline (pH 9.6); clear wavy boundary.

C1 – 15 to 60 inches; light gray (5Y 7/1) silty clay loam, gray (5Y 5/1) moist; strong medium prismatic structure; very hard, firm, sticky and plastic; few very fine roots; common very fine and fine tubular pores; strongly effervescent; very strongly alkaline (pH 9.6).

Type Location: The representative pedon is from the Bodie-Coleville survey, at SE/4 of NE/4 of Sec., 8, T.2N., R.28E., Mono County, Bodie SE Quadrangle.

Range in Characteristics: Soil depth ranges from 40 to greater than 60 inches. The mean annual soil temperature at a 20 inch depth is about 50°F. The soil is strongly calcareous and very strongly alkaline in reaction (pH 9.6). Hue is mostly 5Y but 2.5 Y in some pedons. The A1 horizon has value of 6 or 7 dry and 4 or 5 moist and chroma of 1 dry and 1 or 2 moist. The C horizon has value of 6 or 7 dry and 4 or 5 moist in most pedons but range to 2 moist in some pedons. Texture of the control section is silty clay loam or silt loam. Strata of sandy loam or loamy sand are present in the lower portion of some pedons. Rock fragments are 0 to 2 percent gravel and average 0 to 5 percent by volume.

The A horizon has color of 5Y 7/1 or 6/1 dry; and 5Y 5/2, 5/1, 4/2, 4/1, 2/2 or 2/1 moist. It is sandy loam or silty clay loam, with 5 to 30 percent clay. Rock fragments are 0 to 2 percent gravel and average 0 to 5 percent by volume.

The C horizon has color of 5Y 7/1 or 6/1 dry; and 5Y 5/2, 5/1, 4/2 or 4/1 moist. It is silty clay loam, with about 20 to 30 percent clay. Rock fragments are 0 to 2 percent and average 0 to 5 percent by volume.

POWMENT FAMILY

The Powment family consists of shallow, somewhat excessively drained soils forming in material weathering from adamellite. These soils are on mountainsides and mountain ridges, and have slopes of 30 to 90 percent. Elevation is 5,200 to 11,400 feet. The mean annual precipitation is about 6 to 30 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Sandy-skeletal, mixed, frigid, shallow Typic Xerorthents

Typical Pedon: The representative profile for this soil is on a northwest-facing hillside, under pinyon pine, mountain mahogany and Mormon tea, at an elevation of 8,000 feet. Colors are for dry soil unless otherwise noted.

- A1 – 0 to 2 inches; grayish brown (10YR 5/2) very gravelly sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 40 percent gravel; neutral (pH 6.6); clear smooth boundary.
- A2 – 2 to 6 inches; grayish brown (10YR 5/2) very gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine, and few medium roots; many very fine interstitial pores; 45 percent gravel; neutral (pH 6.6); clear wavy boundary.
- A3 – 6 to 9 inches; brown (10YR 5/3) very gravelly sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine interstitial pores; 40 percent gravel and 5 percent cobbles; neutral (pH 6.7); clear wavy boundary.
- C1 – 9 to 13 inches; pale brown (10YR 6/3) very gravelly loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and medium roots; many very fine interstitial pores; 40 percent gravel; neutral (pH 6.7) clear smooth boundary.
- C2 – 13 to 15 inches; pale brown (10YR 6/3) extremely

gravelly coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and medium roots; many very fine interstitial pores; 60 percent gravel and 5 percent cobbles; neutral (pH 6.7); clear smooth boundary.

Cr – 15 inches; decomposing adamellite grus, which can be easily cut with a tilespade.

Type Location: About 165 feet west and 825 feet south of the northeast corner of Section 5, T.8S., R.32E., MDBM, Bishop SW Quadrangle.

Range in Characteristics: Soil depth is 7 to 15 inches to paralithic contact. The mean annual soil temperature at the lithic contact is about 44°F, and the mean summer temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The textural control section is from the 10 inch depth to paralithic for pedons deeper than 14 inches, and is the whole soil for pedons less than 14 inches to the paralithic contact. It is loamy sand, loamy coarse sand or coarse sand, with 1 to 4 percent clay. Rock fragments are 20 to 60 percent gravel, 0 to 20 percent cobbles, 0 to 5 percent stones and 0 to 5 percent boulders, and average 40 to 50 percent by volume.

Some pedons have surface organic layers.

The surface A horizon has dry color of 10YR 5/2; moist color is 10YR 3/2 or 4/2. It is sand, with about 1 percent clay. Rock fragments are 25 to 40 percent gravel, 0 to 15 percent cobbles, 0 to 5 percent stones and 0 to 5 percent boulders by volume. Reaction is neutral.

The other A horizons have dry color of 10YR 5/2, 5/3 or 6/3; moist color is 10YR 3/2, 4/2 or 5/3. They are loamy sand, loamy coarse sand, sand or coarse sand, with 1 to 4 percent clay. Rock fragments are 20 to 45 percent gravel and 0 to 20 percent cobbles by volume. Reaction is neutral.

The C horizon has dry color of 10YR 6/3; moist color is 10YR 4/3 or 5/3. It is loamy sand, loamy coarse sand or coarse sand, with 1 to 4 percent clay. Rock fragments are 40 to 60 percent gravel and 0 to 20 percent cobbles by volume. Reaction is neutral.

PRESTON FAMILY

The Preston family consists of moderately deep to very deep, somewhat excessively drained soils forming in material weathering from granitic and mixed rocks. These soils are on mountainsides and hillsides, and have slopes of 30 to 60 percent. Elevation is 4,800 to 9,100 feet. The mean annual precipitation is about 5 to 20 inches, and the mean annual temperature is about 46°F.

Taxonomic Class: Mixed, mesic Typic Xeropsamments

Typical Pedon: The representative profile for this soil is on a north-facing hillside, under big sagebrush and bitterbrush, at an elevation of 7,100 feet. Slope is 50 percent. Colors are for dry soil unless otherwise noted.

Oi - 4 to 0 inches; decomposed and decomposing big sagebrush leaves and twigs; abrupt wavy boundary.

A - 0 to 2 inches; dark grayish brown (10YR 4/2) cobbly loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine and medium roots; many very fine interstitial pores; 10 percent gravel, 10 percent cobbles and 5 percent stones; neutral (pH 6.7); clear smooth boundary.

C1 - 2 to 9 inches; brown (10YR 5/3) loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky grading to weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine interstitial and few fine tubular pores; 5 percent gravel and 5 percent cobbles; neutral (pH 6.7); clear wavy boundary.

C2 - 9 to 16 inches; pale brown (10YR 6/3) loamy sand, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few

very fine, common fine, medium and coarse roots; many very fine interstitial pores; 5 percent gravel; neutral (pH 6.7); gradual wavy boundary.

C3 - 16 to 60 inches; light brownish gray (10YR 6/2) loamy sand, grayish brown (10YR 5/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; few very fine interstitial pores; 5 percent gravel; neutral (pH 6.6).

Type Location: About 100 feet west and 100 feet south of the southeast corner of the northwest quarter of the northwest quarter of Section 35, T.7S., R.31E., MDBM, Mt. Tom SE Quadrangle.

Range in Characteristics: Soil depth ranges from 30 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil is usually dry from May to late November, and is usually moist in some parts the rest of the year. The 10 to 40 inch textural control section is sandy loam, loamy fine sand, loamy sand, loamy coarse sand, sand and coarse sand, with 1 to 6 percent clay. Rock fragments are 5 to 40 percent gravel, 0 to 10 percent cobbles and 0 to 5 percent stones, and average 10 to 40 percent by volume.

The A horizon has dry color of 10YR 6/2, 5/2 or 4/2; moist color is 10YR 3/2 or 3/3. It is sandy loam, loamy fine sand, loamy sand or sand, with 1 to 4 percent clay. Rock fragments are 0 to 40 percent gravel, 0 to 10 percent cobbles and 0 to 5 percent stones, and average 0 to 40 percent by volume. Reaction is neutral.

The C horizons have dry color of 10YR 6/2, 6/3 or 5/3; moist color is 10YR 5/3, 5/2, 4/3, 4/3, 3/3 or 3/2. It is loamy fine sand, loamy sand, sand or coarse sand, with 1 to 6 percent clay. Rock fragments are 0 to 30 percent gravels and 0 to 5 percent cobbles, and average 5 to 20 percent by volume. Reaction is neutral.

RAILCITY FAMILY

The Railcity family consists of deep to very deep, somewhat excessively drained soils forming in material weathering from rhyolite, andesite and granitic rocks. They are on mountainsides and moraine basins, on slopes of 2 to 90 percent. Elevation is 7,000 to 10,400 feet. The mean annual precipitation is about 10 to 35 inches, and the mean annual temperature is about 40°F.

Taxonomic Class: Sandy-skeletal, mixed, frigid Typic Xerorthents

Typical Pedon: The representative profile for this soil is on a southwest-facing mountainside, under Jeffrey pine and big sagebrush, at an elevation of 7,920 feet. Slope is 59 percent. When described (8/29/84), the soil was dry throughout. Colors are for dry soil unless otherwise noted.

Oe – 1 to 0 inch; decomposed and decomposing Jeffrey pine needles and twigs, and big sagebrush leaves; abrupt wavy boundary.

A1 – 0 to 3 inches; grayish brown (10YR 5/2) gravelly coarse sand, very dark gray (10YR 3/1) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine, and few fine roots; many very fine and fine interstitial pores; 16 percent gravel; strongly acid (pH 5.5); clear wavy boundary.

A2 – 3 to 14 inches; light brownish gray (10YR 6/2) extremely stony coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many fine and medium interstitial pores; 10 percent gravel, 20 percent cobbles and 30 percent stones; slightly acid (pH 6.5); clear wavy boundary.

C1 – 14 to 27 inches; light brownish gray (10YR 6/2) very cobbly coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine, medium and coarse roots; many fine and medium interstitial pores; 25 percent gravel and 25 percent cobbles; slightly acid (pH 6.5); clear wavy boundary.

C2 – 27 to 60 inches; gray (10YR 5/1) very stony

coarse sand, black (10YR 2/1) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many fine and medium interstitial pores; 8 percent gravel, 5 percent cobbles and 25 percent stones; neutral (pH 7.0).

Type Location: About 1.35 miles east on the northern dirt road going to the mixing table in Smokey Bear Flat, from its intersection with Highway 395, the 0.6 mile south on dirt road, then 0.7 mile on southeast fork, and 175 feet upslope, on the east side of the road; about 175 feet east and 500 feet north of the southeast corner of the southwest quarter of the northeast quarter of Section 18, T.3S., R.28E., MDBM, Mt. Morrison NW Quadrangle.

Range in Characteristics: Soil depth to the lithic or paralithic contact is 42 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 40°F, and the mean summer soil temperature is about 57°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is loamy fine sand, loamy sand, loamy coarse sand, fine sand or coarse sand, with 2 to 10 percent clay. Rock fragments are 8 to 30 percent gravel, 0 to 45 percent cobbles, 0 to 30 percent stones and 0 to 19 percent boulders, and average 40 to 81 percent by volume.

Some pedons have A horizons with loamy coarse sand textures. Other pedons do not have a surface organic layer.

The A horizon has dry color of 10YR 5/2 or 6/2; moist color is 10YR 3/1 or 3/2. It is loamy sand, fine sand or coarse sand, with 2 to 10 percent clay. Rock fragments are 5 to 35 percent gravel, 0 to 20 percent cobbles, 0 to 30 percent stones and 0 to 10 percent boulders by volume. Reaction is very strongly to slightly acid.

The C horizon has dry color of 10YR 5/1, 6/1, 6/2, 6/3, 7/2, 7/3 or 7/4; moist color is 10YR 2/1, 3/2, 3/3, 4/2, 4/3, 4/4 or 5/3. It is loamy fine sand, loamy sand, loamy coarse sand, fine sand or coarse sand, with 2 to 10 percent clay. Rock fragments are 8 to 30 percent gravel, 0 to 45 percent cobbles, 0 to 25 percent stones and 0 to 19 percent boulders by volume. Reaction is moderately acid to neutral.

SALT CHUCK FAMILY

The Salt Chuck family consists of moderately deep to very deep, somewhat excessively drained soils forming in material weathering from granitic rocks. They are on moraines, mountainsides and hillsides, on slopes of 15 to 75 percent. Elevation is 7,200 to 12,300 feet. The mean annual precipitation is about 10 to 30 inches, and the mean annual temperature is about 39°F.

Taxonomic Class: Sandy-skeletal, mixed Entic Cryumbrepts

Typical Pedon: The representative profile for this soil is on a northwest-facing moraine sideslope, under lodgepole pine and western white pine, at an elevation of 10,100 feet. Slope is 58 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; dark grayish brown (10YR 4/2) extremely stony loamy sand, very dark gray (10YR 3/1) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many medium interstitial pores; 30 percent gravel, 20 percent cobbles, 35 percent stones and 10 percent boulders; moderately acid (pH 5.9); clear irregular boundary.

A2 – 2 to 7 inches; brown (10YR 5/3) extremely stony loamy sand, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure, parting to weak fine granular; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many medium interstitial pores; 10 percent gravel, 20 percent cobbles and 45 percent stones; moderately acid (pH 6.0); clear irregular boundary.

A3 – 7 to 14 inches; brown (10YR 5/3) extremely stony loamy sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, and common fine, medium and coarse roots; many medium interstitial pores; 10 percent gravel, 20 percent cobbles and 45 percent stones; moderately acid (pH 6.0); clear wavy boundary.

C1 – 14 to 22 inches; light yellowish brown (2.5Y 6/4) very gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine

and fine roots; many medium interstitial pores; 35 percent gravel and 5 percent cobbles; slightly acid (pH 6.1); clear wavy boundary.

C2 – 22 to 33 inches; light gray (2.5Y 7/2) extremely stony loamy sand, olive (5Y 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; many medium interstitial pores; 45 percent gravel, 10 percent cobbles and 20 percent stones; slightly acid (pH 6.2); abrupt irregular boundary.

Cr – 33 inches; decomposing granitic bedrock, which can be cut with a tilespade.

Type Location: Just west of Serene Lake; about 1,000 feet west and 500 feet south of the northeast corner of the southwest quarter of the unaligned Section 12, T.6S., R.29E., MDBM, Mt. Tom NW Quadrangle.

Range in Characteristics: Soil depth to the lithic or paralithic contact is 30 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 41°F, and the mean summer soil temperature is about 53°F. The textural control section is from 10 inches to the lithic or paralithic contact in moderately deep pedons, and is the 10 to 40 inch section in deep pedons. It is sandy loam or loamy sand, with 2 to 8 percent clay. Rock fragments are 10 to 45 percent gravel, 5 to 20 percent cobbles, 0 to 45 percent stones and 0 to 20 percent boulders, and average 58 to 63 percent by volume.

Some pedons have a surface organic layer.

The A horizon has dry color of 10YR 4/2 or 5/3; moist color is 10YR 3/1, 3/2 or 3/3. It is sandy loam or loamy sand, with 1 to 9 percent clay. Rock fragments are 10 to 45 percent gravel, 10 to 20 percent cobbles, 5 to 45 percent stones, and 0 to 20 percent boulders by volume. Reaction is moderately acid to neutral.

The C horizon has dry color of 10YR 5/3, 5/4, 6/3 or 6/4, or 2.5Y 6/4 or 7/2; moist color is 10YR 3/3, 4/4 or 5/4, or 5Y 5/3. It is loamy sand, with 2 to 7 percent clay. Rock fragments are 20 to 45 percent gravel, 5 to 15 percent cobbles, 0 to 35 percent stones and 0 to 20 percent boulders by volume. Reaction is slightly acid to neutral.

SHERWIN FAMILY

The Sherwin family consists of shallow and very shallow, well drained soils forming from hard rhyolitic tuff. These soils are on volcanic flows and fans, and have slopes of 0 to 15 percent. Elevation is 5,700 to 7,600 feet. The mean annual precipitation is about 6 to 12 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Ashy, nonacid, mesic Lithic Xeric Torriorthents

Typical Pedon: The representative profile for this soil is a southeast-facing lava flow, under big sagebrush, desert needlegrass, spiney hopsage and Nevada ephedra, at an elevation of 5,400 feet. Slope is 6 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 3 inches; light gray (10YR 7/2) very cobbly loamy fine sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; 30 percent gravel (tuff fragments), 20 percent cobbles and 1 percent stones; neutral (pH 6.8); abrupt smooth boundary.

A2 – 3 to 7 inches; light gray (10YR 7/2) sandy loam, brown (10YR 4/3) moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine vesicular pores; 5 percent gravel (tuff fragments), 5 percent cobbles and 1 percent stones; neutral (pH 6.8); abrupt wavy boundary.

R – 7 inches; pinkish white (7.5YR 8/2) hard rhyolitic tuff, light brown (7.5YR 6/4) moist. Fracture spacing averages 6 inches.

Type Location: In the Benton-Owens Valley Soil Survey Area, about 13 miles northwest of Bishop, California and 1 mile south of Mesa Camp, between two sharp secondary drainages; 1,100 feet west and 1,200 feet north of the southeast corner of Section 21, T.5S., R.31E., MDBM, Mount Tom Quadrangle.

Range in Characteristics: Depth to the hard tuff is 4 to 14 inches. The soil surface is covered with 35 to 65 percent rock fragments, made up of gravel (angular tuff fragments), cobbles and stones. The gravel and cobbles predominate. These soils contain 40 to 60 percent rhyolitic volcanic ash. Base saturation is 90 to 100 percent. The mean annual soil temperature at the lithic contact is about 55°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is the whole soil, and is loamy fine sand or sandy loam, with an average of 6 to 10 percent clay. Rock fragments are 5 to 20 percent gravel, 15 to 30 percent cobbles and 0 to 3 percent stones, and average 20 to 35 percent by volume. The organic carbon is 0.3 to 0.6 percent. The soil is neutral or slightly alkaline throughout.

The A horizon has dry color of 10YR 6/3, 7/2, 7/3 or 8/2; moist color is 10YR 4/3, 4/4, 5/2, 5/3 or 6/2. The upper part (A1) is a very cobbly loamy fine sand, with 0 to 3 percent clay and contains 35 to 50 percent angular rock fragments, consisting of 10 to 30 percent gravel, 20 to 35 percent cobbles and 0 to 3 percent stones by volume. The lower part (A2) is sandy loam or gravelly sandy loam, and contains 11 to 20 percent angular tuff fragments, consisting of 5 to 15 percent gravel, 5 to 10 percent cobbles and 0 to 3 percent stones by volume.

SONOMA FAMILY

The Sonoma family consists of very deep, strongly alkaline soils forming in alluvium and lake sediments weathered from mixed rocks, which includes a high percentage of volcanic ash. These soils are on lake terraces, and have slopes of 0 to 2 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Fine-silty, mixed (calcareous), mesic Aeric Fluvaquents

Typical Pedon: The representative profile for this soil is on a southeast-facing lake terrace, under saltgrass, reeds and greasewood, at an elevation of 6,460 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 4 inches; very pale brown (10YR 7/3) sand, grayish brown (2.5Y 5/2) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few fine and medium roots; many very fine and fine interstitial pores; 2 percent gravel; violently effervescent; strongly alkaline (pH 8.5+); clear smooth boundary.

A2 – 4 to 13 inches; light gray (10YR 7/2) sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 12 percent gravel; violently effervescent; strongly alkaline (pH 8.5+); clear smooth boundary.

2A – 13 to 22 inches; light gray (10YR 7/1) silt loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine interstitial pores; slightly effervescent; strongly alkaline (pH 8.5+); gradual smooth boundary.

2C1 – 22 to 46 inches; gray (5Y 6/1) silty clay loam, gray (5Y 5/1) moist; massive; soft, very friable, sticky and plastic; few fine and medium roots; common

very fine and few fine interstitial pores; strongly effervescent; strongly alkaline (pH 8.5+); abrupt smooth boundary.

2C2 – 46 to 52 inches; light yellowish brown (2.5Y 6/4) fine sand, olive brown (2.5Y 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few medium roots; many very fine and fine interstitial pores; slightly effervescent; moderately alkaline (pH 8.0); abrupt smooth boundary.

2C3 – 52 to 60 inches; light gray (5Y 7/1) silty clay loam, gray (5Y 5/1) moist; massive; soft, very friable, sticky and plastic; common very fine and fine interstitial pores; violently effervescent; moderately alkaline (pH 8.0).

Type Location: Near the southwest corner of the northeast quarter of the northwest quarter of Section 32, T.3N., R.27E., MDBM, Bodie SE Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean soil temperature at a 20 inch depth is about 50°F. The mean annual summer temperature is about 69°F, and the mean winter temperature is about 36°F. The soil is strongly calcareous and moderately to strongly alkaline in reaction. The textural control section is fine-silty, and it is fine sand, silt loam and silt clay loam, with 2 to 30 percent clay. Rock fragments are 0 to 12 percent gravel.

The A horizons have dry color of 10YR 7/3, 7/2, 7/1, 5Y 7/1 or 6/1; moist color is 10YR 5/3, 4/3, 3/3 or 2.5Y 5/2, 5/1, 4/2 or 4/1. It is sand, loamy sand, loam or silt loam, with 0 to 20 percent clay. Rock fragments are 0 to 12 percent gravel. Reaction is strongly alkaline.

The C horizons have dry color of 5Y 7/1 or 6/1; moist color is 5Y 5/2, 5/1, 4/2, 4/1 or 2.5Y 4/4. It is fine sand, silt loam or silt clay loam, with 0 to 30 percent clay. Rock fragments are 0 to 2 percent gravel. Reaction is moderately to strongly alkaline.

SPAINHOWER FAMILY

The Spainhower family consists of very deep, well drained soils forming in alluvium from mixed rocks. These soils are on fan terraces, and have slopes of 5 to 15 percent. Elevation is 4,400 to 6,000 feet. The mean annual precipitation is about 4 to 8 inches, and the mean annual temperature is about 55°F.

Taxonomic Class: Clayey-skeletal, mixed, thermic Xeric Haplargids

Typical Pedon: The representative profile for this soil is on a northeast-facing fan terrace, under spiny hopsage, Nevada ephedra and desert needlegrass, at an elevation of 3,900 feet. Slope is 7 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 5 inches; pale brown (10YR 6/3) cobbly sandy loam, dark brown (10YR 3/3) moist; moderate coarse subangular blocky structure, parting to moderate thick platy; slightly hard, friable, sticky and plastic; common very fine and few fine and medium roots; many very fine vesicular, and few very fine and fine tubular pores; 15 percent gravel, 5 percent cobbles and 2 percent stones; slightly alkaline (pH 7.6); clear smooth boundary.

BAt – 5 to 10 inches; light yellowish brown (10YR 6/4) gravelly sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and fine, and few medium roots; common very fine tubular pores; many thin clay films bridging mineral grains and on peds; 20 percent gravel, 8 percent cobbles and 2 percent stones; slightly alkaline (pH 7.6); clear smooth boundary.

Bt – 10 to 17 inches; light yellowish brown (10YR 6/4) very cobbly clay, dark yellowish brown (10YR 4/4) moist; moderate coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common very fine and few fine tubular, and common very fine interstitial pores; many thin clay films bridging mineral sand grains, and common moderately thick clay films on peds and rock fragments; 25 percent gravel, 20 percent cobbles and 2 percent stones; slightly alkaline (pH 7.6); gradual smooth boundary.

Btk – 17 to 30 inches; light yellowish brown (10YR 6/4) extremely cobbly clay, dark yellowish brown

(10YR 4/4) moist; moderate coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine roots; common very fine and few fine tubular pores; many thin clay films bridging mineral grains, and common moderately thick clay films on peds and rock fragments; slightly effervescent; 25 percent gravel, 35 percent cobbles and 5 percent stones; moderately alkaline (pH 8.0); gradual smooth boundary.

BCt – 30 to 42 inches; light yellowish brown (10YR 6/4) extremely cobbly sandy loam, dark yellowish brown (10YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; common very fine and fine interstitial pores; many thin clay films bridging mineral grains, and few moderately thick clay films on peds and rock fragments; 30 percent gravel, 40 percent cobbles and 3 percent stones; neutral (pH 6.6); gradual smooth boundary.

C – 42 to 60 inches; light yellowish brown (10YR 6/4) extremely gravelly sandy loam, dark yellowish brown (10YR 4/6) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine and fine interstitial pores; common very thin clay films bridging mineral grains; 60 percent gravel, 20 percent cobbles and 5 percent stones; neutral (pH 6.8).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 4.5 miles northwest of Independence, California, and 150 feet west of Highway 395; about 350 feet east and 1,050 feet north of the southwest corner of Section 35, T.12S., R.34E., MDBM, Independence Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 62°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is the whole argillic if less than 20 inches thick and the upper 20 inches of the argillic if greater than 20 inches thick. Reaction is slightly acid to moderately alkaline throughout. It is noneffervescent to slightly effervescent, with disseminated carbonates throughout.

The A horizon has dry color of 10YR 5/3 or 6/3; moist

color is 10YR 3/3, 4/3 or 4/4. It is cobbly sandy loam, with 10 to 20 percent clay. Rock fragments are 10 to 20 percent gravel, 8 to 20 percent cobbles and 0 to 10 percent stones, and average 25 to 35 percent by volume. Organic carbon is less than 0.5 percent.

The BA_t horizon has dry color of 7.5YR 5/4 or 6/4, or 10YR 6/4; moist color is 7.5YR 4/4, or 10YR 4/4. It is gravelly, cobbly, very gravelly or very cobbly sandy clay loam, loam or clay loam, with 20 to 35 percent clay. Rock fragments are 10 to 25 percent gravel, 8 to 25 percent cobbles and 0 to 15 percent stones.

The B_t and B_{tk} horizons have dry color of 7.5YR 5/4

or 6/4, or 10YR 6/4; moist color is 7.5YR 4/4, or 10YR 4/4. They are very cobbly or extremely cobbly clay loam or clay, with 35 to 45 percent clay. Rock fragments are 20 to 35 percent gravel, 20 to 35 percent cobbles and 2 to 20 percent stones, and average 40 to 70 percent by volume.

The BC_t and C horizons have dry color of 7.5YR 6/4, or 10YR 6/4; moist color is 7.5YR 4/4, or 10YR 4/4 or 4/6. They are extremely gravelly or extremely cobbly sandy loam, with 10 to 20 percent clay. Rock fragments are 20 to 60 percent gravel, 20 to 40 percent cobbles and 2 to 25 percent stones, and average 60 to 80 percent by volume.

SPRINGMEYER FAMILY

The Springmeyer family consists of moderately deep to very deep, well drained soils forming in volcanic tuff and mixed rocks. These soils are on mountainsides, and have slopes of 30 to 60 percent. Elevation is 6,800 to 7,200 feet. The mean annual precipitation is about 8 to 12 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Fine-loamy, mixed, mesic Aridic Argixerolls

Typical Pedon: The representative profile for this soil is on an east-facing mountainside, under Jeffrey pine, bitterbrush, big sagebrush, rabbitbrush and Great Basin wildrye, at an elevation of 7,280 feet. Slope is 47 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; grayish brown (10YR 5/2) sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; many very fine and fine interstitial pores; 10 percent gravel; neutral (pH 7.0); clear smooth boundary.

A2 – 2 to 7 inches; brown (10YR 5/3) gravelly sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine and fine interstitial pores; 20 percent gravel; slightly alkaline (pH 7.5); clear wavy boundary.

A3 – 7 to 13 inches; brown (10YR 5/3) gravelly sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and few fine roots; many very fine and fine interstitial pores; 25 percent gravel; 8 percent durinodes; neutral (pH 7.0); clear wavy boundary.

2Ab – 13 to 20 inches; brown (10YR 5/3) gravelly sandy loam, dark grayish brown (10YR 3/2) moist; massive; soft, very friable, slightly sticky and nonplastic; many very fine and few fine and medium roots; common very fine and fine interstitial pores; 22 percent gravel; slightly alkaline (pH 7.5); abrupt wavy boundary.

2Bt1 – 20 to 28 inches; brown (10YR 5/3) gravelly clay loam, dark grayish brown (10YR 4/2) moist;

massive; slightly hard, friable, slightly sticky and slightly plastic; common moderately thick colloid in bridges between mineral grains and common thin clay films line pores; few very fine, fine and coarse roots; common very fine and fine tubular pores; 32 percent gravel; slightly alkaline (pH 7.5); clear wavy boundary.

2BCtb – 28 to 32 inches; light brownish gray (2.5Y 6/2) clay loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, friable, sticky and plastic; many moderately thick colloid in bridges between mineral grains; few very fine and fine roots; few very fine and fine tubular pores; slightly alkaline (pH 7.5); abrupt wavy boundary.

2Cr – 32 to 60 inches; soft fractured tuff.

Type Location: About 100 feet northeast from the southwest corner of the southwest quarter of the southwest quarter of Section 17, T.28S., R.28E., MDBM, Cow-track Mtn SW Quadrangle.

Range in Characteristics: Soil depth ranges from 20 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is the whole argillic if less than 20 inches thick and the upper 20 inches of the argillic if greater than 20 inches thick. It is sandy loam or clay loam, with 5 to 25 percent clay. Rock fragments are 0 to 35 percent gravel.

The A horizons have dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/2 or 4/2. It is sand, loamy sand or sandy loam, with 0 to 8 percent clay. Rock fragments are 5 to 30 percent gravel. Reaction is neutral to slightly alkaline.

The Bt horizon has dry color of 10YR 5/2, 5/3, 2.5Y 6/2 or 6/3; moist color is 10YR 3/2, 2/2, 2.5Y 4/4 or 5/4. It is sandy loam or clay loam, with 18 to 30 percent clay. Rock fragments are 0 to 25 percent gravel. Reaction is slightly alkaline.

STACY FAMILY

The Stacy family consists of moderately deep to very deep, well to somewhat excessively drained soils forming from alluvium derived from mixed rocks. These soils are on alluvial fans and valley bottoms, and have slopes of 0 to 15 percent. Elevation is 6,500 to 8,000 feet. The mean annual precipitation is about 8 to 15 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Coarse-loamy, mixed, mesic, Aridic Duric Haploxerolls

Typical Pedon: The representative profile for this soil is on an southeast-facing alluvial fan, under sagebrush, rabbitbrush, bitterbrush, Great Basin wildrye and squirreltail, at an elevation of 7,500 feet. Slope is 5 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 1 inches; dark brown (10YR 4/3) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak thin platy & weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; few very fine roots; few medium interstitial pores; 5 percent gravel; slightly acid (pH 6.2); clear smooth boundary.

A2 – 1 to 6 inches; brown (10YR 5/3) loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine and fine subangular blocky structure; soft, friable, nonsticky and nonplastic; few very fine and fine roots; few medium interstitial pores; slightly acid (pH 6.3); clear smooth boundary.

C1 – 6 to 12 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 3/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine and fine interstitial and tubular pores; slightly acid (pH 6.4); clear smooth boundary.

C2 – 12 to 20 inches; dark brown (10YR 4/3) sandy loam, dark brown (10YR 3/3) moist; moderate medium fine grading to moderate very fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and few

fine roots; few very fine interstitial pores; slightly acid (pH 6.4); clear wavy boundary; 10 percent durinodes.

C3 – 20 to 38 inches; dark brown (10YR 4/3) sandy loam, dark brown (10YR 3/3) moist; massive; hard, firm and hard, nonsticky and nonplastic; few very fine interstitial pores; slightly acid (pH 6.3); gradual smooth boundary; 15 percent durinodes.

C4 – 38 to 60 inches; yellowish brown (10YR 5/4) fine sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine interstitial pores; slightly acid (pH 6.4).

Type Location: About 100 feet northwest of the southeast corner of the northwest quarter of the southwest quarter of Section 7, T.3S., R.31E., MDBM, Casa Diablo Mtn NE Quadrangle.

Range in Characteristics: Soil depth to bedrock is 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean annual summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The 10 to 40 inch textural control section is loamy sand, sandy loam or fine sandy loam, with 2 to 12 percent clay. Rock fragments are 0 to 15 percent gravel. Depths between 20 to 38 inches may comprise a duric layer or a horizon cemented by illuvial silica.

The A horizons have dry color of 10YR 5/2, 5/3 or 4/3; moist color is 10YR 3/2. It is loamy sand, sandy loam or fine sandy loam, with 4 to 12 percent clay. Rock fragments are 0 to 15 percent gravel. Reaction is slightly acid.

The C horizons have dry color of 10YR 6/3, 5/4, 5/3 or 4/3; moist color is 10YR 3/3. It is loamy sand, sandy loam or fine sandy loam, with 2 to 12 percent clay. Rock fragments are 0 to 10 percent gravel. Reaction is slightly acid.

STECUM FAMILY

The Stecum family consists of moderately deep to very deep, somewhat excessively drained soils forming in materials weathering from granitic, metavolcanic, metasedimentary, glacial till and mixed rocks. It is on moraines, mountainsides and mountaintops, and glaciated terraces, on slopes of 2 to 80 percent. Elevation is 6,800 to 12,900 feet. The mean annual precipitation is about 8 to 30 inches, and the mean annual temperature is about 40°F.

Taxonomic Class: Sandy-skeletal, mixed Typic Cryorthents

Typical Pedon: The representative profile for this soil is on a north-facing mountainside, under hemlock and western white pine, at an elevation of 9,440 feet. Slope is 50 percent. When described (7/12/88), the soil was dry in the upper 9 inches, and slightly moist in the rest of the profile. Colors are for dry soil unless otherwise noted.

A - 0 to 9 inches; light gray (10YR 7/2) very cobbly loamy sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; common very fine and few medium roots; many very fine and fine interstitial pores; 9 percent gravel and 30 percent cobbles; strongly acid (pH 5.5); gradual smooth boundary.

2A - 9 to 24 inches; light brownish gray (10YR 6/2) very cobbly loamy sand, brown (10YR 5/3) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 12 percent gravel, 25 percent cobbles and 5 percent boulders; strongly acid (pH 5.5); clear smooth boundary.

2C - 24 to 60 inches; light yellowish brown (10YR 6/4) very cobbly loamy coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 12 percent

gravel, 33 percent cobbles and 15 percent boulders; strongly acid (pH 5.5).

Type Location: About 220 feet west and 110 feet north of the southeast corner of the southwest quarter of the northwest quarter of Section 13, T.4S., R.27E., MDBM, Mt. Morrison SW Quadrangle.

Range in Characteristics: Depth to hard bedrock is 21 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 41°F, and the mean summer soil temperature is about 53°F. The textural control section is from 10 inches to the lithic contact in pedons shallower than 40 inches, and is the 10 to 40 inch section in pedons deeper than 40 inches. It is loamy fine sand, loamy sand, loamy coarse sand or coarse sand, with 1 to 16 percent clay. Rock fragments are 10 to 90 percent gravel, 0 to 37 percent cobbles, 0 to 50 percent stones and 0 to 25 percent boulders, and average 35 to 90 percent by volume.

Some pedons have a surface organic layer. Other pedons have buried B horizons.

The A horizon has dry color of 10YR 4/2, 4/3, 5/2, 5/3, 5/4, 6/2, 6/3, 6/4, 7/2 or 7/4; moist color is 10YR 3/1, 3/2, 3/3, 4/2, 4/3 or 5/3. It is loamy sand or loamy coarse sand, with 1 to 8 percent clay. Rock fragments are 9 to 60 percent gravel, 0 to 40 percent cobbles, 0 to 50 percent stones and 0 to 20 percent boulders by volume. Reaction is strongly acid to neutral.

The C horizon has dry color of 7.5YR 6/6 or 7/6, or 10YR 5/6, 6/3, 6/4, 7/2, 7/3, 7/4 or 8/2, or 2.5Y 6/2, 6/4 or 7/2; moist color is 7.5YR 5/6, or 10YR 3/3, 4/2, 4/3, 4/4, 5/3, 5/4, 5/6 or 8/2, or 2.5Y 4/2 or 4/4. It is loamy fine sand, loamy sand, loamy coarse sand or coarse sand, with 0 to 7 percent clay. Rock fragments are 10 to 90 percent gravel, 0 to 35 percent cobbles, 0 to 50 percent stones and 0 to 25 percent boulders by volume. Reaction is strongly acid to neutral.

SUMINE FAMILY

The Sumine family consists of very deep, well drained soils forming in material weathering from basalt rock. These soils are on mountainsides and mountain benches, and have slopes of 2 to 30 percent. Elevation is 7,600 to 9,400 feet. The mean annual precipitation is about 12 to 25 inches, and the mean annual soil temperature is about 47 °F.

Taxonomic Class: Loamy-skeletal, mixed frigid Aridic Argixerolls.

Typical Pedon: The representative profile for this soil is on a southwest-facing mountain bench, under big sagebrush, antelope bitterbrush and Jeffrey pine, at an elevation of 8,080 feet. Colors are for dry soil unless otherwise noted.

Oe – 1/4 to 0 inch; fresh and decomposing shrub parts; abrupt smooth boundary.

A1 – 0 to 2 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many fine interstitial pores; 20 percent gravel; moderately acid (pH 5.7); abrupt smooth boundary.

A2 – 2 to 13 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 15 percent gravel; slightly acid (pH 6.2); clear wavy boundary.

A3 – 13 to 27 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine and medium roots; common very fine interstitial pores; 15 percent gravel; slightly acid (pH 6.5); clear wavy boundary.

2Bwb – 27 to 38 inches; brown (10YR 5/3) very gravelly sandy loam, brown (10YR 4/3) moist; moder-

ate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common medium and coarse roots; common very fine interstitial pores; 30 percent gravel and 5 percent cobbles; slightly acid (pH 6.5); abrupt wavy boundary.

2Btb – 38 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 4/3) moist; massive; hard, friable, nonsticky and nonplastic; few coarse roots; few very fine interstitial pores; few thin clay films bridging mineral sand grains; 35 percent gravel and 15 percent cobbles; neutral (pH 6.7).

Type Location: About 1,485 feet east and 660 feet north of the southwest corner of Section 10, T.2S., R.28E., MDBM, Cowtrack Mountain SW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 53°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is the upper 20 inches of the argillic horizon. It is sandy loam or loam, with 6 to 12 percent clay. Rock fragments are 25 to 35 percent gravel, 0 to 15 percent cobbles and 0 to 5 percent stones, and average 35 to 65 percent by volume.

Some pedons do not have organic surface layers.

The A horizon has dry color of 10YR 4/3, 5/2 or 5/3; moist color is 10YR 3/2. It is loamy sand or loamy coarse sand, with 1 to 2 percent clay. Rock fragments are 5 to 25 percent gravel by volume. Reaction is moderately acid to neutral.

The B horizon has dry color of 10YR 3/3, 4/3, 5/3 or 6/3, or 5YR 4/4; moist color is 10YR 4/3, or 7.5YR 3/2, or 5YR 3/4. It is loam, fine sandy loam or sandy loam, with 4 to 12 percent clay. Rock fragments are 5 to 35 percent gravel, 5 to 35 percent cobbles and 0 to 5 percent stones by volume. Reaction is slightly acid to neutral.

SUR FAMILY

The Sur family consists of moderately deep to very deep, well drained soils forming in material weathering from granitic till, adamellite or basalt. These soils are on hillsides and moraines, and have slopes of 15 to 60 percent. Elevation is 4,400 to 8,600 feet. The mean annual precipitation is about 4 to 17 inches, and the mean annual temperature is about 51°F.

Taxonomic Class: Loamy-skeletal, mixed, mesic Entic Haploxerolls

Typical Pedon: The representative profile for this soil is on a south-facing glacial moraine, under big sagebrush and antelope bitterbrush, at an elevation of 5,600 feet. Color are for dry soil unless otherwise noted.

A1 – 0 to 1 inch; brown (10YR 5/3) sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; neutral (pH 6.7); clear wavy boundary.

A2 – 1 to 5 inches; brown (10YR 5/3) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky, parting to weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine and few fine and medium vesicular pores; 15 percent gravel, 3 percent stones and 2 percent boulders; neutral (pH 6.7); clear wavy boundary.

A3 – 5 to 12 inches; brown (10YR 5/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky, parting to moderate very fine and fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine tubular pores; 15 percent gravel, 15 percent cobbles, 3 percent stones and 2 percent boulders; neutral (pH 6.6); clear irregular boundary.

C1 – 12 to 34 inches; pale brown (10YR 6/3) very cobbly sandy loam, dark brown (10YR 3/3) moist; massive; very hard, friable, slightly sticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; 35 percent gravel, 15 percent cobbles, 3

percent stones and 2 percent boulders; neutral (pH 6.7); gradual smooth boundary.

C2 – 34 to 60 inches; pale brown (10YR 6/3) very gravelly sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard; friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 40 percent gravel, 10 percent cobbles, 7 percent stones and 3 percent boulders; neutral (pH 6.7).

Type Location: About 660 feet north and 500 feet west of the southwest corner of the southeast quarter of the southwest quarter of the irregular Section 26, T.9S., R.33E., MDBM, Big Pine NE Quadrangle.

Range in Characteristics: Soil depth is 31 to greater than 60 inches to lithic contact. The mollic epipedon is 10 to 12 inches thick. The mean annual soil temperature at 20 inches is about 53°F. The mean summer temperature is about 69°F, and the mean winter temperature is about 36°F. The textural control section is the 10 inch to lithic contact portion in pedons less than 40 inches to bedrock, and is the 10 to 40 inch section in soils greater than 40 inches to bedrock. It is sandy loam or coarse sandy loam, with 3 to 17 percent clay. Rock fragments are 12 to 50 percent gravel, 0 to 65 percent cobbles, 0 to 7 percent stones and 0 to 3 percent boulders, and average 42 to 68 percent by volume.

Some pedons have organic surface horizons.

The A horizon has dry color of 10YR 5/3 or 5/4; moist color is 10YR 3/2 or 3/3. It is sandy loam, loamy sand or sand, with 1 to 10 percent clay. Rock fragments are 0 to 50 percent gravel, 0 to 25 percent cobbles, 0 to 3 percent stones and 0 to 2 percent boulders by volume. Reaction is neutral.

The C horizon has dry color of 10YR 5/3, 5/4 or 6/3, or 2.5Y 5/4; moist color is 10YR 3/2, 3/3, 4/3 or 4/4, or 2.5Y 4/2. It is sandy loam or coarse sandy loam, with 3 to 17 percent clay. Rock fragments are 12 to 50 percent gravel, 0 to 65 percent cobbles, 0 to 7 percent stones and 0 to 3 percent boulders by volume. Reaction is neutral.

TABOOSE FAMILY

The Taboose family consists of very deep, well drained soils forming in material weathered from basalt lava containing many cinders. These soils are on recent basalt lava flows, and have slopes of 5 to 30 percent. Elevation is 4,000 to 4,800 feet. The mean annual precipitation is about 4 to 8 inches, and the mean annual temperature is about 55°F.

Taxonomic Class: Ashy-skeletal, thermic Vitrandic Torriorthents

Typical Pedon: The representative profile for this soil is on an east-facing lava flow, under Nevada ephedra, fremont dalea, spiney hopsage and desert needlegrass, at an elevation of 4,200 feet. Slope is 8 percent. Colors are for dry soil unless otherwise noted.

- A - 0 to 5 inches; brown (10YR 5/3) very gravelly loamy fine sand, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, non-sticky and nonplastic; few very fine roots; common very fine interstitial and vesicular pores; 35 percent gravel (cinders), 15 percent cobbles and 1 percent stones; neutral (pH 7.3); clear wavy boundary.
- C - 5 to 25 inches; pale brown (10YR 6/3) gravelly fine sandy loam; dark brown (10YR 3/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine, and common medium roots; common very fine interstitial and tubular pores; 20 percent gravel (cinders), 5 percent cobbles and 1 percent stones; moderately alkaline (pH 7.5); gradual wavy boundary.
- 2C - 25 to 60 inches; yellowish brown (10YR 5/4) extremely stony loamy fine sand, dark brown (10YR

3/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, and few fine and medium roots; many very fine interstitial pores; 40 percent gravel (cinders), 10 percent cobbles and 20 percent stones; silica coatings on the undersides of cinders; moderately alkaline (pH 7.5).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 4.75 miles south of Big Pine, California, on Crater Mountain lava flow; about 100 feet west and 1,500 feet north of the southwest corner of Section 9, T.10S., R.34E., MDBM, Big Pine Quadrangle.

Range in Characteristics: Soil depth to hard lava is 60 inches or more. The mean annual soil temperature at 20 inches is about 59°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The 10 to 40 inch textural section is gravelly fine sandy loam to extremely stony loamy fine sand. Rock fragments average 35 to 80 percent cinders by volume. The soil is neutral to moderately alkaline throughout.

The A horizon has dry color of 10YR 5/3 or 6/3; moist color is 10YR 3/3 or 4/3. It is very gravelly loamy fine sand or very gravelly fine sandy loam. Rock fragments are 20 to 60 percent gravel, 5 to 20 percent cobbles and 1 to 3 percent stones, and average 35 to 75 percent by volume. The organic carbon content is 0.3 to 0.5 percent.

The C horizon has dry color of 10YR 4/1, 4/3, 5/3, 5/4 or 6/3; moist color is 10YR 3/3, 3/4 or 4/3. It is extremely stony loamy fine sand or very stony loamy fine sand. Rock fragments are 40 to 60 percent gravel, 5 to 30 percent cobbles and 15 to 25 percent stones, and average 35 to 80 percent by volume.

TINEMAHA FAMILY

The Tinemaha family consists of very deep, well drained soils forming in granitic alluvium. These soils are on alluvial fans and fan terraces, and have slopes of 5 to 15 percent. Elevation is 4,400 to 6,000 feet. The mean annual precipitation is about 4 to 8 inches, and the mean annual temperature is about 55 to 58°F.

Taxonomic Class: Loamy-skeletal, mixed thermic Xeric Haplargids

Typical Pedon: The representative profile for this soil is on an east-facing fan terrace, under spiny hopsage, Nevada ephedra and desert needlegrass, at an elevation of 4,300 feet. Slope is 8 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 1 inch; pale brown (10YR 6/3) gravelly loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 10 percent gravel, 3 percent cobbles, 2 percent stones and 1 percent boulders; neutral (pH 7.0); abrupt smooth boundary.

A2 – 1 to 9 inches; pale brown (10YR 6/3) gravelly loamy coarse sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 10 percent fine gravel, 3 percent cobbles, 2 percent stones and 1 percent boulders; neutral (pH 7.2); clear wavy boundary.

Bt1 – 9 to 15 inches; brown (10YR 5/3) very cobbly sandy clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; common very fine interstitial, and few very fine tubular pores; few thin clay films in pores and bridging mineral grains; 10 percent fine pebbles; neutral (pH 7.2); clear wavy boundary.

Bt2 – 15 to 27 inches; yellowish brown (10YR 5/4) very cobbly sandy clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; common very fine interstitial, and few very fine tubular pores; common thin clay films on ped faces, in pores and bridging mineral grains; 10 percent fine gravel, 30 percent cobbles and 10

percent stones; neutral (pH 7.2); gradual wavy boundary.

C – 27 to 60 inches; pale brown (10YR 6/3) very stony loamy coarse sand, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 10 percent fine gravel, 20 percent cobbles and 20 percent stones; neutral (pH 7.2).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 6 miles south of Big Pine, California and 1 mile west of Fish Springs, in the Owens Valley, 25 yards northwest of the powerline on the west side of the powerline road; 75 feet west and 1,300 feet north of the southeast corner of Section 17, T.10S., R.34E., MDBM, Big Pine Quadrangle.

Range in Characteristics: Soil depth is 60 inches or greater. Solum depth is 19 to 30 inches. The mean annual soil temperature at 20 inches is about 62°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is the whole argillic if less than 20 inches thick and the upper 20 inches if greater than 20 inches thick. Base saturation is 90 to 100 percent throughout the profile. The soil is neutral to slightly alkaline throughout.

The A horizon has dry color of 10YR 5/3, 6/3, 6/4 or 7/3; moist color is 10YR 3/3, 4/3, 4/4 or 5/3. It is loamy sand, gravelly loamy sand or gravelly loamy coarse sand, with 3 to 10 percent clay. Rock fragments are 10 to 30 percent gravel, 1 to 10 percent cobbles and 3 to 10 percent stones and boulders, and average 15 to 35 percent by volume. The organic carbon content is 0.2 to 0.4 percent.

The Bt horizon has dry color of 10YR 5/3, 5/4, 6/3, 6/4, 7/2, or 7/3, or 7.5YR 5/6, 6/4 or 6/6; moist color is 10YR 3/3, 4/2, 4/3, 4/4 or 5/4, or 7.5YR 4/4 or 4/6. It is sandy loam or sandy clay loam, with very stony, very cobbly or extremely stony modifiers. Clay content is 12 to 30 percent, but averages 20 to 30 percent in the upper 20 inches of the horizon. Faint and distinct mottles with olive and reddish yellow hues (5Y 4/4 or 7.5Y 6/6), are present in some profiles. Rock fragments are 10 to 30 percent gravel, 10 to 30 percent cobbles and 5 to 40 percent stones, and average 35 to 80 percent by volume.

The C horizon has dry color of 10YR 6/3, 7/2 or 7/3, or 7.5YR 6/6; moist color is 10YR 4/3, 5/3 or 5/4, or 7.5YR 4/6. It is loamy coarse sand, with very stony or

extremely stony modifiers. Rock fragments are 10 to 30 percent gravel, 15 to 30 percent cobbles and 30 to 50 percent stones, and average 35 to 80 percent by volume.

TOQUERVILLE FAMILY

The Toquerville family consists of shallow and very shallow, somewhat excessively drained soils forming in residuum from granitic bedrock. These soils are on hillsides, and have slopes of 5 to 60 percent. Elevation is 4,000 to 6,800 feet. The mean annual precipitation is about 4 to 8 inches, and the mean annual temperature is about 55°F.

Taxonomic Class: Mixed, thermic Lithic Torripsamments

Typical Pedon: The representative profile for this soil is on a northeast-facing hillside, under blackbrush, Nevada ephedra, California buckwheat and desert needlegrass, at an elevation of 5,400 feet. Slope is 40 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 5 inches; light brownish gray (10YR 6/2) cobbly sand, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few medium roots; many very fine interstitial pores; 15 percent gravel and 15 percent cobbles; slightly alkaline (pH 7.5); abrupt wavy boundary.

R – 5 inches; hard granodiorite bedrock.

Type Location: In the Benton-Owens Valley Soil Survey Area, about 5 miles west of Bishop, California, and 1/4 mile south of house, near hilltop; about 600 feet east and 400 feet south of the NW1/4 of the NE1/4 of Section 7, T.7S., R.32E., MDBM, Mount Tom Quadrangle.

Range in Characteristics: Depth to the lithic contact is 3 to 20 inches. The mean annual soil temperature at the lithic contact or 20 inches is about 60°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is the whole soil for soils less than 14 inches deep, or is the section from the 10 inch depth to the lithic contact for those soils deeper than 14 inches.

The A horizon has dry color of 10YR 6/2 or 6/3; moist color is 10YR 4/2 or 4/3. It is bouldery, stony, cobbly or gravelly loamy coarse sand or sand. Rock fragments are 5 to 25 percent gravel, 0 to 15 percent cobbles, 0 to 10 percent stones and 0 to 5 percent boulders, and average 10 to 35 percent by volume. Structure is weak subangular blocky, massive or single grain. Base saturation is 90 to 100 percent. The soil reaction is neutral or slightly alkaline. The organic carbon content is 0.2 to 0.4 percent.

TORRIORTHENTIC HAPLOXEROLLS

These Torriorthentic Haploxerolls consist of very deep, somewhat excessively drained soils forming in material weathering from mixed and basalt rocks. These soils are on alluvial fans, glacial moraines, terraces, mountainsides, hillsides and hilltops, on slopes of 0 to 60 percent. Elevation is 4,600 to 8,800 feet. The mean annual precipitation is about 4 to 20 inches, and the mean annual air temperature is about 48°F.

Taxonomic Class: Torriorthentic Haploxerolls

Typical Pedon: The representative profile for this soil is on an east-facing mountainside, under big sagebrush and Indian ricegrass, at an elevation of 7,680 feet. Slope is 39 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 3 inches; brown (10YR 5/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 27 percent gravel; slightly acid (pH 6.5); abrupt irregular boundary.

2A1 – 3 to 5 inches; brown (10YR 4/3) gravelly sandy loam, very dark brown (10YR 2/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 20 percent gravel; neutral (pH 6.7); clear irregular boundary.

2A2 – 5 to 16 inches; brown 10YR 4/3) gravelly sandy loam, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine, medium and coarse roots, many very fine and fine interstitial pores; 27 percent gravel; neutral (pH 7.0); clear wavy boundary.

2A3 – 16 to 20 inches; brown (10YR 4/3) gravelly sandy loam, dark brown (10YR 3/3) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many very fine and fine interstitial pores; 25 percent gravel; neutral (pH 7.0); clear wavy boundary.

2B1q – 20 to 43 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, dark brown (10YR 3/3) moist; massive; very hard, firm, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; few

very fine tubular pores; 25 percent gravel; neutral; (pH 7.0); gradual wavy boundary.

2B2q – 43 to 60 inches; yellowish brown (10YR 5/4) very cobbly sandy loam, brown (10YR 4/3) moist; massive; hard, firm, nonsticky and nonplastic; few fine, medium and coarse roots; few very fine and fine tubular pores; 25 percent gravel; neutral (pH 7.0).

Type Location: About 1 mile west on McGee Creek Road (Forest Service Road 4S06), then 3/4 mile west on trail, on west shoulder of road; about 165 feet east and 1,150 feet north of the southwest corner of Section 28, T.4S., R.29E., MDBM, Mt. Morrison Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil moisture control section is 4 to 30 inches. It is usually dry from May to October, and is usually moist in some part the rest of the year. The 10 to 40 inch textural control section is sandy clay loam, sandy loam, coarse sandy loam, loamy sand, and loamy coarse sand with 2 to 20 percent clay. Rock fragments are 20 to 70 percent gravel, 0 to 40 percent cobbles, and 0 to 30 percent stones, and average 41 to 66 percent by volume.

Some pedons have surface layers with coarse sandy loam textures. Other pedons have organic surface layers 1/4 inch or less thick.

The surface A horizon has dry color of 10R 4/2, 5/2, or 5/3; moist color is 10YR 3/1, 3/2 or 4/2. It is sandy loam, loamy sand or loamy coarse sand, with 1 to 6 percent clay. Rock fragments are 10 to 35 percent gravel, 0 to 20 percent cobbles, and 0 to 5 percent stones by volume. Reaction is moderately acid to slightly alkaline.

The other A horizons have dry color of 2.5Y 5/2 or 5/4, or 10YR 4/2, 4/3, 4/4, 5/2 or 5/3; moist color is 2.5Y 3/2, or 10YR 2/2, 3/2 or 3/3, or 7.5YR 3/2. They are sandy clay loam, sandy loam, coarse sandy loam, loamy sand or loamy coarse sand, with 2 to 20 percent clay. Rock fragments are 20 to 70 percent gravel, 0 to 40 percent cobbles, and 0 to 30 percent stones. Reaction is slightly acid to neutral.

The Bq horizon has dry color of 10YR 4/4, 5/3 or 5/4; moist color is 10YR 3/3 or 4/3. It is sandy loam or loamy coarse sand, with 2 to 10 percent clay. Rock fragments

are 25 to 40 percent gravel, 0 to 35 percent cobbles, and 0 to 50 percent stones. Reaction is neutral.

TYPIC FLUVAQUENTS

These Typic Fluvaquents consist of very deep, poorly drained soils forming in drainage bottoms from alluvium weathered from mixed rocks, and have slopes of 0 to 9 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Typic Fluvaquents

Typical Pedon: The representative profile for this soil is on a southeast-facing relict shoreline, under grasses and sedges and scattered sagebrush, at an elevation of 6,470 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, friable, nonsticky and nonplastic; many very fine, fine and medium roots; high organic matter content; moderately alkaline (pH 8.2); abrupt smooth boundary.

A2 – 2 to 5 inches; light grayish brown (10YR 6/2) gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; many very fine, fine and medium roots; moderately alkaline (pH 8.2); abrupt smooth boundary.

A3 – 5 to 10 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; many very fine, fine and medium roots; high organic matter content; moderately alkaline (pH 8.2 to 8.4); abrupt smooth boundary.

2C1 – 10 to 12 inches; light gray (10YR 6/1) loamy sand, dark gray (10YR 4/1) moist; massive; loose, nonsticky and nonplastic; common very fine and fine roots; slightly effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.

3C2 – 12 to 18 inches; dark gray (10YR 4/1) and reddish pink (5YR 7/6) sandy loam, light gray (10YR 6/1) and reddish yellow (5YR 6/6) moist; massive; slightly hard, very friable, nonsticky and slightly plastic; many very fine and fine roots; slightly effervescent; moderately alkaline (pH 8.2); gradual smooth boundary.

4C3 – 18 to 32 inches; light brownish gray (10YR 6/2) and dark gray (10YR 4/1) loam with organic

stains and many distinct white (10YR 8/1) and light gray (10YR 7/1) mottles, and dark grayish brown (10YR 4/2) and very dark gray (10YR 3/1) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; slightly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.

4C4 – 32 to 42 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; slightly effervescent; moderately alkaline (pH 8.2); abrupt smooth boundary.

5C5 – 42 to 44 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; slightly effervescent; moderately alkaline (pH 8.3); abrupt smooth boundary.

6C6 – 44 to 60 inches; grayish brown (10YR 5/2) silty clay loam with many medium distinct white (10YR 8/1) mottles, very dark grayish brown (10YR 3/2) moist with light gray (10YR 7/1) mottles; massive; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; slightly effervescent; moderately alkaline (pH 8.3).

Type Location: About 0.5 miles east of Dechambeau Ranch, 1,900 feet east from shoulder of dirt road; at 2.2 miles south of the southeast corner of Sec. 27, T.2N., R.26E., MDBM, Bodie SE Quadrangle.

Range in Characteristics: Soil depth is usually 60 inches or more. The mean annual soil temperature at 20 inches is about 44°F. The mean annual summer and winter soil temperature differ by more than 9°F. The particle-size class of the control section is fine-loamy, ranging in texture from sandy loam to silt loam, with 18 to 35 percent clay. Rock fragments are gravel, and range from 0 to 25 percent and average 0 to 30 percent by volume.

The A horizons have dry color of 10YR 6/1, 6/2, 5/1 or 5/2; moist color is 10YR 4/1, 4/2, 3/1 or 3/2. Texture is loam and gravelly loamy sand, with 2 to 20 percent clay. Gravel rock fragments range from 0 to 25 percent, and average 0 to 30 percent by volume.

The C horizons have dry color of 10YR 6/1, 6/2, 5/1, 5/2 or 5YR 7/6; moist color is 10YR 5/2, 4/1, 4/2, 3/2, or 5YR 6/6. The C horizons are stratified with three or more lithologic discontinuities or contrasting horizons.

Mottles color are 10YR 8/1 dry, and 7/1 moist. Textures are silty clay loam, loam and loamy sand, with 3 to 35 percent clay. Gravel-size rock fragments average 0 to 15 percent by weight, and 0 to 18 percent by volume.

VITRANDIC CRYOPSAMMENTS

These Vitrandic Cryopsamments consist of deep to very deep, somewhat excessively drained soils forming in pumice, mixed with minor amounts of obsidian, andesitic and granitic rocks. These soils are on mountainsides, hillsides and mountain basins, and have slopes of 0 to 60 percent. Elevation is 7,500 to 10,200 feet. The mean annual precipitation is about 10 to 30 inches, and the mean annual temperature is about 42°F.

Taxonomic Class: Vitrandic Cryopsamments

Typical Pedon: The representative profile for this soil is on a west-by-southwest-facing mountainside under lodgepole pine and bunchgrasses, at an elevation of 8,880 feet. Slope is 13 percent. When described (8/28/86), the soil was dry in the upper 32 inches and slightly moist in the lower 28 inches. Color is for dry soil unless otherwise noted.

A1 – 0 to 3 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft; very friable, nonsticky and nonplastic; common very fine, fine and medium roots; many very fine and fine interstitial pores; 12 percent pumice and obsidian gravel; strongly acid (pH 5.5); clear smooth boundary.

A2 – 3 to 11 inches; light brownish gray (10YR 6/2) gravelly coarse sand, dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 18 percent pumice and obsidian gravel; neutral (pH 7.0); clear smooth boundary.

C – 11 to 21 inches; light gray (10YR 7/2) gravelly coarse sand, variegated gray and light gray (10YR 5/1 and 7/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine, medium and coarse roots; many very fine and fine interstitial pores; 20 percent pumice and obsidian gravel; neutral (pH 7.0); abrupt smooth boundary.

2Ab – 21 to 32 inches; light brownish gray (10YR 6/2) gravelly coarse sand, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few medium, and common coarse and very coarse roots; many fine and

fine interstitial pores; 15 percent pumice, obsidian and granitic gravel; slightly acid (pH 6.5); gradual smooth boundary.

3C1 – 32 to 39 inches; pale brown (10YR 6/3) gravelly loamy sand, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; 25 percent pumice, obsidian and granitic gravel; slightly acid (pH 6.5); gradual smooth boundary.

3C2 – 39 to 60 inches; light brown (7.5YR 6/4) sand, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; 13 percent granitic and rhyolitic gravel; slightly acid (pH 6.5)

Type Location: About 210 feet east of the intersection of Forest Service roads 1S35 and 1S56; about 1,300 feet east and 660 feet south of the northwest corner of Sec. 25, T.1S., R.28E., MDBM, Cowtrack Mountain SE Quadrangle.

Range in Characteristics: Soil depth to volcanic bedrock is 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 35°F, and the mean annual summer soil temperature is about 43°F. The 10 to 40 inch textural control section is loamy sand, loamy coarse sand, sand or coarse sand, with 0 to 7 percent clay. Rock fragments are 5 to 30 percent gravel, mostly pumice, with minor amounts of obsidian and granitics, and averages 5 to 25 percent by volume.

Some pedons have loamy fine sand, sand and very coarse sand surface layers. Other pedons do not have an organic layer. A few pedons are underlain by glacial till at depths of 40 inches or greater.

The A horizon has dry color of 10YR 5/1, 5/2, 6/1, 6/2, 6/3 or 7/2; moist color is 10YR 3/1, 3/2, 4/1, 4/2, 4/3, 5/2 or 5/3. It is loamy sand, loamy coarse sand or coarse sand, with 1 to 4 percent clay. Rock fragments are 1 to 55 percent gravel by volume, mostly pumice, with minor amounts of obsidian, andesitic and granitic gravel. Reaction is strongly acid to neutral.

The C horizon has dry color of N7/0; or 10YR 5/1, 5/4, 6/2, 6/3, 7/2, 7/3, 8/2 or 8/3, or 7.5 YR 5/4 or 6/4; moist color is 10YR 3/3, 4/2, 4/3, 4/4, 5/1, 5/2, 5/3, 6/2, 6/3, 7/2 or 8/1, or 7.5YR 4/4. It is loamy fine sand, loamy sand, loamy coarse sand, sand or coarse

sand, with 0 to 7 percent clay. Rock fragments are 3 to 32 percent gravel by volume, mostly pumice, with minor amounts of obsidian and granitic gravel. Reaction is strongly acid to neutral.

VITRANDIC CRYORTHENTS

These Vitrandic Cryorthents consist of moderately deep to very deep, somewhat excessively drained soils forming in material weathering from pumice, rhyolite, granite and obsidian. These soils are on hillsides, terraces, mountainsides, mountain benches, mountain flats, and have slopes of 0 to 60 percent. Elevation is 6,800 to 9,900 feet. The mean annual precipitation is about 10 to 45 inches, and the mean annual temperature is about 38°F.

Due to restrictions in Soil Taxonomy, Vitrandic Cryorthents, map unit descriptions are subdivided into Vitrandic Cryorthents, Vitrandic Cryorthents, ashy and Vitrandic Cryorthents, pumiceous. These subdivision were made to provide the Soil Resource Inventory (SRI) user with additional site specific information.

Taxonomic Class: Vitrandic Cryorthents.

Typical Pedon: The representative profile for this soil is on a northeast-facing hillside, under lodgepole pine, at an elevation of 8,050 feet. When described (7/23/84), this soil was moist throughout. Colors are for dry soil unless otherwise noted.

Oe – 1 to 0 inch; decomposed and decomposing lodgepole pine needles, twigs and cones; abrupt wavy boundary.

A – 0 to 2 inches; grayish brown (10YR 5/2) very gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic, few very fine and fine, common medium, coarse and very coarse roots; common very fine, and many fine and medium interstitial pores; 50 percent pumice, rhyolite and obsidian gravel; strongly acid (pH 5.5); gradual wavy boundary.

C1 – 2 to 10 inches; pale brown (10YR 6/3) gravelly coarse sand, dark brown (10YR 3/3) moist; massive, soft, very friable, nonsticky and nonplastic; few fine roots; many very fine and fine interstitial pores; 25 percent pumice, rhyolite and obsidian gravel; strongly acid (pH 5.5); clear wavy boundary.

C2 – 10 to 25 inches; variegated light brownish gray and dark gray (10YR 6/2 and 10YR 4/1) very gravelly coarse sand, brown and very dark gray (10YR 5/3 and 10YR 3/1) moist; massive; soft, very friable, nonsticky and nonplastic; few medium roots; common very fine, and many fine and medium

interstitial pores; 50 percent pumice, rhyolite and quartz gravel; moderately acid (pH 6.0); clear wavy boundary.

C3 – 25 to 40 inches; pinkish gray (7.5YR 7/2) very gravelly coarse sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few medium roots; common very fine, and many fine and medium interstitial pores; 50 percent pumice, rhyolite and quartz gravel; slightly acid (pH 6.5); clear wavy boundary.

C4 – 40 to 60 inches; variegated light gray and dark gray (10YR 7/2 and 10YR 4/1) extremely gravelly coarse sand, dark grayish brown and grayish brown (10YR 4/2 and 10YR 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, and many fine and medium interstitial pores; 90 percent pumice and rhyolite gravel; slightly acid (pH 6.5).

Type Location: About 3.9 miles west on Deadman Campground Road, from its intersection with Highway 395, then 0.15 mile on the southwest fork, then 0.25 mile on the south fork, and 150 feet west of the road; about 500 feet west of the southeast corner of the northeast quarter of the southeast quarter of Section 6, T.3S., R.27E., MDBM, Devil's Postpile NE Quadrangle.

Range in Characteristics: Soil depth to soft bedrock is 29 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 37°F, and the mean summer soil temperature is about 43°F. The 10 to 40 inch textural control section is loamy sand, loamy coarse sand, fine sand, sand, coarse sand, very coarse sand or gravel, with 0 to 5 percent clay. Rock fragments are 3 to 100 percent gravel and 0 to 5 percent cobbles, and average 10 to 60 percent by volume. Gravel-size pumice rock fragments make up 66 to 100 percent of the total rock fragments. Obsidian, rhyolite, quartz or rhyolitic tuff make up the remainder of the rock fragments.

Some pedons do not have a surface organic layer. Other pedons have mineral surface horizons with sand, loamy coarse sand, loamy fine sand, or loamy sand textures.

The A horizon has dry color of 10YR 5/2, 5/3, 6/1, 6/2, 6/3 or 7/2, or 2.5Y 5/2; moist color is 10YR 2/1, 3/1, 3/2, 3/3, 4/3, 5/1 or 5/2. It is loamy sand, sand or coarse sand, with 1 to 7 percent clay. Rock fragments are 5 to 75 percent gravel by volume, and

are mostly pumice, with minor amounts of rhyolite and quartz gravel. Reaction is extremely to slightly acid.

The C horizon has dry color of N4/0, or 10YR 4/1, 5/1, 6/2, 6/3, 6/4, 7/1, 7/2, 7/3 or 8/1, or 7.5YR 4/1, 6/3, 7/2 or 8/3; moist color is 10YR 3/1, 3/2, 3/3, 4/2, 4/3, 4/4, 5/1, 5/2, 5/3, 6/1, 6/2, 7/3 or 8/1, or 7.5YR 4/3. It is loamy sand, loamy coarse sand, fine sand, sand, coarse

sand, very coarse sand or gravel, with 0 to 5 percent clay. Rock fragments are 3 to 100 percent gravel and 5 percent cobbles by volume. The gravel is mostly pumice, with minor amounts of obsidian, rhyolite or rhyolitic tuff. The cobbles are obsidian, rhyolite, quartz or rhyolitic tuff. Reaction is strongly acid to slightly alkaline.

VITRANDIC HAPLODURIDS

These Vitrandic Haplodurids consist of very shallow to moderately deep, well to somewhat excessively drained soils forming in a mixture of rhyolitic ashy alluvium and airfall ash deposits. These soils are on lake terraces and relict shoreline deposits, and have slopes of 0 to 2 percent. Elevation is 6,300 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Vitrandic Haplodurids

Typical Pedon: The representative profile for this soil is on a northwest-facing lake terrace, under black greasewood, saltgrass, shadscale and fourwing saltbush, at an elevation of 6,560 feet. Slope is 2 percent. Colors are for dry soil unless otherwise noted.

A – 0 to 4 inches; light gray (10YR 7/2 sand, light brownish gray (10YR 6/2) moist; single grain; loose, non-sticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; 5 percent fine pebbles; slightly effervescent, lime disseminated; moderately alkaline (pH 8.0); abrupt smooth boundary.

B1 – 4 to 10 inches; light yellowish brown (10 YR 6/4) gravelly coarse sand, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine and very fine interstitial pores; 25 percent fine pebbles; slightly effervescent, lime disseminated; moderately alkaline (pH 8.0); abrupt smooth boundary.

B2kqm – 10 inches; extremely hard lime-silica duripan.

Type Location: About 4,100 feet south and 750 feet west of the southeast corner of Sec. 15, T.1N., R.27E.,

MDBM, Cowtrack Mountain NW Quadrangle.

Range in Characteristics: Soil depth to duripan ranges from 1 to 40 inches. The soil is slightly to moderately alkaline. The mean annual soil temperature at 10 to 20 inches is about 50°F. The mean summer temperature is about 69°F, and the mean winter soil temperature is about 35°F. The pebbles in the soil are pumice, obsidian and mixed granitic or rhyolitic rock. The textural control section is either from 10 inches to the duripan in pedons shallower than 40 inches, or the 10 to 40 inch section in the pedon, if thicker than 40 inches. It is coarse sand, with 0 to 3 percent clay. Rock fragments are 0 to 35 percent pebbles, and average 0 to 40 percent by volume.

The A horizon has dry color of 10YR 6/1, 7/1 or 7/2; moist color is 10YR 4/1, 5/1, 5/2 or 6/2. Textures are sand, loamy sand, or gravelly coarse sand. Gravel content ranges from 5 to 30 percent. Gravel-sized tufa fragments are present in some pedons. The fine earth fraction is ashy.

The B horizon has dry color of 10YR 6/2, 6/4, 7/2, 7.5YR 7/1 or 5Y 7/3; moist color of 10YR 4/2, 4/4, 5/2, 7.5YR 5/1 or 5Y 4/3. Textures are sand, loamy sand, gravelly sand, coarse sand, or gravelly coarse sand. Stratification is usually present. Gravel content ranges from 0 to 35 percent. Gravel-sized tufa fragments are present in some pedons. The fine earth fraction is ashy. The duripan is very hard or extremely hard. Its structure is typically very coarse platy. The pan may be a result of shallow groundwater evaporation associated with spring activity, although decomposing fine ash and obsidian may play a significant role.

VITRANDIC HAPLOXEROLLS

These Vitrandic Haploxerolls consist of very deep, somewhat excessively drained soils forming in material weathering from pumice and obsidian. They are on mountainsides, mountain toeslopes and hillsides, on slopes of 0 to 30 percent. Elevation is 7,200 to 8,400 feet. The mean annual precipitation is about 10 to 15 inches, and the mean annual temperature is about 44°F.

Due to restrictions in Soil Taxonomy, Vitrandic Haploxeroll map unit descriptions are subdivided into Vitrandic Haploxerolls and Vitrandic Haploxerolls, pumiceous. This subdivision was made to provide the Soil Resource Inventory (SRI) user with additional site specific information.

Taxonomic Class: Vitrandic Haploxerolls.

Typical Pedon: The representative profile for this soil is on a west by southwest-facing foothill, under big sagebrush, antelope bitterbrush and grasses, at an elevation of 7,920 feet. Slope is 6 percent. When described (8/28/85), the soil was dry in the upper 10 inches and slightly moist below 10 inches. Colors are for dry soil unless otherwise noted.

Oe – 1/4 to 0 inch; decomposing big sagebrush and bitterbrush plant parts; abrupt smooth boundary.

A1 – 0 to 3 inches; grayish brown (10YR 5/2) gravelly coarse sand, very dark gray (10YR 3/1) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; 16 percent pumice and obsidian gravel; slightly acid (pH 6.5); clear smooth boundary.

A2 – 3 to 10 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 21 percent pumice and obsidian gravel; slightly acid (pH 6.5); gradual smooth boundary.

C1 – 10 to 22 inches; light brownish gray (10YR 6/2) gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 21 percent pumice and obsidian gravel; neutral (pH 7.0); clear smooth boundary.

C2 – 22 to 25 inches; light brownish gray (10YR 6/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 18 percent pumice and obsidian gravel; neutral (pH 7.0); abrupt wavy boundary.

2A1b – 25 to 30 inches; pinkish gray (7.5YR 6/2) gravelly loamy coarse sand, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 18 percent pumice and obsidian gravel; slightly acid (pH 6.5); gradual smooth boundary.

2A2b – 30 to 45 inches; pinkish gray (7.5YR 6/2) gravelly loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 17 percent tuff gravel; neutral (pH 7.0); gradual smooth boundary.

2C – 45 to 60 inches; pale brown (10YR 6/3) gravelly loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 23 percent tuff gravel; neutral (pH 7.0).

Type Location: About 2.1 miles north of Pilot Springs turnoff, on Highway 120, on east shoulder of road; about 100 feet east and 500 feet south of the northwest corner of the northeast quarter of the southwest quarter of Section 3, T.1S., R.28E., MDBM, Cowtrack Mountain NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 40°F, and the mean summer soil temperature is about 57°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand or coarse sand, with 0 to 6 percent clay. Rock fragments are 3 to 65 percent gravel, and are mostly pumice, with minor amounts of obsidian, tuff and andesite, and average 8 to 64 percent by volume.

Some pedons have surface mineral layers with fine sand or loamy coarse sand textures. Other pedons do not

have organic surface layers.

The surface A horizon has dry color of 10YR 4/1, 4/2, 5/2 or 5/3; moist color is 10YR 2/1, 3/1, 3/2 or 3/3. It is loamy sand, sand or coarse sand, with 1 to 6 percent clay. Rock fragments are 3 to 50 percent gravel by volume, and are mostly pumice, with minor amounts of obsidian, andesite and mixed rocks. Reaction is strongly acid to neutral.

The other A horizons have dry color of 10YR 5/2, 5/3, 6/2 or 7.5YR 6/2; moist color is 10YR 3/2, 3/3 or 4/3. They are loamy sand or loamy coarse sand, with 1 to 4 percent clay. Rock fragments are 5 to 30 percent gravel

by volume, and are mostly pumice, with minor amounts of obsidian, andesite and mixed rocks. Reaction is strongly to slightly acid.

The C horizon has dry color of 10YR 3/1, 5/2, 5/3, 5/4, 6/1, 6/2, 6/3, 6/4, 7/1, 7/2, 7/3, 7/4 or 8/1; moist color is 10YR 2/1, 3/2, 3/3, 3/4, 4/2, 4/3, 4/4, 5/1, 5/2, 5/3, 5/4 or 7/2. It is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand, coarse sand or very coarse sand, with 0 to 6 percent clay. Rock fragments are 5 to 75 percent gravel by volume, and are mostly pumice, with minor amounts of obsidian, 0 to 15 percent andesite cobbles and 0 to 5 percent andesite stones by volume. Reaction is strongly acid to neutral.

VITRANDIC TORRIORTHENTS

These Vitrandic Torriorthents consist of moderately deep to very deep, well to somewhat excessively drained soils forming in sandy beach deposits on old lake beaches, shorlines, sideslopes of alluvial fans, hillsides and canyon walls, and have slopes of 0 to 60 percent. Elevation is 5,800 to 9,300 feet. The mean annual precipitation is about 6 to 25 inches, and mean annual temperature is about 48°F.

Due to restrictions in Soil Taxonomy, Vitrandic Torriorthent map unit descriptions are subdivided into Vitrandic Torriorthents, sodic, Vitrandic Torriorthents, ashy and Vitrandic Torriorthents, gravelly. These subdivisions were made to provide the Soil Resource Inventory (SRI) user with additional site specific information.

Taxonomic Class: Vitrandic Torriorthents

Typical Pedon: The representative profile for this soil is on a northwest-facing lake terrace, under saltgrass, rubber rabbitbrush and Russian thistle, at an elevation of 6,355 feet. Slope is 1 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 8 inches; light gray (10YR 7/1) sand, light gray (10YR 6/1) moist; single grain; loose, nonsticky and nonplastic; many very fine, fine and medium roots; many very fine interstitial pores; 2 percent fine pebbles; slightly effervescent, lime disseminated; moderately alkaline (pH 8.0); abrupt smooth boundary.

A2 – 8 to 12 inches; pale yellow (5Y 7/3) sand, olive (5Y 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine, fine and medium roots; many very fine interstitial pores; slightly effervescent, lime disseminated; moderately alkaline (pH 8.0); abrupt smooth boundary.

2C1 – 12 to 27 inches; light gray and grayish brown (10YR 7/1, 2.5Y 5/2) stratified silt loam, fine sandy loam, sand and gravelly sand, gray and very dark grayish brown (10YR 5/1, 2.5Y 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; slightly effervescent, lime disseminated; moderately alkaline (pH 8.0); abrupt smooth boundary.

3C2 – 27 to 60 inches; light gray (10YR 7/1) coarse sand, light gray (10YR 6/1) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very

fine roots; many very fine interstitial pores; slightly effervescent, lime disseminated; strongly alkaline (pH 8.5).

Type Location: About 8 miles east of Lee Vining on the shore of Mono Lake, 0.25 miles northwest of dirt road; at southwest corner of the northeast quarter of the southwest quarter, Sec. 11, T.1N., R.27E., MDBM, Cowtrack Mountain NW Quadrangle.

Range in Characteristics: Soil depth to bedrock is 34 to greater than 60 inches, and the soil can be dry from mid-May to October. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 35°F. The textural control section is either from 10 inches to the lithic contact in pedons shallower than 40 inches, or the 10 to 40 inch section in pedons deeper than 40 inches. It is silty clay loam, loamy fine sand, fine sand, sand or coarse sand, with 0 to 30 percent clay. Rock fragments are 0 to 40 percent gravel, 5 to 40 percent cobbles, 0 to 15 percent stones and 0 to 5 percent boulders, and average 0 to 44 percent by volume. Pumice rock fragments are less than 2/3 of the total rock fragments by volume. They are gravel, and average 21 to 29 percent by volume. Cobbles, stones and boulders are mixed and rhyolitic rock, and average 20 to 22 percent by volume.

The A horizons have dry color of 10YR 6/1, 6/3, 7/1 or 5Y 6/2, 7/3 or 2.5Y 6/2; moist color is 10YR 3/3, 4/1, 5/1, 6/1 or 5Y 5/2, 5/3 or 2.5Y 4/2, 5/2. Textures are silty clay loam, silt loam, fine sandy loam, loamy sand, sand, coarse sand, or gravelly coarse sand, with 0 to 30 percent clay. Rock fragments are 0 to 55 percent gravel, 0 to 20 percent cobbles, 0 to 30 percent stones and 0 to 10 percent boulders by volume. Gravel is mostly pumice, with minor amounts of mixed, rhyolitic or obsidian rock. The cobbles, stones and boulders are mixed or rhyolitic rocks. A vesicular layer may be present near the soil surface. Reaction is slightly acid to very strongly alkaline. The electrical conductivity of the saturation extract ranges from 1 to 15 mmhos/cm, and exchangeable sodium percentages range from 15 to 90. Boron content is 2 to 70 ppm.

The C horizons have dry color of 10YR 6/1, 6/3, 7/1, 7/2, or 2.5Y 5/2, 6/2 or 5Y 6/1, 6/2 or N8/0; moist color is 10YR 3/3, 4/1, 4/3, 5/1, 5/3, 6/1 or 7.5YR 4/4 or 5Y 4/1, 4/2, 5/2, 6/2 or 2.5Y 3/2, 4/2, 5/2 or N8/0.

It is silty clay loam, silt loam, loam, fine sandy loam, loamy fine sand, loamy sand, fine sand or coarse sand, with 0 to 33 percent clay. The C horizon is stratified with layers of sand. Hard bedrock may occur below a depth of 20 inches on Paoha and Negit Islands. Rock fragments are 0 to 40 percent gravel, 5 to 40 percent cobbles, 0 to 15 percent stones and 0 to 5 percent boulders by volume. Gravel is mostly pumice, with minor amounts

of mixed, rhyolitic or obsidian rock. The cobbles, stones and boulders are mixed or rhyolitic rocks. Reaction is slightly acid to very strongly alkaline. Some pedons do not have carbonates. The electrical conductivity of the saturation extract ranges from 2 to 10 mmhos/cm, and the exchangeable sodium percentage ranges from 15 to 50. Boron content is 2 to 20 ppm.

VITRANDIC TORRIPSAMMENTS

These Vitrandic Torrripsamments consist of very deep, somewhat excessively drained soils forming in fan and lake terraces. These soils are on interdune areas and lake terraces, and have slopes of 2 to 30 percent. Elevation is 6,400 to 6,600 feet. The mean annual precipitation is about 6 to 10 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Vitrandic Torrripsamments

Typical Pedon: The representative profile is on a southwest-facing lake terrace, under rubber rabbitbrush, hairy horsebrush, fourwing saltbush and black grease-wood, at an elevation of 6,530 feet. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; light brownish gray (10YR 6/2) gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine, common medium and coarse roots; many very fine and fine interstitial pores; neutral (pH 6.8); clear wavy boundary.

A2 – 2 to 9 inches; light brownish gray (10YR 6/2) gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; few very fine, fine common medium and coarse roots; many very fine and fine interstitial pores; neutral (pH 7.0); clear wavy boundary.

A3 – 9 to 19 inches; light brownish gray (10YR 6/2) gravelly coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; few very fine and fine; common medium and coarse roots; many very fine and fine interstitial pores; neutral (pH 7.0); abrupt wavy boundary.

Ab – 19 to 28 inches; very pale brown (10YR 7/3) gravelly sand; brown to dark brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; neutral (pH 7.2); clear wavy boundary.

C – 28 to 60 inches; very pale brown (10YR 7/3) coarse sand, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; slightly alkaline (pH 7.8).

Type Location: In the Bodie-Coleville Soil Survey, about 1.65 miles west on west Portal road, from intersection with highway 395, .28 miles on southeast road on the north shoulder of the road.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean soil temperature is about 62°F. The difference between the mean annual summer and winter soil temperature is greater than 9°F. The 10 to 40 inch textural control section is coarse sand or sand, with 0 to 3 percent clay. Rock fragments are pumice, tuff and obsidian, and are 5 to 35 percent by volume.

The A horizon has dry color of 10YR 6/2, 6/3 or 7/2; moist is 10YR 3/2, 4/2, 4/3 or 5/2. It is gravelly coarse sand. Rock fragments are mostly gravel, and average 5 to 30 percent. The organic carbon content is 0.2 to 0.6 percent. Reaction is neutral.

The C horizon has dry color of 10YR 6/2, 6/3, 7/2 or 7/3; moist is 10YR 4/2, 4/3, 5/2 or 5/3. It is coarse sand. Rock fragments are gravel, and average 5 to 30 percent by volume. Reaction is slightly alkaline.

VITRANDIC XEROCHREPTS

These Vitrandic Xerochrepts consist of very deep, well drained soils forming in material weathering from pumice and andesite rock. These soils are on mountainsides and moraine sideslopes, and have slopes of 30 to 60 percent. Elevation is 7,500 to 8,000. The mean annual precipitation is about 12 to 30 inches, and mean annual temperature is about 44°F.

Taxonomic Class: Vitrandic Xerochrepts

Typical Pedon: The representative profile for this soil is on a south by southeast-facing mountainside, under red fir and Jeffrey pine, at an elevation of 7,680 feet. Slope is 33 percent. When described (8/14/87), the soil was dry throughout. Colors are for dry soil unless otherwise noted.

A – 0 to 1 inch; grayish brown (10YR 5/2) gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, nonsticky and nonplastic; many very fine and fine interstitial pores; 30 percent pumice gravel; slightly acid (pH 6.5); abrupt wavy boundary.

2C1 – 1 to 14 inches; variegated white and yellow (10YR 8/1 and 10YR 8/6) pumice gravel, white and brownish yellow (10YR 8/2 and 10YR 6/6) moist; single grain; loose, nonsticky and nonplastic; common fine and medium roots; few very fine and fine, and many medium interstitial pores; slightly acid (pH 6.5); abrupt wavy boundary.

3C2 – 14 to 16 inches; light gray (10YR 7/2) gravelly loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 25 percent pumice and andesite gravel; neutral (pH 7.0); abrupt wavy boundary.

4A – 16 to 32 inches; pale brown (10YR 6/3) extremely cobbly loamy sand, brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium, and common coarse roots; many very fine and fine interstitial pores; 25 percent pumice and andesite gravel and 40 percent andesite cobbles; moderately acid (pH 6.0); abrupt wavy boundary.

4Bw – 32 to 51 inches; light yellowish brown (10YR 6/4) extremely cobbly sandy loam, dark yellowish brown (10YR 3/4) moist; massive; soft, very friable,

nonsticky and nonplastic; few very fine, fine and medium, and common coarse roots; many very fine and fine interstitial pores; 25 percent pumice and andesite gravel and 40 percent andesite cobbles; moderately acid (pH 6.0); abrupt wavy boundary.

5C – 51 to 60 inches; brown (10YR 4/3) cobbly silt loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, medium and coarse roots; many very fine and fine interstitial pores; 7 percent pumice gravel and 10 percent andesite cobbles; moderately acid (pH 6.0).

Type Location: About 3.75 miles west on Highway 203, from its intersection with Highway 395, then 11.85 miles north on Reds Meadow Campground Road, on the north shoulder of the road; about 850 feet east and 825 feet north of the southwest corner of the northwest quarter of Section 2, T.4S., R.26E., MDBM, Devil's Postpile NE Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 44°F, and the mean summer soil temperature is about 61°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is fine sandy loam, sandy loam, loamy sand, coarse sand or gravel, with 0 to 6 percent clay. Rock fragments are 5 to 100 percent pumice and andesite gravel, 0 to 40 percent andesite cobbles and 25 percent andesite stones, and average 46 to 67 percent by volume. The upper part of the control section averages 100 percent pumice rock fragments by volume. The lower part averages 40 to 62 percent rock fragments by volume. Pumice makes up 50 to 63 percent of the total rock fragments in the lower part. The remainder of the rock fragments are andesite.

Some pedons have a surface organic layer.

The A horizon has dry color of 10YR 5/2; moist color is 10YR 3/2. It is coarse sand, with 1 to 2 percent clay. Rock fragments are 30 to 35 percent pumice gravel by volume. Reaction is very strongly to moderately acid.

The buried A horizons have dry color of 10YR 6/3 or 7/1; moist color is 10YR 4/3 or 6/2. They are fine sandy loam or loam, with 2 percent clay. Rock fragments are 5 to 25 percent pumice and andesite gravel and 0 to 40

percent andesite cobbles by volume. Reaction is strongly to moderately acid.

The B horizon has dry color of 10YR 6/1, 6/3 or 6/4; moist color is 10YR 3/4, 4/1, 4/3 or 4/4. It is fine sandy loam or sandy loam, with 3 to 6 percent clay. Rock fragments are 5 to 55 percent pumice and andesite gravel, 0 to 40 percent andesite cobbles and 0 to 20 percent andesite stones by volume. Reaction is

moderately acid.

The C horizon has dry color of 10YR 4/3, 7/2, 8/1 or 8/6; moist color is 10YR 4/3, 6/6 or 8/2, or 2.5Y 4/2. It is silt loam, loamy sand or gravel, with 0 to 5 percent clay. Rock fragments are 7 to 100 percent pumice and andesite gravel and 0 to 10 percent andesite cobbles by volume. Reaction is moderately acid to neutral.

VITRANDIC XEROFLUVENTS

These Vitrandic Xerofluvents consist of very deep, somewhat excessively drained soils forming in pumice and ash. These soils are in mountain basins and depressions, and have slopes of 0 to 15 percent. Elevation is 6,800 to 7,200 feet. The mean annual precipitation is about 8 to 12 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Vitrandic Xerofluvents

Typical Pedon: The representative profile for this soil is on an southeast-facing mountain basin, under big sagebrush, rabbitbrush, silver sagebrush, California rose and California styrax, at an elevation of 7,280 feet. Slope is 1 percent. Colors are for dry soil unless otherwise noted.

Oi – 1 to 0 inch; decomposed and decomposing big sagebrush, rabbitbrush and silver sagebrush leaves and twigs; abrupt smooth boundary.

A – 0 to 2 inches; dark gray (10YR 4/1) gravelly sandy loam, black (N2/0) moist; single grain; loose, very friable, nonsticky and nonplastic; few very fine roots; many very fine and common fine interstitial pores; 20 percent gravel; neutral (pH 7.0); clear smooth boundary.

2A – 2 to 12 inches; dark gray (10YR 4/1) gravelly sandy loam, black (10YR 2/1) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; many very fine and common fine interstitial pores; 27 percent gravel; slightly acid (pH 6.5); clear smooth boundary.

3A – 12 to 39 inches; gray (10YR 6/1) gravelly coarse sand, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine, medium and coarse roots; common very fine and few fine interstitial pores; 20 percent gravel; slightly alkaline (pH 7.5); abrupt smooth boundary.

4A – 39 to 41 inches; gray (10YR 6/1) gravelly loamy sand, very dark gray (10YR 3/1) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine interstitial pores; 2

percent gravel; slightly alkaline (pH 7.5); abrupt way boundary.

5A – 41 to 46 inches; gray (10YR 5/1) sandy loam, black (N2/0) moist; massive; slightly hard, friable, nonsticky and nonplastic; few medium and coarse roots; common very fine and fine interstitial pores; 2 percent gravel; moderately alkaline (pH 8.0); abrupt smooth boundary.

6A – 46 to 60 inches; gray (10YR 6/1) gravelly sand; dark grayish brown (10YR 4/2) moist; slightly hard, very friable, nonsticky and nonplastic; few medium roots; few very fine and fine interstitial pores; 15 percent gravel; moderately alkaline (pH 8.0).

Type Location: About 2 miles east on Arcularius Ranch Road, from its intersection with Highway 395, just north of Rest Area, then 2.2 miles north on Forest Service Road 2S04, then 1.75 miles on east fork, then 1.15 miles north on Forest Service Road 1S47, and 50 feet west of road.

Range in Characteristics: Soil depth is 40 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The 10 to 40 inch textural control section is coarse sand, sand, loamy sand or sandy loam, with 0 to 12 percent clay. Rock fragments are 2 to 30 percent gravel. Volcanic ash is very prominent throughout the profile and gravel is primarily pumice.

Some pedons lack thin surface organic layers. Other pedons have C horizons.

The A horizons have dry color of 10YR 3/1, 4/1, 5/1 or 6/1; moist color is 10YR 2/1, 3/1, 3/2, 4/2 or N2/. It is coarse sand, sand, loamy sand or sandy loam, with 0 to 12 percent clay. Rock fragments are 2 to 30 percent gravel. Reaction is slightly acid to slightly alkaline.

The C horizons (if present) have dry color of 10YR 6/1 or 5/1; moist color is 10YR 3/1, 4/1 or 5/1. It is sand, loamy sand or sandy loam, with 0 to 7 percent clay. Rock fragments are 2 to 20 percent gravel. Reaction is neutral to moderately alkaline.

VITRANDIC XERORTHENTS

These Vitrandic Xerorthents soils consist of very deep, somewhat excessively drained soils forming in pumice, obsidian and rhyolitic rock. These soils are on mountainsides, mountain flats and mountain basins, benches and hillsides, and have slopes of 0 to 70 percent. Elevation is 6,500 to 11,200 feet. The mean annual precipitation is about 10 to 45 inches, and the mean annual temperature is about 40°F.

Due to restrictions in Soil Taxonomy, Vitrandic Xerorthents map unit descriptions are subdivided into Vitrandic Xerorthents, Vitrandic Xerorthents, ashy, Vitrandic Xerorthents, ashy, warm, Vitrandic Xerorthents, pumiceous and Vitrandic Xerorthents, pumiceous, warm. These subdivisions were made to provide the Soil Resource Inventory (SRI) user with additional site specific information.

Taxonomic Class: Vitrandic Xerorthents.

Typical Pedon: The representative profile for this soil is on a north-facing mountain flat, under Jeffrey pine and lodgepole pine, at an elevation of 7,600 feet. Slope is 2 percent. When described (8/9/84), the soil was dry in the upper 2 inches, and very slightly moist in the rest of the profile. Colors are for dry soil unless otherwise noted.

Oe – 3 to 0 inches; decomposing Jeffrey pine and lodgepole pine needles, twigs and cones; abrupt smooth boundary.

A1 – 0 to 2 inches; grayish brown (10YR 5/2) loamy coarse sand, very dark grayish brown (10YR 3/2) moist; weak medium platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine interstitial pores; 13 percent pumice and rhyolitic gravel; very strongly acid (pH 5.0); clear wavy boundary.

A2 – 2 to 10 inches; light brownish gray (10YR 6/2) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine, medium and coarse roots; many very fine and fine interstitial pores; 23 percent pumice and rhyolitic gravel; strongly acid (pH 5.2); clear wavy boundary.

2C1 – 10 to 14 inches; very pale brown (10YR 7/3) gravelly loamy coarse sand, brown (10YR 4/3) moist; weak thin and medium platy structure; soft, very

friable, nonsticky and nonplastic; few fine, medium and coarse roots; many very fine and fine interstitial pores; 25 percent pumice and rhyolitic gravel; strongly acid (pH 5.3); abrupt wavy boundary.

2C2 – 14 to 19 inches; variegated white and gray (10YR 8/1 and 10YR 5/1) extremely gravelly coarse sand, white and dark gray (2.5Y 8/2 and 10YR 4/1) moist; single grain; loose; nonsticky and nonplastic; few fine and medium roots; many fine, medium and coarse interstitial pores; 93 percent pumice and rhyolitic gravel; strongly acid (pH 5.2); abrupt wavy boundary.

3C3 – 19 to 22 inches; very pale brown (10YR 7/3) very gravelly coarse sand, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; many fine and medium pores; 60 percent pumice and rhyolitic gravel; strongly acid (pH 5.2); abrupt wavy boundary.

3C4 – 22 to 32 inches; variegated white and gray (10YR 8/1 and 10YR 5/1) extremely gravelly coarse sand, white and dark gray (2.5Y 8/2 and 10YR 4/1) moist; single grain; loose, nonsticky and nonplastic; few fine and medium roots; many fine, medium and coarse interstitial pores; 90 percent pumice and rhyolitic gravel; strongly acid (pH 5.2); abrupt smooth boundary.

4C5 – 32 to 33 inches; white (N8/0) loamy sand, light gray (10YR 7/1) moist; moderate medium platy structure; soft, very friable, nonsticky and nonplastic; few very fine and fine tubular pores; 6 percent pumice gravel; strongly acid (pH 5.2); abrupt smooth boundary.

4C6 – 33 to 60 inches; light brownish gray (10YR 6/2) loamy sand, very dark gray (10YR 3/1) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and medium pores; 12 percent pumice gravel; strongly acid (pH 5.3).

Type Location: About 1.5 miles west on Deadman Camp Road, from its intersection with Highway 395, and 110 feet east of road; about 300 feet east and 650 feet north of the southeast corner of the southeast quarter of the northeast quarter of Section 33, T.2S., R.27E., MDBM, Mt. Morrison NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 38°F, and the mean summer soil temperature is about 55°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The 10 to 40 inch textural control section is loamy fine sand, fine sand, sand, loamy sand, loamy coarse sand, coarse sand or gravel, with 0 to 14 percent clay. Rock fragments are 0 to 100 percent gravel and 0 to 5 percent rhyolitic cobbles, and average 12 to 83 percent by volume. The upper part of the textural control section is 100 percent pumice gravel by volume. The lower part is 80 to 100 percent of the total rock fragments by volume. The remainder of the rock fragments are rhyolitic and obsidian.

Some pedons have surface horizons with fine sand or sand textures. Other pedons do not have a surface organic layer. In additions some pedons may have E horizons or buried A horizons.

The surface A horizon has dry color of 10YR 5/1, 5/2, 5/3, 6/1, 6/2, 6/3, 6/4 or 7.5YR 4/2, 4/6, 7/2 or 5YR 5/3; moist color is 10YR 2/1, 3/1, 3/2, 4/2, 4/4 or 7.5YR 3/2, 7/2 or 5YR 3/4 or 5Y 2.5/1 or 3/2. It is loamy sand, loamy coarse sand, fine sand, sand or coarse sand, with 0 to 5 percent clay. Rock fragments are 6 to 85 percent gravel by volume, and are mostly pumice, with minor

amounts of rhyolite. Reaction is very strongly acid to neutral.

The other A horizons have dry color of 10YR 5/2, 5/3, 6/1, 6/2, 6/4 or 5YR 5/3; moist color is 10YR 3/1, 3/2, 4/1, 4/2, 4/4, 5/2 or 5YR 3/4 or 5Y 3/2 or 3/3. It is loamy fine sand, loamy sand, loamy coarse sand, coarse sand or sand, 1 to 3 percent clay. Rock fragments are 5 to 75 percent gravel by volume, and are mostly pumice, with minor amounts of rhyolite and obsidian. Reaction is strongly acid to neutral.

The E horizon has dry color of 10YR 6/3; moist color is 10YR 3/3. It is loamy sand, with 1 to 2 percent clay. Rock fragments are 6 to 16 percent pumice gravel by volume. Reaction is moderately acid.

The C horizon has dry color of N8/0, or 10YR 4/1, 5/1, 5/2, 5/3, 6/1, 6/2, 6/3, 7/1, 7/2, 7/3, 8/1, 8/2, 8/3, 8/4 or 5Y 7/1 or 2.5Y 8/2, 8/3 or 8/4; moist color is 10YR 3/1, 3/2, 3/3, 4/1, 4/2, 4/3, 4/4, 5/1, 5/2, 5/3, 5/4, 6/2, 6/3, 6/4, 7/1 or 7/2 or 2.5Y 7/2, 7/3, 7/4, or 8/2. It is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand, coarse sand or gravel, with 0 to 14 percent clay. Rock fragments are 0 to 100 percent gravel and 0 to 5 percent cobbles by volume, and are mostly pumice, with minor amounts of rhyolite and obsidian. Reaction is strongly acid to slightly alkaline.

VITRANDIC XEROPSAMMENTS

These Vitrandic Xeropsamments consist of moderately deep to very deep, somewhat excessively drained soils forming in material weathering from pumice and rhyolitic rock. These soils are on mountainsides, mountain flats and basins, mountain bottomlands, hillsides and glacial outwash plains, and have slopes of 0 to 70 percent. Elevation is 6,500 to 11,200 feet. The mean annual precipitation is about 8 to 35 inches, and the mean annual temperature is about 41°F.

Due to restrictions in Soil Taxonomy, Vitrandic Xeropsamment map unit descriptions are subdivided into Vitrandic Xeropsamments and Vitrandic Xeropsamments, warm. This subdivision was made to provide the Soil Resource Inventory (SRI) user with additional site specific information.

Taxonomic Class: Vitrandic Xeropsamments.

Typical Pedon: The representative profile for this soil is on a north-facing mountainside, under red fir and Jeffrey pine, at an elevation of 8,000 feet. Slope is 36 percent. When described (8/25/83), the soil was moist throughout. Colors are for dry soil unless otherwise noted.

Oi - 2 to 0 inch; decomposing red fir and Jeffrey pine needles and twigs; abrupt wavy boundary.

A1 - 0 to 3 inches; pale brown (10YR 6/3) loamy coarse sand, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 6 percent pumice gravel; moderately acid (pH 5.6); gradual wavy boundary.

A2 - 3 to 7 inches; pale brown (10YR 6/3) loamy coarse sand, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 8 percent pumice gravel; strongly acid (pH 5.3); clear wavy boundary.

C1 - 7 to 13 inches; very pale brown (10YR 7/3) loamy sand, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 6 percent pumice gravel; very strongly acid (pH 4.9); gradual wavy boundary.

2C2 - 13 to 34 inches; light gray (10YR 7/2) loamy coarse sand, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few fine, medium, coarse and very coarse roots; many very fine and fine interstitial pores; 8 percent pumice gravel; very strongly acid (pH 4.9); clear wavy boundary.

3C3 - 34 to 60 inches; light gray (10YR 7/1) loamy sand, grayish brown (10YR 5/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few medium, coarse, and very coarse roots; many very fine and fine interstitial pores; 8 percent pumice gravel; extremely acid (pH 4.3).

Type Location: About 2.4 miles northwest on Forest Service Road 3S25, from its intersection with Highway 203, then 1.0 mile north on Forest Service Road 3S36, then 0.55 mile west on Forest Service Road 3S35, then 0.1 mile south on Forest Service Road 3S48, on the upslope shoulder of the road; about 800 feet west of the northeast corner of the southeast quarter of Section 23, T.3S., R.27E., Mt. Morrison NW Quadrangle.

Range in Characteristics: Soil depth to the bedrock is 38 to greater than 60 inches. The mean annual soil temperature at 20 inches is about 43°F, and the mean summer soil temperature is about 58°F. The difference between the mean summer and mean winter soil temperatures is greater than 9°F. The soil moisture control section is 12 to 35 inches. It is usually dry from early June to mid-October, and is usually moist the rest of the year. The textural control section is from 10 inches to the lithic contact in pedons shallower than 40 inches, and is the 10 to 40 inch section in pedons deeper than 40 inches. It is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand or coarse sand, with 1 to 7 percent clay. Rock fragments are 5 to 33 percent pumice, obsidian and rhyolite gravel, dominated by pumice, and 0 to 5 percent obsidian and rhyolite cobbles, and average 5 to 30 percent by volume.

Some pedons have surface layers with coarse sand, sand, fine sand or sandy loam textures. Some pedons have surface layers up to 3 inches thick. Other pedons have buried B horizons at depths greater than 40 inches. Other pedons do not have a surface organic layer.

The A horizon has dry color of 10YR 4/1, 5/1, 5/2, 6/1, 6/2, 6/3 or 7/2; moist color is 10YR 2/1, 3/2, 3/3, 4/1, 4/2, 4/3, 5/2 or 5/3. It is loamy fine sand, loamy sand,

loamy coarse sand, sand or coarse sand, with 1 to 6 percent clay. Rock fragments are 0 to 60 percent gravel by volume. The gravel is dominated by pumice, with small amounts of obsidian and mixed gravel. Reaction is very strongly acid to neutral.

The C horizon has dry color of 10YR 5/1, 5/2, 6/2, 6/3, 6/4, 7/1, 7/2, 7/3, 8/2, or 7.5YR 7/2, 8/4, or

N8/0, N2/0; moist color is 10YR 3/2, 3/3, 4/2, 4/3, 4/4, 5/1, 5/2, 5/3, 6/3, 7/2 or 7.5YR 4/4, 5/4, or 2.5Y 5/2, or 5Y 5/6 or N2/0. It is loamy fine sand, loamy sand, loamy coarse sand, fine sand, sand or coarse sand, with 1 to 5 percent clay. Rock fragments are 5 to 50 percent pumice, obsidian and rhyolite gravel and cobbles by volume. Reaction is extremely acid to neutral.

WATERMAN FAMILY

The Waterman family consists of shallow, well to somewhat excessively drained soils forming in material weathered from granitic till, adamellite or basalt. These soils are on foothills and moraines, and have slopes of 15 to 60 percent. Elevation is 4,400 to 8,600 feet. The mean annual precipitation is about 4 to 17 inches, and the mean annual temperature is about 51°F.

Taxonomic Class: Sandy-skeletal, mixed, mesic Lithic Xerorthents

Typical Pedon: The representative profile for this soil is a east-facing hillside, under big sagebrush and bitterbrush, at an elevation of 6,480 feet. Colors are for dry soil unless otherwise noted.

A – 0 to 3 inches; brown (10YR 5/3) extremely bouldery loamy sand, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine, fine and medium interstitial pores; 60 percent gravel, 10 percent stones and 25 percent boulders; neutral (pH 6.6); clear smooth boundary.

C1 – 3 to 6 inches; pale brown (10YR 6/3) extremely bouldery loamy sand, dark brown (10YR 4/3) moist; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine roots; many very fine, fine and medium tubular pores; 35 percent gravel, 10 percent stones and 30 percent boulders; neutral (pH 6.6); clear wavy boundary.

C2 – 6 to 12 inches; pale brown (10YR 6/3) extremely

bouldery sand, dark brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine, fine and medium tubular pores; 40 percent gravel, 10 percent cobbles and 30 percent boulders; neutral (pH 6.6); clear wavy boundary.

R – 12 inches; hard adamellite bedrock

Type Location: About 300 feet west of the northeast corner of the northeast quarter of the southwest quarter of Section 21, T.7S., R.31E., MDBM, Mt. Tom SE Quadrangle.

Range in Characteristics: Soil depth is 7 to 20 inches to lithic contact. The mean annual soil temperature at 10 inches is 55°F. The mean summer temperature is about 69°F, and the mean winter temperature is about 35°F. The textural control section is the 10 inch section to lithic contact portion, and is loamy sand, loamy coarse

The A horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 4/2, 3/3 or 3/2. It is loamy sand, with 0 to 7 percent clay. Rock fragments are 15 to 60 percent gravel, 0 to 15 percent cobbles, 0 to 15 percent stones and 0 to 40 percent boulders, and average 40 to 80 percent by volume. Reaction is neutral.

The C horizons have dry color of 10YR 5/3, 5/4 or 6/3; moist color is 10YR 5/3, 4/3, 4/2 or 3/3. It is loamy sand, coarse loamy sand, sand or coarse sand, with 0 to 4 percent clay. Rock fragments are 0 to 45 percent gravel, 0 to 20 percent cobbles, 0 to 15 percent stones and 0 to 30 percent boulders, and average 40 to 75 percent by volume. Reaction is neutral.

WATTERSON FAMILY

The Watterson family consists of very deep, well drained soils forming in mixed alluvium and volcanic ash. These soils are on alluvial fans and lake terraces, and have slopes of 5 to 15 percent. Elevation is 5,700 to 7,600 feet. The mean annual precipitation is about 6 to 15 inches, and the mean annual temperature is about 48°F.

Taxonomic Class: Loamy-skeletal, mixed, mesic Pachic Haploxerolls

Typical Pedon: The representative profile for this soil is on east-facing lake terrace, under big sagebrush, antelope bitterbrush, Indian ricegrass and western needlegrass, at an elevation of 6,900 feet. Slope is 1 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 8 inches; pale brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, and few fine and medium roots; common very fine interstitial pores; 3 percent gravel; slightly acid (pH 6.1); clear wavy boundary.

A2 – 8 to 35 inches; pale brown (10YR 5/3) very gravelly sandy loam, brown (10YR 3/3) moist; weak fine angular blocky structure; hard, very friable, nonsticky and nonplastic; few fine and medium roots; common very fine interstitial pores; 35 percent gravel and 15 percent cobbles; slightly acid (pH 6.1); abrupt smooth boundary.

2C – 35 to 60 inches; light yellowish brown (2.5Y 6/4) sand, dark yellowish brown (10YR 4/4) moist; single grain, loose, nonsticky and nonplastic; few very fine roots; many fine interstitial pores; 2 percent

gravel; neutral (pH 7.0).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 2 miles west of Crowley Lake, California and 4 miles east-by-northeast of the Mammoth Airport, and 20 feet northwest of the dirt road; about 250 feet east and 200 feet north of the southwest corner of Section 33, T.3S., R.29E., MDBM, Mount Morrison Quadrangle.

Range in Characteristics: Soil depth is 60 inches or greater. The A horizon is 25 to 40 inches thick. The mean annual soil temperature at 20 inches is about 50°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The 10 to 40 inch textural control section is very gravelly sandy loam or sand, with 8 to 15 percent clay. Rock fragments are mainly gravel and cobbles, and average 35 to 60 percent by volume.

The A horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/2 or 3/3. It is sandy loam, gravelly sandy loam and very gravelly sandy loam. Rock fragments are 2 to 15 percent in the upper part and 35 to 60 percent in lower part, and are mostly gravel, with lesser amounts of cobbles. Structure is weak subangular or angular blocky, or it is single grain or massive. The organic carbon content is 0.6 to 1.0 percent.

The C horizon has dry color of 10YR 5/3 or 6/3, or 2.5Y 6/4; moist color is 10YR 4/3 or 4/4, or 2.5Y 4/4. It is very gravelly sandy loam or sand. Strata of loamy sand or gravelly sandy loam are present in some areas. Rock fragments are 20 to 60 percent gravel and 5 to 20 percent cobbles, and average 35 to 60 percent by volume. Structure is weak subangular blocky, or the horizon is massive or single grain.

WHITEWOLF FAMILY

The Whitewolf family consists of moderately deep to deep, somewhat excessively drained soils, forming in residuum and colluvium from granitic rocks. These soils are on lower hillsides, and have slopes of 5 to 60 percent. Elevation is 4,000 to 6,800 feet. The mean annual precipitation is about 4 to 8 inches, and the mean annual temperature is about 55°F.

Taxonomic Class: Mixed, thermic Xeric Torripsamments

Typical Pedon: The representative profile for this soil is on a east-facing sideslope, under blackbrush, Nevada ephedra, California buckwheat and desert needlegrass, at an elevation of 4,700 feet. Slope is 30 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; light brownish gray (10YR 6/2) coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; many very fine interstitial pores; 5 percent gravel; neutral (pH 6.8); abrupt smooth boundary.

A2 – 2 to 18 inches; light brownish gray (10YR 6/2) loamy coarse sand; dark grayish brown (10YR 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; many very fine interstitial pores; 5 percent gravel; neutral (pH 7.3); gradual wavy boundary.

C – 18 to 43 inches; brown (10YR 5/3) loamy coarse sand, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and few fine and medium roots; many very fine interstitial pores; 5 percent gravel and 5

percent cobbles; slightly alkaline (pH 7.7); abrupt irregular boundary.

R – 43 inches; hard granodiorite bedrock.

Type Location: In the Benton-Owens Valley Soil Survey area, about 5 miles west of Bishop, northwest of the southwest corner of the northeast corner of Section 7, T7S, R36E., MDBM, Bishop, Quadrangle.

Range in Characteristics: Depth to hard bedrock is 20 to 60 inches. The mean annual soil temperature at 20 inches is about 60°F, and the mean summer and mean winter soil temperatures differ by more than 9°F. The textural control section is 10 to 40 inches or paralithic or lithic contact, with a loamy coarse sand, and 0 to 3 percent clay. Rock fragments are 0 to 10 percent gravel and 0 to 5 percent cobbles. Base saturation is 90 to 100 percent.

Some pedons have a paralithic horizon above the lithic contact.

The A horizon has dry color of 10YR 6/2 or 6/3; moist color is 10YR 4/2 or 4/3. It is coarse sand or loamy coarse sand, with 5 to 15 percent gravel. The organic carbon content is 0.2 to 0.4 percent. Reaction is neutral.

The C horizon has dry color of 10YR 5/3 or 6/3; moist color is 10YR 4/3 or 4/4. It is loamy coarse sand, with 0 to 3 percent clay. Rock fragments are 5 to 10 percent gravel, 0 to 5 percent cobbles and 0 to 3 percent stones, and average 5 to 15 percent by volume. Reaction is slightly alkaline.

WRANGO FAMILY

The Wrango family consists of very deep, somewhat excessively drained soils forming in material weathering from granitic and mixed rocks. These soils are on mountainsides, hillsides, canyon slopes, bench terraces, outwash plains, foothills, alluvial fans, moraines and glacial bottom lands, and have slopes of 0 to 90 percent. Elevation is 4,000 to 12,300 feet. The mean annual precipitation is about 4 to 30 inches, and the mean annual temperature is about 45°F.

Taxonomic Class: Sandy-skeletal, mixed, mesic Xeric Torriorthents.

Typical Pedon: The representative profile for this soil is on an east-facing moraine, under big sagebrush, antelope bitterbrush and grasses, at an elevation of 7,200 feet. Slope is 10 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 4 inches; grayish brown (10YR 5/2) loamy coarse sand, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine and medium roots; many very fine and fine interstitial pores; 10 percent gravel; neutral (pH 6.8); clear wavy boundary.

A2 – 4 to 10 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; many very fine, fine, and medium roots; many very fine and fine interstitial pores; 10 percent gravel and 5 percent cobbles; neutral (pH 6.8); clear wavy boundary.

A3 – 10 to 15 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; many very fine, fine and medium roots; many very fine and fine interstitial pores; 10 percent gravel and 5 percent cobbles; neutral (pH 6.8); abrupt wavy boundary.

C1 – 15 to 28 inches; yellowish brown (10YR 5/4) very gravelly coarse sand, brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; many fine, medium and coarse roots; many very fine and fine interstitial pores; 30 percent gravel and 10 percent cobbles; neutral (pH 6.8); abrupt wavy boundary.

C2 – 28 to 60 inches; light brown (7.5YR 6/4) very cobbly coarse sand, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few medium and coarse roots; many fine interstitial pores; 30 percent gravel and 30 percent cobbles; neutral (pH 6.8).

Type Location: About 1320 feet west and 330 feet south of the northeast corner of the southeast quarter of Section 5, T.1S., R.26E., MDBM, Mono Craters NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 50°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The soil moisture control section is 13 to 60 inches. It is usually dry from mid-April to late November, and is usually moist in some parts the rest of the year. The 10 to 40 inch textural control section is sandy loam, loamy sand, loamy coarse sand, sand, and coarse sand, with 1 to 10 percent clay. Rock fragments are 5 to 45 percent gravel, 0 to 45 percent cobbles, 0 to 40 percent stones, and 0 to 40 percent boulders, and average 38 to 83 percent by volume.

Some pedons are 20 to 40 inches deep to lithic or paralithic contact.

The A horizon has dry color of 10YR 4/3, 5/2, 5/3, 5/4, 6/2 or 6/3; moist color is 10YR 3/2, 3/3, 4/2, 4/3, or 4/4. It is loamy sand, loamy coarse sand or coarse sand, with 1 to 4 percent clay. Rock fragments are 0 to 55 percent gravel, 0 to 15 percent cobbles, 0 to 25 percent stones, and 0 to 15 percent boulders by volume. Reaction is moderately acid to neutral.

The C horizon has dry color of 10YR 5/4, 6/3, 6/4, 7/3 or 7/4, or 7.5YR 6/4, or 5YR 5/3; moist color is 10YR 3/3, 4/3, 4/4, 5/3 or 5/4, or 7.5YR 4/4, or 5YR 3/3. It is sandy loam, loamy sand, loamy coarse sand, sand, or coarse sand, with 1 to 10 percent clay. Rock fragments are 5 to 45 percent gravel, 0 to 45 percent cobbles, 0 to 40 percent stones, and 0 to 40 percent boulders by volume. Reaction is slightly acid to neutral.

XERIC TORRIORTHENTS

These Xeric Torriorthents consist of shallow, somewhat excessively drained soils forming in material weathering from granitic rocks. These soils are on mountainsides, and have slopes of 30 to 60 percent. Elevation is 4,100 to 8,000 feet. The mean annual precipitation is about 4 to 15 inches, and the mean annual temperature is about 49 °F.

Taxonomic Class: Xeric Torriorthents.

Typical Pedon: The representative profile for this soil is on an east-facing mountainside, under blackbrush, buckwheat, spiny horsebrush, Mormon tea and needlegrass, at an elevation of 4,880 feet. Colors are for dry soil unless otherwise noted.

A1 - 0 to 2 inches; pale brown (10YR 6/3) very gravelly loamy coarse sand, brown (10YR 4/3) moist; weak fine subangular blocky structure, parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 30 percent gravel and 5 percent cobbles; neutral (pH 7.2); clear smooth boundary.

A2 - 2 to 10 inches; yellowish brown (10YR 5/4) very gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores; 40 percent gravel and 15 percent cobbles; neutral (pH 7.2); abrupt wavy boundary.

Cr - 10 inches; weathering granitic bedrock, which can be cut with a tilespade.

Type Location: About 660 feet west and 330 feet north of the southwest corner of the northeast quarter of the southeast quarter of Section 10, T.17S., R.36E., MDBM, Olancha NE Quadrangle.

Range in Characteristics: Soil depth to soft bedrock is 9 to 12 inches. The mean annual soil temperature at the paralithic contact is about 53 °F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The textural control section is the whole soil. It is loamy fine sand, loamy sand or loamy coarse sand, with 2 to 6 percent clay. Rock fragments are 10 to 40 percent gravel, 0 to 20 percent cobbles, 0 to 10 percent stones and 0 to 35 percent boulders, and average 37 to 60 percent by volume.

Some pedons have surface horizons with loamy fine sand textures.

The surface A horizon has dry color of 10YR 6/3; moist color is 10YR 4/2 or 4/3. It is loamy sand or loamy coarse sand, with 2 to 4 percent clay. Rock fragments are 20 to 30 percent gravel, 0 to 5 percent cobbles, 0 to 10 percent stones and 0 to 35 percent boulders by volume. Reaction is neutral.

The other A horizons have dry color of 10YR 5/4 or 6/3; moist color is 10YR 4/3 or 4/4. They are loamy fine sand, loamy sand or loamy coarse sand, with 2 to 6 percent clay. Rock fragments are 10 to 40 percent gravel, 0 to 15 percent cobbles, 0 to 10 percent stones and 0 to 35 percent boulders by volume. Reaction is neutral.

XEROFLUVENTS

These Xerofluvents consist of very deep, poorly to very poorly drained soils forming in mixed alluvium. These soils are on floodplains, stream channels and stream terraces, and have slopes of 0 to 5 percent. Elevation is 6,000 to 8,400 feet. The mean annual precipitation is about 6 to 15 inches, and the mean annual temperature is about 45 to 55°F.

Taxonomic Class: Xerofluvents

Typical Pedon: The representative profile for this soil is on a east-facing terrace in a flood plain in Bishop creek, under water birch, red willows, sedges and beardless wildrye, at an elevation of 7,500 feet. Slope is 5 percent. Colors are for dry soil unless otherwise noted.

A1 – 0 to 6 inches; dark gray (10YR 4/1) sandy loam, black (10YR 2/1) moist; moderate fine granular structure; soft, friable, nonsticky and nonplastic; many very fine and fine roots; common very fine and fine tubular and interstitial pores; 10 percent gravel; neutral (pH 7.0); clear smooth boundary.

A2 – 6 to 11 inches; light brownish gray (10YR 6/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; massive; nonsticky and nonplastic; common very fine and fine roots; common very fine and fine tubular and interstitial pores; 15 percent gravel and 2 percent cobbles; neutral (pH 7.2); abrupt smooth boundary.

A3 – 11 to 18 inches; pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 3/3) moist; common prominent (10YR 6/4) iron accumulations lining pores and surrounding roots; massive; nonsticky and nonplastic; common very fine and fine, and few coarse roots; common very fine and fine tubular pores; 15 percent gravel and 2 percent cobbles; slightly alkaline (pH 7.4); abrupt smooth boundary.

C1 – 18 to 32 inches; light gray (5Y 6/1) very gravelly

loam, dark gray (5Y 4/1) moist; common prominent (10YR 6/4) iron accumulations lining pores and surrounding roots; massive; slightly hard, firm, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular pores; 40 percent gravel, 5 percent cobbles and 5 percent stones; neutral (pH 7.2); abrupt smooth boundary.

Cg2 – 32 to 60 inches; greenish gray (5GY 6/1) stratified very gravelly sand and very cobbly sandy clay loam, dark greenish gray (5GY 4/1) moist; loose, very friable, nonsticky and nonplastic; 40 to 50 percent gravel, 5 to 15 percent cobbles and 0 to 10 percent stones; neutral (pH 7.2).

Type Location: In the Benton-Owens Valley Soil Survey Area, about 2,500 feet east and 1,100 feet south of the northwest corner of Section 10, T.7S., R.32E., MDBM, Bishop Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. Depth to the high water table is 12 to 24 inches. Due to the highly variable nature of this soil, it is not necessarily representative of these soils throughout the survey area.

The A horizon has dry color of 10YR 3/1, 4/1, 5/2 or 6/2; moist color is 10YR 2/1, 2/2, 3/2, 4/2 or 4/3. Textures are sandy loam and loam, with 6 to 18 percent clay. Rock fragments are 0 to 15 percent gravel and 0 to 5 percent cobbles, and average 0 to 15 percent by volume.

The C horizon has dry color of 5Y 6/1, or 5GY 6/1, or 10YR 5/1, 6/1, 6/2 or 6/3; moist color is 5Y 4/1, or 5GY 4/1, or 10YR 3/2, 3/3, 4/2 or 5/3. Textures range are sand, loamy sand, sandy loam and sandy clay loam, with 2 to 27 percent clay. Rock fragments are 0 to 50 percent gravel, 0 to 20 percent cobbles and 0 to 5 percent stones, and average 15 to 60 percent by volume.

YELLOWHILLS FAMILY

The Yellowhills family consists of very deep, somewhat excessively drained soils forming in material weathering from pumice, basalt and mixed rocks. These soils are in valley fills, alluvial fans and upland depressions, and have slopes of 2 to 15 percent. Elevation is 6,000 to 8,400 feet. The mean annual precipitation is about 8 to 15 inches, and the mean annual temperature is about 49°F.

Taxonomic Class: Ashy, mesic Vitritorrandic Haploxerolls

Typical Pedon: The representative profile for this soil is in a valley fill, under desert bitterbrush, big sagebrush and grasses, at an elevation of 7,120 feet. When described (8/7/87), the soil was dry in the upper 15 inches, and slightly moist in the 15 to 60 inch section. Colors are for dry soil unless otherwise noted.

A1 – 0 to 2 inches; grayish brown (10YR 5/2) gravelly coarse sand, very dark gray (10YR 3/1) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine and fine interstitial pores; 20 percent pumice and basalt gravel; moderately acid (pH 6.0); clear smooth boundary.

A2 – 2 to 5 inches; grayish brown (10YR 5/2) gravelly sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 25 percent pumice and basalt gravel; moderately acid (pH 6.0); clear wavy boundary.

C1 – 5 to 15 inches; brown (10YR 5/3) gravelly loamy sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine interstitial pores; 15 percent pumice and basalt

gravel; slightly acid (pH 6.5); clear wavy boundary.

C2 – 15 to 60 inches; yellowish brown (10YR 5/4) loamy sand, dark brown (10YR 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine and medium roots; many very fine and fine interstitial pores; 10 percent pumice and basalt gravel; neutral (pH 7.0).

Type Location: About 5.2 miles east on the Arcularius Ranch Road, from its intersection with Highway 395, then 0.2 mile north on trail, and 30 feet east of the trail; about 660 feet north of the southeast corner of the northeast quarter of Section 28, T.2S., R.28E., MDBM, Mt. Morrison NW Quadrangle.

Range in Characteristics: Soil depth is greater than 60 inches. The mean annual soil temperature at 20 inches is about 53°F. The mean summer soil temperature is about 69°F, and the mean winter soil temperature is about 36°F. The 10 to 40 inch textural control section is loamy fine sand or loamy sand, with 2 to 3 percent clay. Rock fragments are 10 to 25 percent gravel, and average 10 to 18 percent by volume. Gravel is mostly pumice, with minor amounts of basalt or mixed gravel.

The A horizon has dry color of 10YR 5/2 or 5/3; moist color is 10YR 3/1 or 3/2. It is sand or coarse sand, with 1 to 3 percent clay. Rock fragments are 10 to 25 percent gravel by volume. The gravel is mostly pumice, with minor amounts of basalt or mixed rock. Reaction is moderately to slightly acid.

The C horizon has dry color of 10YR 5/3, 5/4 or 6/4; moist color is 10YR 3/2 or 3/3. It is loamy fine sand or loamy sand, with 2 to 3 percent clay. Rock fragments are 10 to 25 percent gravel by volume. The gravel is mostly pumice, with minor amounts of basalt or mixed rock. Reaction is slightly acid to neutral.

TABLE 5. - Soil Properties

The results of physical and chemical analyses of selected soils are given in table 5. The data are for soils sampled at carefully selected sites. The pedons are typical of the families and are described in the section "Taxonomic Unit Descriptions". Soil samples were analyzed by the U.S. Department of Agriculture, Soil

Conservation Service, National Soil Survey Laboratory, Lincoln, Nebraska. Most determinations, except those for grain-size analysis, were made on soil material less than 2 millimeters in diameter. Measurements reported as percent or quantity of unit weight were calculated on an oven-dry basis.

SOIL CHARACTERIZATION DATA

Map Unit Symbol 134		Soil Classification - Vitrandic Haploxerolls (Inclusion)					Pedon No-86P 975		Soil Survey ID No. -S86CA-051-002				(>2MM) Wt. % of Whole Soil			
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight				
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5		5-20	20-75	.1-75
0-8	A1	0.6	5.8	93.6	2.9	2.9	5.1	12.6	15.7	25.1	35.1	14	2	--	90	16
8-25	A2	0.8	15.0	84.2	8.0	7.0	8.6	21.7	24.2	17.4	12.3	14	7	--	81	21
25-46	C1	2.0	11.5	86.5	7.5	4.0	7.6	22.5	24.1	18.4	13.9	15	6	--	83	21
46-71	C2	2.0	19.0	79.0	12.3	6.7	7.5	17.4	19.1	19.6	15.4	13	5	--	77	18
71-94	2A1B	2.1	14.7	83.2	9.4	5.3	9.5	21.7	22.3	17.0	12.7	12	6	--	78	18
94-109	2AB2	2.2	15.5	82.3	9.4	6.1	11.2	25.3	24.0	14.3	7.5	9	8	--	76	17
109-152	2C	3.5	16.2	80.3	9.2	7.0	14.5	24.0	19.8	13.8	8.2	12	11	--	74	27
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay	
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al
0-8	A1	0.62	0.053			1.9	0.2	TR	0.2	2.3	1.2		3.5	3.0		
8-25	A2	0.59	0.047			2.5	0.3	0.1	0.5	3.4	0.9		4.3	3.4		
25-46	C1	0.27	0.030			2.0	0.2	TR	0.2	2.4	0.5		2.9	2.5		1.25
46-71	C2	0.22	0.021			1.8	0.2	TR	0.2	2.2	0.5		2.7	2.1		1.05
71-94	2A1B	0.21	0.023			1.8	0.3	TR	0.2	2.3	0.3		2.6	2.6		1.24
94-109	2AB2	0.23	0.024			2.6	0.2	0.1	0.2	3.1	0.5		3.6	2.7		1.23
109-152	2C	0.17	0.021			2.6	0.5	0.2	0.1	3.4	0.3		3.7	3.5		1.00
DITH-CIT-Extractable (all depths) FE-0.1, 0.1, 0.1, 0.1, 0.1, 0.1, 0.2, 0.2, 0.2 & AL-TR, TR, TR, TR, TR, TR, TR																
BULK DENSITY (depths levels 2, 3, 7) 1/3 Bar 4A1D-1.11, 1.17, 1.53 & oven dry 4A1H-1.16, 1.23, 1.54 & Whole Soil 4D1-0.011, 0.013, 0.001 & WATER CONTENT - 1/3 Bar 4B1C-18.7, 27.5, 16.1																

Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al				
0-8	A1		66	77	7.4	5.0	6.3	0.03	0.05	0.00	0.00	59		8.1	
8-25	A2		79	100	7.7	5.5	6.1	0.03	0.06	0.00	0.01	59		5.3	
25-46	C1		83	96	7.7	5.5	6.5	0.02	0.03	0.00	0.01	60		4.9	2.45
46-71	C2		81	100	7.7	5.6	6.5	0.01	0.01	0.00	0.01	59		3.7	1.85
71-94	2A1B		88	88	7.6	5.7	6.5	0.02	0.03	0.00	0.01	59		3.9	1.86
94-109	2AB2		86	100	7.7	5.7	6.6	0.02	0.01	0.00	0.01	59		3.7	1.68
109-152	2C		92	97	7.7	5.9	6.9	0.02	0.02	0.00	0.01	58		3.5	1.00
Depth (cm)	Horizon	Clay Fraction X-Ray Minerals	Clay Fraction Oxides (%)			Silt & Sand (%)						Clay (%)			
			Al ₂ O ₃	Fe ₂ O ₃	K ₂ O	Fractionation	Total Retained	Grain Count (%)			Fine	CO ₂			
0-8	A1	X-RAY= M11/CR1/THERMAL= ----		1.4	0.6	VFS			GS84	OT14	GA2				
8-25	A2					VFS			GS73	OT19	GA8				
25-46	C2	X-RAY=M11, KK1, CR1/TH.=KK9		1.7	0.9	VFS			GS75	OT21	GA4				
71-94	2A1B					CSi			GS84	OT15	GA2				
94-109	2AB2	X-RAY=KK2,M11,CR1/TH.=KK43		4.1	0.9	VFS			GS78	OT17	GA5				
109-152	2C					VFS			GS60	OT25	GA15				
						VFS			GS58	OT27	GA15				

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 134	Soil Classification - Vitrandic Haploxerolls (Inclusion)	Pedon No -86P 975	NCSS Sample No
Soil Survey -S86CA-051-002	Laboratory	Sample Date	

Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve												Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at						Atterberg (pct)		Gradation				
		Inches						Number			Microns			Millimeter			Percentile			LL	PI	CU	CC			
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05					60	50	10
0-3	A1	100	100	100	100	100	99	98	84	30	8	3	1	1	55	33	20	10	5	1.14	0.862	0.103			11.0	1.5
3-10	A2	100	100	100	100	100	97	93	79	51	16	7	3	1	69	56	36	19	12	0.63	0.409	0.033			18.9	1.5
10-18	C1	100	100	100	100	100	97	94	79	49	14	8	4	2	68	53	34	17	11	0.68	0.440	0.041			16.5	1.4
18-28	C2	100	100	100	100	100	98	95	82	49	21	12	6	2	69	53	38	23	17	0.67	0.432	0.013			49.5	2.6
28-37	2A1B	100	100	100	100	100	97	94	82	53	18	9	5	2	72	58	39	22	14	0.56	0.374	0.023			24.9	1.9
37-43	2AB2	100	100	100	100	100	96	92	83	60	20	10	5	2	77	65	45	24	15	0.42	0.298	0.021			19.7	1.9
43-60	2C	100	100	100	100	100	95	89	77	56	21	10	6	3	71	60	45	26	15	0.50	0.316	0.021			24.0	1.4

Depth (in)	Horizon	Weight Fractions												Weight Per Unit Volume G/CC								Void Ratios				
		Whole Soil (mm)						<75 mm Fraction						Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar								
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moist	Saturated	1/3 Bar	15 Bar	Oven Dry	Moist	Saturated	Whl Soil	Bar <2 mm	
0-3	A1	16	--	--	16	--	2	14	84	16	--	2	14	84	1.56											
3-10	A2	21	--	--	21	--	7	14	79	21	--	7	14	79	1.09	1.12	1.25	1.00	1.11	1.15	1.16	1.32	1.00			
10-18	C1	21	--	--	21	--	6	15	79	21	--	6	15	79	1.13	1.17	1.38	1.00	1.17	1.22	1.23	1.49	1.00			
18-28	C2	18	--	--	18	--	5	13	82	18	--	5	13	82	1.58											
28-37	2A1B	18	--	--	18	--	6	12	82	18	--	6	12	82	1.58											
37-43	2AB2	17	--	--	17	--	8	9	83	17	--	8	9	83	1.57											
43-60	2C	25	2	--	23	--	11	12	75	23	--	11	12	77	1.36	1.36	1.52	1.00	1.53	1.54	1.54	1.78	1.00			

SOIL CHARACTERIZATION DATA

Map Unit Symbol		Soil Classification - Brantel Family										Pedon No-86P 976		Soil Survey ID No. -S86CA-051-003				(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight						
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75			
0-8	A1	1.4	7.6	91.0	3.7	3.9	7.1	13.4	17.5	30.2	22.8	10	2	2V	86	14		
8-23	A2	2.3	18.6	79.1	10.9	7.7	10.7	15.7	18.0	20.5	14.2	11	3	--	73	14		
23-64	2C1	1.2	6.3	92.5	2.2	4.1	11.0	20.8	20.7	21.2	18.8	20	9	--	87	29		
64-102	3C2	2.1	13.8	84.1	10.1	3.7	2.2	5.7	15.6	31.7	28.9	17	4	--	86	21		
102-114	4C3	2.0	20.4	77.6	12.5	7.9	10.0	13.8	14.3	17.0	22.5	--	--	--	68	--		
114-135	5C4	2.1	12.8	85.1	9.8	3.0	5.0	13.2	17.5	24.0	25.4	15	11	--	85	26		
135-150	6C5	0.7	1.8	97.5	1.3	0.5	2.7	10.5	20.3	34.7	29.3	27	32	1	98	60		
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay			
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al		
0-8	A1	0.49	0.034			1.2	0.2	TR	0.2	1.6	0.9		2.5	2.2		1.57		
8-23	A2	0.17	0.012			1.0	0.2	0.1	0.1	1.4	0.7		2.1	1.9		0.83		
23-64	2C1	0.04	0.002			0.9	0.1	TR	TR	1.0	--		1.0	1.2		1.00		
64-102	3C2	0.01	0.003			0.4	0.1	0.1	TR	0.6	0.1		0.7	0.8		0.38		
102-114	4C3	0.32	0.001			1.1	0.5	0.4	0.2	2.2	--		2.2	2.1		1.05		
114-135	5C4	0.03	--			0.6	0.3	0.3	TR	1.2	--		1.2	1.3		0.62		
135-150	6C5	0.03	0.006			0.4	0.1	0.2	--	0.7	--		0.7	0.9				

Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al				
0-8	A1		64	73	7.5	5.0	5.9							4.1	2.93
8-23	A2		67	74	7.6	4.9	5.8							2.6	1.13
23-64	2C1		100	83	7.4	5.5	6.3							4.7	3.92
64-102	3C2		86	75	7.4	5.5	6.4							1.8	0.86
102-114	4C3		100	100	8.0	7.2	7.8							1.6	0.80
114-135	5C4		100	92	7.7	6.1	7.3							1.8	0.86
135-150	6C5		100	78	7.4	6.1	6.9							3.5	
Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)						
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent		Total Retain.	Optical Grain Count 7B1a	
				DSC	TGA	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			Thermal (%)				
				7A6	7A4b						DTA 7A3b	TGA 7A4b			
0-8	A1														
8-23	A2														
23-64	2C1														
64-102	3C2														
102-114	4C3														
114-135	5C4														
135-150	6C5														
DITH-CIT- Extractable (all depths) FE 6C2B-0.1, 0.2, 0.1, TR, 0.2, 0.1, 0.1 & AL 6G7A-TR, TR, --, --, TR, TR, --															
BULK DENSITY (depths 2, 4, 6) 1/3 Bar 4A1D-1.50, 1.54, 1.58 & oven dry 4A1H-1.50, 1.58, 1.60 & Whole Soil 4D1- --, 0.006, 0.003 & Water Content 1/3 Bar 4B1C-9.1, 11.3, 10.4															
CO ₂ AS (depth 5) CaCO ₃ - --															
(all depths) KOH AL-0.0, 0.0, 0.0, 0.0, 0.0, 0.0 & HUMIC COLOR-0.0, 1.3, 0.0, 0.0, 0.0, 0.0 & HCL-HF COLOR-0.03, 0.02, 0.05, 0.03, 0.06, 0.04, 0.03															

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 146		Soil Classification - Brantel Family													Pedon No -86P 976			NCSS Sample No									
Soil Survey -S86CA-051-003		Laboratory													Sample Date												
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve											Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at						Atterberg (pct)		Gradation						
		Inches						Number					Microns					Millimeter			Percentile			LL	PI	CU	CC
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10			unifmty.	curvtur	
0-3	A1	100	99	99	98	98	97	96	87	37	11	4	2	1	67	41	26	14	8	0.83	0.636	0.064			13.0	1.8	
3-9	A2	100	100	100	100	100	99	97	86	52	23	11	6	2	74	56	41	27	18	0.58	0.380	0.014			40.5	1.8	
9-25	2C1	100	100	100	100	100	96	91	71	39	10	2	1	1	58	43	28	13	5	1.13	0.703	0.076			14.9	0.9	
25-40	3C2	100	100	100	100	100	98	96	79	28	14	10	5	2	56	31	19	14	13	1.12	0.843	0.022			50.1	8.8	
4-45	4C3	100	100	100	100	100	100	100	100	57	28	15	7	2	78	61	46	32	22	0.49	0.301	0.009			55.9	1.7	
45-53	5C4	100	100	100	100	100	95	89	74	34	13	9	4	2	55	37	24	15	11	1.19	0.816	0.033			36.5	2.9	
53-59	6C5	100	100	100	99	99	83	67	40	12	2	1	TR	TR	28	14	6	2	1	3.77	2.745	0.343			11.0	0.9	
Depth (in)	Horizon	Weight Fractions													Weight Per Unit Volume G/CC										Void Ratios		
		Whole Soil (mm)								<75 mm Fraction					Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar								
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moist	Saturated	1/3 Bar	15 Bar	Oven Dry	Moist	Saturated	Whl Soil	Bar <2 mm		
0-3	A1	13	--	--	13	2	2	9	87	13	2	2	9	87	1.54												
3-9	A2	14	--	--	14	--	3	11	86	14	--	3	11	86	1.41	1.41	1.52	1.00	1.50	1.50	1.50	1.64	1.00				
9-25	2C1	29	--	--	29	--	9	20	71	29	--	9	20	71	1.67												
25-40	3C2	21	--	--	21	--	4	17	79	21	--	4	17	79	1.38	1.41	1.50	1.00	1.54	1.57	1.58	1.71	1.00				
40-45	4C3	--	--	--	--	--	--	--	100	--	--	--	--	100	1.45												
45-53	5C4	26	--	--	26	--	11	15	74	26	--	11	15	74	1.38	1.39	1.49	1.00	1.58	1.60	1.60	1.74	1.00				
53-59	6C5	60	--	--	60	1	32	27	40	60	1	32	27	40	1.99												

Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil													C/N Rat- io	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)			
		>2	250- up	250- 75	75-2	75- 20	20- 5	5-2	<2	2- .05	.05- .002	LT .002	Pores D	F		Fine Clay	CEC		-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil		<2mm				
																	Sum CATS	NH ₄ OAc			-15 Bar	Oven Dry	-15 Bar	Oven Dry	Whole Soil	<2mm	
0-3	A1	8	--	--	8	1	1	5	92	46	4	1	42		15		1.86	1.57	2.93								
3-9	A2	20	--	--	20	--	4	16	80	37	9	1		10	14		0.91	0.83	1.13						0.08	0.10	
9-25	2C1	18	--	--	18	--	6	13	82	41	3	1	37		19		0.83	1.00	3.92								
25-40	3C2	29	--	--	29	--	6	24	71	35	6	1		11	4		0.33	0.38	0.86	0.429	0.7	0.7	0.6	0.9	0.10	0.15	
40-45	4C3	--	--	--	--	--	--	--	100	42	11	1	45		317		1.10	1.05	0.80								
45-53	5C4	36	--	--	36	--	15	21	64	33	5	1		10			0.57	0.62	0.86	0.190	0.2	0.2	0.4	0.4	0.09	0.14	
53-59	6C5	44	--	--	44	1	24	20	56	29	1		25		5		1.00	1.29	5.00								
Depth (in)	Horizon	Weight Fraction - Clay Free													Texture Determined <2mm		PSDA (mm) Pct of 2mm			<2mm Electrical			Whole Soil				
		Whole Soil Pct. of >2mm + Sand + Silt							<2mm Fraction / Pct of Sand + Silt																		
		>2	75-2	20-2	2- .05	.05- .002	LT .002	VC	C	M	F	VF	C	F	Clay	In field	By PSDA	Sand 2-.05	Silt .05- .002	Clay LT .002	PH CA-CL ₂ .01M	Re- sist OHMS	Con- duct Mmhos	MG/ KG	1/3 Bar to 15 Bar Airdry		
0-3	A1	13	13	11	80	7	1	23	31	18	14	7	4	4	1	COS	COS	91.0	7.6	1.4	5.0						
3-9	A2	14	14	14	69	16	2	15	21	18	16	11	8	11	2	COS	LCOS	79.1	18.6	2.3	4.9						
9-25	2C1	29	29	29	66	5	1	19	21	21	21	11	4	2	1	COS	COS	92.5	6.3	1.2	5.5						
25-40	3C2	21	21	21	68	11	2	30	32	16	6	2	4	10	2	COS	LCOS	84.1	13.8	2.1	5.5						
40-45	4C3				79	21	2	23	17	15	14	10	8	13	2		LCOS	77.6	20.4	2.0	7.2						
45-53	5C4	26	26	26	64	10	2	26	25	18	13	5	3	10	2	COS	LCOS	85.1	12.8	2.1	6.1						
53-59	6C5	60	60	59	36	1	TR	30	35	20	11	3	1	1	1		COS	97.5	1.8	0.7	6.1						

SOIL CHARACTERIZATION DATA

Map Unit Symbol 146		Soil Classification - Lakash Family						Pedon No-86P 977		Soil Survey ID No. -S86CA-051-004				(>2MM) Wt. % of Whole Soil		
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight				
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20		20-75	.1-75
0-3	A1	1.6	6.2	92.2	2.6	3.6	14.2	23.2	19.8	18.3	16.7	14	12	2V	84	28
3-13	A2	1.6	12.2	86.2	4.9	7.3	12.4	21.3	19.4	17.1	16.0	15	36	2	88	53
13-18	C1	2.2	13.3	84.5	5.7	7.6	13.5	25.5	20.9	13.9	10.7	11	10	2	78	23
18-30	C2	1.4	8.5	90.1	3.7	4.8	12.8	24.8	22.2	16.5	13.8	18	9	--	83	27
30-43	2C3	1.8	9.3	88.9	5.7	3.7	10.9	20.5	22.3	20.7	14.5	12	6	--	82	18
43-84	3C4	1.3	5.0	93.7	2.2	2.8	9.0	20.8	20.2	20.0	23.7	16	10	--	89	26
84-117	4C5	1.0	2.7	96.3	0.9	1.8	6.8	21.9	21.4	20.8	25.4	20	29	1	95	50
117-142	5C6	2.3	16.1	81.6	11.8	4.3	3.0	8.4	16.9	26.8	26.5	21	9	--	85	30
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay	
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al
0-3	A1	0.67	0.038			1.5	0.4	0.1	0.2	2.2	0.9		3.1	2.3		1.44
3-13	A2	0.52	0.034			1.9	0.3	0.1	0.1	2.4	0.2		2.6	2.5		1.56
13-18	C1	0.17	0.012			1.7	0.4	0.1	0.1	2.3	--		2.3	2.2		1.00
18-30	C2	0.06	0.004			1.2	0.3	0.1	0.1	1.7	--		1.7	1.9		1.36
30-43	2C3	0.04	0.002			1.4	0.4	0.1	TR	1.9	--		1.9	2.0		1.11
43-84	3C4	0.08	0.002			0.9	0.3	0.2	TR	1.4	--		1.4	1.6		1.23
84-117	4C5	0.06	0.001			0.4	0.1	0.6	TR	1.1	0.1		1.2	1.0		1.00
117-142	5C6	0.03	0.001			0.4	TR	0.8	0.1	1.3	--		1.3	1.0		0.43
DITH-CIT - Extractable (all depths) FE 6C2B-0.1, 0.1, 0.2, 0.1, 0.1, 0.1, 0.1, 0.1 & AL 6G7a-TR, TR, TR, TR, TR, TR, TR, TR																
BULK DENISTY (depths 3, 5) 1/3 Bar 4A1D-1.49, 1.50 & oven dry 4A1H-1.49, 1.50 & Water Content 1/3 Bar 4B1C-7.1, 7.1 & Cole Whole Soil 4D1- --, --																

Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/Clay %	
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al					
0-3	A1		71	96	7.7	5.3	6.1	0.02	0.00	0.00	0.00			4.6	2.88	
3-13	A2		92	96	7.5	5.5	6.3	0.02	0.00	0.00	0.00			5.6	3.50	
13-18	C1		100	100	7.5	5.7	6.5	0.01	0.00	0.00	0.00			3.0	1.36	
18-30	C2		100	89	7.6	5.8	6.6	0.01	0.00	0.00	0.00			3.1	2.21	
30-43	2C3		100	95	7.5	5.8	6.7	0.01	0.00	0.00	0.00			2.1	1.17	
43-84	3C4		100	88	7.5	5.7	6.7	0.02	0.00	0.00	0.00			3.9	3.00	
84-117	4C5		92	100	7.5	6.6	7.5	0.02	0.00	0.00	0.00			8.5	8.50	
117-142	5C6		100	100	7.6	8.7	9.6	0.01	0.00	0.00	0.00			1.4	0.61	
Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)							
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent					
				DSC	TGA	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			Thermal (%)		Total Retain.	Optical Grain Count 7B1a		
				7A6	7A4b						DTA 7A3b	TGA 7A4b				
0-3	A1	TCLY	MI 1	KK 2				2.7	0.6	VFS					GS62, OT36, GA 2	
3-13	A2									VFS						GS77, OT23, GA 1
13-18	C1	TCLY	MI 1, MT 2	KK 2				6.4	1.3	VFS						GS57, OT41, GA 2
18-30	C2									VFS						GS63, OT36, GA 2
30-43	2C3	TCLY	MI1,MT1, KK1	KK 8				4.1	1.0	VFS						GS57, OT41, GA 2
43-84	3C4															
84-117	4C5															
117-142	5C6	TCLY	KK 2, CR 1	KK20				1.3	1.8	VFS						GS84, OT13, GA 3
CaCO ₃ <2MM - (depth 8) - 1																
(all depths) KOH-0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 0.0 HUMIC COLOR-0.0, 0.0, 0.0, 1.3, 0.0, 0.0, 0.0, 0.0 HCL-HF COLOR 0.05, 0.04, 0.07, 0.02, 0.05, 0.06, 0.05, 0.04																

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 146	Soil Classification - Lakash Family	Pedon No -86P 977	NCSS Sample No
Soil Survey -S86CA-051-004	Laboratory	Sample Date	

Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve												Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at						Atterberg (pct)		Gradation				
		Inches						Number			Microns			Millimeter			Percentile			LL	PI	CU	CC			
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05					60	50	10
0-1	A1	100	99	99	98	98	93	87	73	44	12	3	2	1	61	47	33	16	6	0.96	0.571	0.067			14.4	0.7
1-5	A2	100	99	99	98	98	80	62	47	29	10	3	2	1	39	31	22	12	6	4.19	2.373	0.076			55.2	0.6
5-7	C1	100	99	99	98	98	93	88	77	54	18	6	3	2	69	58	42	22	12	0.57	0.353	0.037			15.4	1.0
7-12	C2	100	100	100	100	100	96	91	73	47	13	4	2	1	63	51	35	17	7	0.85	0.482	0.061			13.8	0.8
12-17	2C3	100	100	100	100	100	97	94	82	49	14	6	3	1	70	53	35	18	9	0.66	0.444	0.054			12.3	1.0
17-33	3C4	100	100	100	100	100	95	90	74	38	8	3	2	1	56	42	27	11	5	1.15	0.739	0.087			13.2	0.8
33-46	4C5	100	100	100	99	99	85	70	50	24	4	1	1	1	37	27	16	5	2	3.07	2.000	0.149			20.6	0.8
46-56	5C6	100	100	100	100	100	96	91	70	30	14	10	5	2	51	33	21	15	13	1.38	0.948	0.021			66.2	6.4

Depth (in)	Horizon	Weight Fractions												Weight Per Unit Volume G/CC								Void Ratios				
		Whole Soil (mm)						<75 mm Fraction						Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar								
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moist	Saturated	1/3 Bar	15 Bar	Oven Dry	Moist	Saturated	Whl Soil	Bar <2 mm	
0-1	A1	27	--	--	27	2	11	14	73	27	2	11	14	73	1.65											
1-5	A2	53	--	--	53	2	36	15	47	53	2	36	15	47	1.91											
5-7	C1	23	--	--	23	2	10	11	77	23	2	10	11	77	1.34	1.34	1.41	1.00	1.49	1.49	1.49	1.60	1.00			
7-12	C2	27	--	--	27	--	9	18	73	27	--	9	18	73	1.65											
12-17	2C3	18	--	--	18	--	6	12	82	18	--	6	12	82	1.38	1.38	1.46	1.00	1.50	1.50	1.50	1.61	1.00			
17-33	3C4	26	--	--	26	--	10	16	74	26	--	10	16	74	1.64											
33-46	4C5	50	--	--	50	1	29	20	50	50	1	29	20	50	1.86											
46-56	5C6	30	--	--	30	--	9	21	70	30	--	9	21	70	1.68											

Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil													C/N Ratio	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)													
		>2	250- up	250- 75	75-2	75- 20	20- 5	5-2	<2	2- .05	.05- .002	LT .002	Pores D F			Fine Clay	CEC		-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil		<2mm														
																	Sum CATS	NH ₄ OAc			-15 Bar H ₂ O	-15 Bar	Oven Dry	-15 Bar	Oven Dry	Whole Soil	<2mm										
0-1	A1	17	--	--	17	1	7	9	83	43	3	1	38		18		1.94	1.44	2.88																		
1-5	A2	38	--	--	38	1	26	11	62	30	4	1	28		15		1.63	1.56	3.50																		
5-7	C1	31	--	--	31	3	13	15	69	33	5	1		6	14		1.05	1.00	1.36														0.04	0.06			
7-12	C2	17	--	--	17	--	6	11	83	41	4	1	38		14		1.21	1.36	2.21																		
12-17	2C3	25	--	--	25	--	8	16	75	38	4	1		7	19		1.06	1.11	1.17														0.06	0.08			
17-33	3C4	16	--	--	16	--	6	10	84	43	2	1	38		38		1.08	1.23	3.00																		
33-46	4C5	35	--	--	35	1	20	14	65	34	1		30		57		1.20	1.00	8.50																		
46-56	5C6	19	--	--	19	--	6	13	81	36	7	1	37		26		0.57	0.43	0.61																		
Depth (in)	Horizon	Weight Fraction - Clay Free													Texture Determined <2mm		PSDA (mm) Pct of 2mm			<2mm Electrical			Whole Soil														
		Whole Soil Pct. of >2mm + Sand + Silt							<2mm Fraction / Pct of Sand + Silt																												
		>2	75-2	20-2	2- .05	.05- .002	LT .002		Sands					Silt		Clay	In field	By PSDA	Sand 2-.05	Silt .05- .002	Clay LT .002	PH CA-CL ₂ .01M	Re- sist OHMS	Con- duct Mmhos	Cumult. Amounts Salt inch of H ₂ O												
							VC	C	M	F	VF	C	F											MG/ KG	1/3 Bar to 15 Bar Airdry												
0-1	A1	27	27	25	68	5	1	17	19	20	24	14	4	3	2	S	COS	92.2	6.2	1.6	5.3																
1-5	A2	53	53	51	41	6	1	16	17	20	22	13	7	5	2	COS	COS	86.2	12.2	1.6	5.5																
5-7	C1	23	23	21	66	10	2	11	14	21	26	14	8	6	2	COS	LS	84.5	13.3	2.2	5.7																
7-12	C2	27	27	27	66	6	1	14	17	23	25	13	5	4	1	COS	COS	90.1	8.5	1.4	5.8																
12-17	2C3	18	18	18	74	8	1	15	21	23	21	11	4	6	2	COS	COS	88.9	9.3	1.8	5.8																
17-33	3C4	26	26	26	70	4	1	24	20	20	21	9	3	2	1	COS	COS	93.7	5.0	1.3	5.7																
33-46	4C5	50	50	49	48	1	1	26	21	22	22	7	2	1	1	COS	COS	96.3	2.7	1.0	6.6																
46-56	5C6	30	30	30	58	11	2	27	27	17	9	3	4	12	2	COS	LCOS	81.6	16.1	2.3	8.7																

SOIL CHARACTERIZATION DATA

Map Unit Symbol		Soil Classification - Vitandic Xerorthents, pumiceous										Pedon No-86P 978		Soil Survey ID No. -S86CA-051-005				(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight						
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75			
0-5	A1	2.3	17.6	80.1	9.5	8.1	15.6	21.6	17.7	15.0	10.2	12	10	--	72	22		
5-25	A2	1.8	17.7	80.5	9.2	8.5	15.7	22.8	18.2	13.9	9.9	11	12	--	73	23		
25-36	BW	1.7	20.6	77.7	12.0	8.6	9.9	17.9	18.2	17.5	14.2	18	18	1	80	37		
36-81	2C1	1.8	11.8	86.4	6.8	5.0	4.1	8.1	12.7	24.1	37.4	29	25	TR	92	54		
81-84	3C2	1.0	26.8	72.2	13.2	13.6	19.6	26.3	11.1	9.2	6.0	7	4	--	58	11		
84-152	4C3	0.9	23.0	76.1	12.2	10.8	14.3	24.6	17.3	12.3	7.6	6	3	1	66	10		
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay			
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al		
0-5	A1	2.30	0.069			4.8	0.9	0.1	0.4	6.2	6.2		12.4	8.9		3.87		
5-25	A2	0.86	0.031			3.9	0.6	0.1	0.3	4.9	3.6		8.5	6.4		3.56		
25-36	BW	0.24	0.010			1.6	0.6	TR	0.2	2.4	1.4		3.8	3.5		2.06		
36-81	2C1	0.07	0.003			1.2	0.4	0.1	0.2	1.9	0.7		2.6	2.5		1.39		
81-84	3C2	0.45	0.016			1.6	0.2	TR	0.1	1.9	1.8		3.7	3.2		3.20		
84-152	4C3	0.40	0.020			1.4	0.2	TR	0.1	1.7	3.2		4.9	3.2				

Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/Clay %
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al				
0-5	A1		50	70	8.2	5.0	5.8	0.18	0.23	0.01	0.07	58		5.2	2.26
5-25	A2		58	77	9.4	5.2	6.0	0.10	0.20	0.03	0.09	59		3.9	2.17
25-36	BW		63	69	9.2	5.3	6.2	0.04	0.28	0.04	0.05	61		2.9	1.71
36-81	2C1		73	76	8.2	5.2	6.1	0.04	0.18	0.03	0.02	58		2.9	1.61
81-84	3C2		51	59	9.2	5.2	6.0	0.05	0.04	0.01	0.05	59		1.9	1.90
84-152	4C3		35	53	10.0	5.3	6.1	0.04	0.04	0.07	0.17	59		2.3	2.56

Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)					
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent			
				DSC	TGA	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			Thermal (%)		Total Retain.	Optical Grain Count 7Bla
				7A6	7A4b						DTA 7A3b	TGA 7A4b		
0-5	A1							VFS						GS42, OT40, GA18
5-25	A2	TCLY	*	KK 2	KKtr		3.1	0.7	VFS					GS52, OT33, GA15
25-36	BW								VFS					GS50, OT43, GA 7
36-81	2C1	TCLY	*	KK10			4.1	1.3	VFS					GS57, OT29, GA14
81-84	3C2								VFS					GS89, OT 7, GA 4
84-152	4C3	TCLY	*	KKtr			2.7	0.8	VFS					GS78, OT20, GA 2

* X-RAY 7A2i (depths 2, 4, 6) TCLY, TCLY, TCLY

(all depths) KOH AL-0.1, 0.1, 0.0, 0.0, 0.1, 0.2 & HUMIC COLOR-0.00, 0.00, 0.00, 0.00, 0.00, 0.00 & HCL-HF COLOR-0.17, 0.13, 0.08, 0.04, 0.08, 0.09

WATER CONTENT (depths 2, 3, 5) 1/3 BAR 4B1C-28.0, 35.3, 13.7

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 126		Soil Classification - Vitrandic Xerorthents, pumiceous												Pedon No - 86P 978			NCSS Sample No										
Soil Survey- S86CA-051-005		Laboratory												Sample Date													
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve												Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at						Atterberg (pct)		Gradation					
		Inches						Number			Microns			Millimeter			Percentile			LL	PI	CU	CC				
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10			unifmty.	curvtur	
0-2	A1	100	100	100	100	100	95	90	78	55	22	9	5	2	70	58	45	28	16	0.55	0.329	0.022			24.6	1.0	
2-10	A2	100	100	100	100	100	94	88	77	55	22	8	4	1	69	59	45	27	15	0.54	0.326	0.025			22.0	1.0	
10-14	BW	100	100	100	99	99	90	81	63	40	18	9	4	1	54	43	32	20	14	1.59	0.775	0.025			62.9	1.2	
14-32	2C1	100	100	100	100	100	88	75	46	16	7	4	2	1	29	18	12	8	6	3.02	2.250	0.158			19.1	2.3	
32-33	3C2	100	100	100	100	100	98	96	89	73	35	13	6	1	84	75	66	42	25	0.20	0.136	0.012			16.8	1.6	
33-60	4C3	100	100	100	99	99	98	96	90	68	29	12	5	1	83	72	57	34	22	0.29	0.191	0.014			21.2	1.6	
Depth (in)	Horizon	Weight Fractions												1829Weight Per Unit Volume G/CC								Void Ratios					
		Whole Soil (mm)								<75 mm Fraction				Whole Soil8475 Soil Survey Engine83e72ring				<2mm Fraction Soil Survey Engineering at 1/3 Bar				Whl Soil	Bar <2 mm				
		>2	250- up	250- 75	75-2	75- 50	20- 5	5-2	<2	75- 2	75- 20	20- 5	5-2	<2	1/3 Bar	Oven Dry	Moi- st	Sat- urated	1/3 Bar	15 Bar	Oven Dry	Moist	Sat- urated				
0-2	A1	22	--	--	22	--	10	12	78	22	--	10	12	78	1.62												
2-10	A2	23	--	--	23	--	12	11	77	23	--	12	11	77	0.99	1.02	1.21	1.00	0.99	1.02	1.02	1.27	1.00	0.01	0.01		
10-14	BW	37	--	--	37	1	18	18	63	37	1	18	18	63	1.75												
14-32	2C1	54	--	--	54	TR	25	29	46	54	TR	25	29	46	0.92	1.02	1.07	1.00	0.84	1.02	1.04	1.14	1.00	0.09	0.19		
32-33	3C2	11	--	--	11	--	4	7	89	11	--	4	7	89	1.53												
33-60	4C3	10	--	--	10	1	3	6	90	10	1	3	6	90	1.23	1.24	1.38	1.00	1.27	1.28	1.28	1.44	1.00				

SOIL CHARACTERIZATION DATA

Map Unit Symbol		Soil Classification- Cozetica Family										Pedon No-86P 979		Soil Survey ID No. -S86CA-051-006				(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight						
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75			
0-5	A1	0.6	7.5	91.9	3.1	4.4	12.3	35.1	20.2	12.7	11.6	19	15	7	88	41		
5-15	A2	0.4	9.9	89.7	5.6	4.3	8.8	40.8	21.8	9.4	8.9	14	12	--	86	26		
15-41	C1	0.8	15.1	84.1	8.7	6.4	11.6	25.9	22.5	15.3	8.8	9	4	1	76	14		
41-61	2AB	0.2	3.4	96.4	1.0	2.4	5.7	15.8	20.0	25.0	29.9	17	8	--	93	25		
61-91	2C2	1.1	9.4	89.5	4.1	5.3	9.6	20.1	18.7	17.9	23.2	22	20	--	88	42		
91-107	3C3	0.7	5.5	93.8	1.7	3.8	10.6	23.6	21.6	19.3	18.7	13	9	2	87	24		
107-152	4C4	0.6	3.4	96.0	0.6	2.8	11.7	20.0	20.2	20.7	23.4	22	19	8	92	49		
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)							CEC (meg/100g)			CEC/Clay		
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc	Bases Plus Al			
0-5	A1	1.23	0.079			2.8	0.3	TR	0.2	3.3	1.3		4.6	3.2				
5-15	A2	0.54	0.042			2.3	0.4	TR	0.2	2.9	0.2		3.1	2.6				
15-41	C1	0.15	0.016			1.5	0.4	TR	0.2	2.1	0.7		2.8	2.0				
41-61	2AB	0.02	0.007			0.5	0.1	TR	--	0.6	0.2		0.8	0.9				
61-91	2C2	0.12	0.010			1.5	0.5	0.1	TR	2.1	0.1		2.2	2.1		1.91		
91-107	3C3	0.05	0.011			1.0	0.3	0.1	--	1.4	--		1.4	1.5				
107-152	4C4	TR	0.001			0.7	0.2	0.1	--	1.0	0.2		1.2	1.1				

Depth (cm)	Horizon	Al Sat (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al				
0-5	A1		72	100	7.6	5.5	6.1	0.03	0.01	0.00	0.00	57		6.6	
5-15	A2		94	100	7.7	6.2	6.7	0.03	0.00	0.00	0.00	58		5.0	
15-41	C1		75	100	7.6	6.1	6.8	0.02	0.00	0.00	0.00	58		3.4	
41-61	2AB		75	67	7.5	5.7	6.6	0.01	0.00	0.00	0.00	59		4.7	
61-91	2C2		95	100	7.6	5.7	6.6	0.02	0.00	0.00	0.00	58		3.5	3.18
91-107	3C3		100	93	7.5	5.4	6.4	0.01	0.00	0.00	0.00	59		4.2	
107-152	4C4		83	91	7.5	5.5	6.4	0.01	0.00	0.00	0.00	58		3.9	

Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)					
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent			
				DSC	TGA	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			Thermal (%)		Total Retain.	Optical Grain Count 7Bla
				7A6	7A4b						DT 7A3b	TGA 7A4b		
0-5	A1	TCLY	MI 1	KK 2			1.0	0.7	VFS					GS75, OT18, GA 7
5-15	A2								VFS					GS79, OT16, GA 5
15-41	C1	TCLY	MI 1	KK 3			4.1	1.7	VFS					GS74, OT17, GA 9
41-61	2AB													
61-91	2C2								VFS					GS69, OT22, GA 9
91-107	3C3								VFS					GS82, OT16, GA 2
107-152	4C4	TCLY	MI 1, MT 1	KK10			1.7	0.9	VFS					GS78, OT20, GA 3

DITH-CIT-Extractable (all depths) FE-TR, TR, TR, 0.1, 0.1, 0.1, 0.1 & AL-0.1, TR, TR, TR, TR, TR, TR

(all depths) KOH AL-0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00 & HUMIC COLOR-0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00, 0.00 & HCL-HF COLOR-0.04, 0.09, 0.04, 0.01, 0.02, 0.02, 0.01

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 140, 144	Soil Classification - Cozetica Family	Pedon No -86P 979	NCSS Sample No
Soil Survey- S86CA-051-006	Laboratory	Sample Date	

Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve												Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at									Atterberg (pct)		Gradation	
		Inches						Number			Microns			Millimeter					Percentile				LL	PI	CU	CC
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10				
0-2	A1	100	98	97	94	93	86	78	59	42	9	2	1	TR	52	45	33	12	5	2.09	0.819	0.082			25.4	0.3
2-6	A2	100	100	100	100	100	95	89	75	57	11	4	2	TR	68	61	45	14	8	0.47	0.310	0.064			7.5	0.9
6-16	C1	100	100	100	99	99	97	95	86	60	19	8	4	1	78	65	46	24	14	0.41	0.289	0.027			15.3	1.5
16-24	2AB	100	100	100	100	100	97	93	76	30	5	1	TR	TR	53	34	19	7	3	1.23	0.887	0.125			9.8	1.1
24-36	2C2	100	100	100	100	100	90	80	58	31	9	3	2	1	45	34	23	12	6	2.16	1.325	0.081			26.6	0.8
36-42	3C3	100	99	99	98	98	94	89	76	43	9	2	1	1	62	47	31	13	5	0.92	0.573	0.079			11.7	0.8
42-60	4C4	100	98	96	94	92	83	73	51	26	5	1	TR	TR	39	29	18	8	2	2.84	1.887	0.120			23.7	0.9

Depth (in)	Horizon	Weight Fractions												Weight Per Unit Volume G/CC										Void Ratios		
		Whole Soil (mm)								<75 mm Fraction				Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar								
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moist	Saturated	1/3 Bar	15 Bar	Oven Dry	Moist	Saturated	Whl Soil	Bar <2 mm	
0-2	A1	41	--	--	41	7	15	19	59	41	7	15	19	59	1.77											
2-6	A2	25	--	--	25	--	11	14	75	25	--	11	14	75	1.64											
6-16	C1	14	--	--	14	1	4	9	86	14	1	4	9	86	1.54											
16-24	2AB	24	--	--	24	--	7	17	76	24	--	7	17	76	1.63											
24-36	2C2	42	--	--	42	--	20	22	58	42	--	20	22	58	1.79											
36-42	3C3	24	--	--	24	2	9	13	76	24	2	9	13	76	1.64											
42-60	4C4	49	--	--	49	8	19	22	51	49	8	19	22	51	1.85											

Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil													C/N Ratio	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)	
		>2	250- up	250- 75	75-2	75- 20	20- 5	5-2	<2	2- .05	.05- .002	LT .002	Pores D	F		Fine Clay	CEC		-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil		<2mm		
																	Sum CATS	NH ₄ OAc			-15 Bar	Oven Dry	-15 Bar	Oven Dry	Whole Soil
0-2	A1	28	--	--	28	5	10	13	72	37	3		33		16		7.67	5.33	11.00						
2-6	A2	15	--	--	15	--	7	9	85	41	5		38		13		7.75	6.50	12.50						
6-16	C1	8	--	--	8	1	2	5	92	42	8		42		10		3.50	2.50	4.25						
16-24	2AB	15	--	--	15	--	4	11	85	45	2		38		3		4.00	4.50	23.50						
24-36	2C2	28	--	--	28	--	13	15	72	35	4		32		12		2.00	1.91	3.18						
36-42	3C3	15	--	--	15	1	6	8	85	44	3		38		5		2.00	2.14	6.00						
42-60	4C4	34	--	--	34	6	13	15	66	35	1		30		4		2.00	1.83	6.50						
Depth (in)	Horizon	Weight Fraction - Clay Free														Texture Determined <2mm		PSDA (mm) Pct of 2mm			<2mm Electrical			Whole Soil	
		Whole Soil Pct of >2mm + Sand + Silt							<2mm Fraction / Pct of Sand + Silt																
		>2	75-2	20-2	2- .05	.05- .002	LT .002	VC	C	M	F	VF	C	F	Clay	In field	By PSDA	Sand 2-.05	Silt .05- .002	Clay LT .002	PH CA-CL ₂ .01M	Re- sist OHMS	Con- duct Mmhos	Cumult. Amounts Salt inch of H ₂ O	
																								MG/ KG	1/3 Bar to 15 Bar Airdry
0-2	A1	41	41	34	54	4	TR	12	13	20	35	12	4	3	1	S	S	91.9	7.5	0.6	5.5				
2-6	A2	25	25	25	67	7	TR	9	9	22	41	9	4	6	TR	COS	S	89.7	9.9	0.4	6.2				
6-16	C1	14	15	13	73	13	1	9	15	23	26	12	6	9	1	COS	LS	84.1	15.1	0.8	6.1				
16-24	2AB	24	24	24	73	3	TR	30	25	20	16	6	2	1	TR	COS	COS	96.4	3.4	0.2	5.7				
24-36	2C2	42	42	42	52	5	1	23	18	19	20	10	5	4	1	COS	COS	89.5	9.4	1.1	5.7				
36-42	3C3	24	24	22	72	4	1	19	19	22	24	11	4	2	1	COS	COS	93.8	5.5	0.7	5.4				
42-60	4C4	49	49	41	49	2	TR	24	21	20	20	12	3	1	1	COS	COS	96.0	3.4	0.6	5.5				

SOIL CHARACTERIZATION DATA

Map Unit Symbol		375		Soil Classification- Vitrandic Torripsamments								Pedon No-86P 980		Soil Survey ID No. -S86CA-051-007				(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight						
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75			
0-5	A1	1.0	9.1	89.9	4.1	5.0	12.7	27.9	26.2	16.6	6.5	5	2	--	79	7		
5-23	A2	1.4	13.6	85.0	6.9	6.7	10.9	23.1	24.9	18.1	8.0	7	4	--	77	11		
23-48	A3	1.0	12.9	86.1	7.8	5.1	8.7	21.5	25.8	21.1	9.0	8	4	--	80	12		
48-71	AB	1.6	16.7	81.7	8.1	8.6	17.2	24.5	19.2	13.9	6.9	8	3	--	68	11		
71-152	C	1.9	19.0	79.1	9.4	9.6	12.6	23.9	17.8	14.6	10.2	9	3	--	71	12		
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay			
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al		
0-5	A1	0.54	0.035			2.0	0.2	TR	0.3	2.5	0.7	TR	3.2	2.2		2.20		
5-23	A2	0.62	0.045			2.3	0.2	--	0.3	2.8	1.0	TR	3.8	2.9		2.07		
23-48	A3	0.29	0.025			1.9	0.2	0.2	0.3	2.6	0.1	TR	2.7	2.5		2.50		
48-71	AB	0.18	0.019			2.1	0.2	0.1	0.2	2.6	0.5	TR	3.1	2.5		1.56		
71-152	C	0.18	0.020			2.5	0.3	0.1	TR	2.9	0.1	TR	3.0	3.0		1.58		
Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %			
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al							
0-5	A1		78	100	7.7	5.3	6.1	0.02	0.01	0.00	0.00	58		4.2	4.20			
5-23	A2		74	97	7.7	5.5	6.2	0.02	0.00	0.00	0.00	58		4.5	3.21			
23-48	A3		96	100	7.7	6.3	6.8	0.01	0.00	0.00	0.00	55		3.9	3.90			
48-71	AB		84	100	7.7	6.1	6.8	0.01	0.00	0.00	0.00	58		2.7	1.69			
71-152	C		97	97	7.7	6.4	7.1	0.01	0.00	0.00	0.00	60		2.7	1.42			
Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)									
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent							
				DSC	TGA	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			Thermal (%)		Total Retain.	Optical Grain Count 7Bla				
											7A6	7A4b			DTA 7A3b	TGA 7A4b		
0-5	A1	TCLY	MI 1	KK 1				1.6	1.0	VFS					GS71, OT23, GA 6			
5-23	A2	TCLY								VFS					GS79, OT18, GA 3			
23-48	A3	TCLY	MI 1	KK 5				2.6	0.7	VFS					GS76, OT21, GA 3			
48-71	AB	TCLY								VFS					GS72, OT19, GA 9			
71-152	C	TCLY	MI 1	KK 6				3.4	1.1	VFS					GS62, OT27, GA11			

DITH-CIT-Extractable (all depths) FE 6C2B-0.1, 0.1, 0.1, 0.1, 0.2 & AL 6G7A-TR, TR, TR, TR, TR BULK DENSITY (depth 2) 1/3 Bar 4A1D-1.40 & oven dry 4A1H-1.40 & Whole Soil 4D1- -- & 1/3 Bar Water-13.0

(all depths) KOH AL-0.0, 0.0, 0.0, 0.0, 0.0 & HUMIC COLOR-0.0, 0.0, 0.0, 0.0, 0.0 & HCL-HF COLOR-0.03, 0.04, 0.02, 0.04, 0.03

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit		Soil Classification - Vitrandic Torripsamments										Pedon No-86P 980			Soil Survey - S86CA-051-007											
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve													Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at						Atterberg (pct)		Gradation			
		Inches						Number				Microns			Millimeter			Percentile			LL	PI	unifmtly.	curvtur		
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60					50	10
0-2	A1	100	100	100	100	100	100	99	94	66	16	5	2	1	88	72	48	21	9	0.35	0.267	0.052			6.9	1.0
2-9	A2	100	100	100	100	100	98	96	89	60	19	7	4	1	82	66	44	23	13	0.42	0.305	0.030			14.0	1.5
9-19	A3	100	100	100	100	100	98	96	88	56	17	8	4	1	80	62	39	20	12	0.48	0.352	0.032			15.1	1.8
19-28	AB	100	100	100	100	100	99	97	89	66	25	9	4	1	83	70	53	32	16	0.33	0.217	0.024			13.9	1.1
28-60	C	100	100	100	100	100	99	97	88	62	25	10	5	2	79	66	51	29	18	0.38	0.244	0.020			18.9	1.4
Depth (in)	Horizon	Weight Fractions													Weight Per Unit Volume G/CC						Void Ratios					
		Whole Soil (mm)								<75 mm Fraction					Whole Soil Soil Survey Engineering			<2mm Fraction Soil Survey Engineering at 1/3 Bar								
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moist	Saturated	1/3 Bar	15 Bar	Oven Dry	Moist	Saturated	Whl Soil	Bar <2 mm	
0-2	A1	6	--	--	6	--	1	5	94	6	--	1	5	94	1.49											
2-9	A2	11	--	--	11	--	4	7	89	11	--	4	7	89	1.34	1.34	1.50	1.00	1.40	1.40	1.40	1.58	1.00			
9-19	A3	12	--	--	12	--	4	8	88	12	--	4	8	88	1.53											
19-28	AB	11	--	--	11	--	3	8	89	11	--	3	8	89	1.53											
28-60	C	12	--	--	12	--	3	9	88	12	--	3	9	88	1.54											
Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil													C/N Ratio	Ratios to Clay 2mm Fraction			Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)			
		>2	250-up	250-75	75-2	75-20	20-5	5-2	<2	2-.05	.05-.002	LT .002	Pores D	F		Fine Clay	CEC	-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil	<2mm					
																Sum CATS	NH ₄ OAc			-15 Bar	Oven Dry	-15 Bar	Oven Dry	Whole Soil	<2mm	
0-2	A1	3	--	--	3	--	1	3	97	48	5	1	44		15		3.20	2.20	4.20							
2-9	A2	15	--	--	15	--	5	9	85	38	6	1		15	14		2.71	2.07	3.21						0.10	0.12
9-19	A3	7	--	--	7	--	2	5	93	44	7	1	42		12		2.70	2.50	3.90							
19-28	AB	6	--	--	6	--	2	5	94	42	9	1	42		10		1.94	1.56	1.69							
28-60	C	7	--	--	7	--	2	5	93	40	10	1	42		9		1.58	1.58	1.42							
Depth (in)	Horizon	Weight Fraction - Clay Free													Texture Determined <2mm	PSDA (mm) Pct of 2mm			<2mm Electrical			Whole Soil				
		Whole Soil Pct. of >2mm + Sand + Silt							<2mm Fraction / Pct of Sand + Silt							In field	By PSDA	Sand 2-.05	Silt .05-.002	Clay LT .002	PH CA-CL ₂ .01M	Re-sist OHMS	Conduct Mmhos	Cumult. Amounts Salt inch of H ₂ O		
		>2	75-2	20-2	2-.05	.05-.002	LT .002		VC	C	M	F	VF	C										F		MG/ KG
0-2	A1	6	6	6	85	9	1	7	17	26	28	13	5	4	1	COS	S	89.9	9.1	1.0	5.3					
2-9	A2	11	11	11	77	12	1	8	18	25	23	11	7	7	1	COS	LCOS	85.0	13.6	1.4	5.5					
9-19	A3	12	12	12	76	11	1	9	21	26	22	9	5	8	1	COS	COS	86.1	12.9	1.0	6.3					
19-28	AB	11	11	11	74	15	1	7	14	20	25	17	9	8	2	S	LS	81.7	16.7	1.6	6.1					
28-60	C	12	12	12	71	17	2	10	15	18	24	13	10	10	2	COS	LS	79.1	19.0	1.9	6.4					

SOIL CHARACTERIZATION DATA

Map Unit Symbol		Soil Classification- Vitrandic Xerorthents, pumiceous, warm										Pedon No-86P 981		Soil Survey ID No. -S86CA-051-008			(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight					
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75		
0-10	A1	0.4	3.5	96.1	1.0	2.5	5.7	17.8	28.6	26.9	17.1	17	7	1	93	25	
10-23	A2	0.9	14.9	84.2	7.4	7.5	8.8	18.8	23.7	20.7	12.2	13	11	TR	81	24	
23-58	2BW	0.6	11.2	88.2	5.7	5.5	7.4	4.8	14.2	23.8	38.0	25	39	2	93	66	
58-81	3C1	0.8	7.0	92.2	4.5	2.5	2.0	6.5	9.7	25.9	48.1	24	27	TR	95	51	
81-112	4C2	1.0	16.2	82.8	8.3	7.9	9.4	22.2	21.4	17.2	12.6	15	7	--	79	22	
112-152	4C3	0.8	10.1	89.1	5.9	4.2	7.8	22.3	26.2	21.4	11.4	10	5	--	84	15	
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)							CEC (meg/100g)			CEC/Clay	
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc	Bases Plus Al		
0-10	A1	0.16	0.010			0.9	0.3	TR	TR	1.2	0.8		2.0	2.0			
10-23	A2	0.17	0.009			2.5	0.6	TR	0.1	3.2	0.5		3.7	3.0			
23-58	2BW	0.11	0.006			1.5	0.5	0.1	0.1	2.2	0.5		2.7	2.5			
58-81	3C1	0.10	0.004			1.7	0.5	TR	TR	2.2	0.8		3.0	2.2			
81-112	4C2	0.07	0.002			0.8	0.2	TR	0.1	1.1	0.2		1.3	1.3		1.30	
112-152	4C3	0.14	0.007			1.1	0.2	TR	0.1	1.4	0.5		1.9	1.5			

Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %
			Sum	NH ₄ OAC	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al				
0-10	A1		60	60	7.7	5.0	6.0	0.02	0.20	0.03	0.01	59		3.0	
10-23	A2		86	100	7.9	5.7	6.5	0.03	0.35	0.04	0.02	59		2.6	
23-58	2BW		81	88	7.9	6.1	6.8	0.02	0.18	0.03	0.02	58		2.6	
58-81	3C1		73	100	7.8	6.1	6.8	0.01	0.03	0.00	0.00	59		4.2	
81-112	4C2		85	85	8.3	6.1	6.9	0.01	0.02	0.00	0.01	58		1.5	1.50
112-152	4C3		74	93	8.9	6.1	6.9	0.02	0.02	0.02	0.05	59		1.5	

Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)					
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent			
				DSC	TGA	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			Thermal (%)		Total Retain.	Optical Grain Count 7Bla
				7A6	7A4b						DTA 7A3b	TGA 7A4b		
0-10	A1	TCLY	MI 1	KK21			1.9	0.3	VFS					GS42, OT41, GA17
10-23	A2	TCLY	MI 2 KK 1	KK 5	KKtr		4.9	0.9	VFS					OT56, GS41, GA 3
23-58	2BW	TCLY	MI 1	KK 3			3.3	1.0	VFS					GS49, OT46, GA 6
58-81	3C1	TCLY	MI 1 MT 1	KK 6			3.9	1.1	VFS					GS51, OT43, GA 7
81-112	4C2	TCLY	MI 1	KK 2			1.9	0.9	VFS					GS72, OT23, GA 6
112-152	4C3								VFS					GS72, OT23, GA 5

DITH-CIT-Extractable (all depths) FE-0.3, 0.4, 0.2, 0.1, 0.1, 0.1 & AL-TR, TR, TR, TR, TR, TR

BULK DENSITY (Depth 5) 1/3 Bar 4A1D-1.29 & Oven Dry 4A1H-1.35 & Whole Soil 4D1-0.006 & WATER CONTENT 1/3 Bar 4B2a-16.3

(all depths) KOH AL-0.0, 0.0, 0.0, 0.0, 0.0, 0.1 & HUMIC COLOR-0.0, 0.0, 0.0, 0.0, 0.0 & HCL-HF COLOR- 0.01, 0.03, 0.02, 0.01, 0.03, 0.02

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 137	Soil Classification - Vitrandic Xerorthents, pumiceous, warm	Pedon No - 86P 981	NCSS Sample No
Soil Survey- S86CA-051-008	Laboratory	Sample Date	

Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve													Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at						Atterberg (pct)		Gradation				
		Inches						Number			Microns				Millimeter			Percentile			LL	PI	CU	CC			
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10			unifmty.	curvtur	
0-4	A1	100	100	100	99	99	96	92	75	37	5	1	1	TR	62	42	21	7	3	0.93	0.658	0.121			7.7	1.0	
4-9	A2	100	100	100	100	100	95	90	77	47	16	6	3	1	68	52	33	19	12	0.72	0.469	0.035			20.3	1.6	
9-23	2BW	100	99	99	98	98	79	59	34	12	5	2	1	TR	21	13	8	7	4	4.87	3.456	0.326			15.0	1.6	
23-32	3C1	100	100	100	100	100	87	73	50	12	4	3	1	TR	26	13	8	5	4	2.90	2.000	0.326			8.9	1.3	
32-44	4C2	100	100	100	100	100	97	93	78	51	18	7	3	1	68	55	38	21	13	0.66	0.410	0.030			21.8	1.4	
44-60	4C3	100	100	100	100	100	98	95	85	52	13	6	3	1	75	57	35	16	9	0.56	0.401	0.054			10.3	1.3	

Depth (in)	Horizon	Weight Fractions													Weight Per Unit Volume G/CC										Void Ratios	
		Whole Soil (mm)								<75 mm Fraction					Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar							
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moist	Saturated	1/3 Bar	15 Bar	Oven Dry	Moist	Saturated	Whi Soil	Bar <2 mm	
0-4	A1	25	--	--	25	1	7	17	75	25	1	7	17	75	1.63											
4-9	A2	23	--	--	23	TR	10	13	77	23	TR	10	13	77	1.63											
9-23	2BW	66	--	--	66	2	39	25	34	66	2	39	25	34	2.07											
23-32	3C1	50	--	--	50	TR	27	23	50	50	TR	27	23	50	1.12	1.15	1.21	1.00	1.29	1.34	1.35	1.50	1.00			
32-44	4C2	22	--	--	22	--	7	15	78	22	--	7	15	78	1.61											
44-60	4C3	15	--	--	15	--	5	10	85	15	--	5	10	85	1.56											

Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil													C/N Rat- io	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)		
		>2	250- up	250- 75	75-2	75- 20	20- 5	5-2	<2	2- .05	.05- .002	LT .002	Pores D	F		Fine Clay	CEC		-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil		<2mm			
																	Sum CATS	NH ₄ OAc			-15 Bar	Oven Dry	-15 Bar	Oven Dry	Whole Soil	<2mm
0-4	A1	15	--	--	15	1	4	11	85	45	2		38		16		5.00	5.00	7.50							
4-9	A2	14	--	--	14	TR	6	8	86	40	7		38		19		4.11	3.33	2.89							
9-23	2BW	52	--	--	52	2	31	20	48	24	3		22		19		4.50	4.17	4.33							
23-32	3C1	56	--	--	56	TR	30	26	44	19	1			8	26		3.75	2.75	5.25	1.875	0.6	0.9	1.3	1.5	0.07	0.16
32-44	4C2	13	--	--	13	--	4	9	87	39	8		39		33		1.30	1.30	1.50							
44-60	4C3	9	--	--	9	--	3	6	91	44	5		41		20		2.38	1.88	1.88							
Depth (in)	Horizon	Weight Fraction - Clay Free														Texture Determined <2mm	PSDA (mm) Pct of 2mm			<2mm Electrical			Whole Soil			
		Whole Soil Pct. of >2mm + Sand + Silt							<2mm Fraction / Pct of Sand + Silt																	
		>2	75-2	20-2	2- .05	.05- .002	LT .002	VC	Sands				Silt		Clay		In field	By PSDA	Sand 2-.05	Silt .05- .002	Clay LT .002	PH CA-CL ₂ .01M	Re- sist OHMS	Con- duct Mmhos	Cumult. Amounts Salt inch of H ₂ O	
									C	M	F	VF	C	F											MG/ KG	1/3 Bar to 15 Bar Airdry
0-4	A1	25	25	24	72	3	TR	17	27	29	18	6	3	1	TR	COS	COS	96.1	3.5	0.4	5.0					
4-9	A2	23	23	23	65	12	1	12	21	24	19	9	8	7	1		LCOS	84.2	14.9	0.9	5.7					
9-23	2BW	66	66	64	30	4	TR	38	24	14	5	7	6	6	1	COS	COS	88.2	11.2	0.6	6.1					
23-32	3C1	50	50	50	46	4	TR	48	26	10	7	2	3	5	1	COS	COS	92.2	7.0	0.8	6.1					
32-44	4C2	22	22	22	65	13	1	13	17	22	22	9	8	8	1	COS	LCOS	82.8	16.2	1.0	6.1					
44-60	4C3	15	15	15	76	9	1	11	22	26	22	8	4	6	1	COS	COS	89.1	10.1	0.8	6.1					

SOIL CHARACTERIZATION DATA

Map Unit Symbol		115		Soil Classification - Vitrandic Xerorthents, ashy, warm								Pedon No-86P 982		Soil Survey ID No. -S86CA-051-009				(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight						
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75			
0-3	A1	2.2	20.1	77.7	9.3	10.8	17.3	15.3	16.0	16.1	13.0	6	5	--	65	11		
3-18	A2	1.7	20.1	78.2	10.3	9.8	12.8	18.9	17.1	17.5	11.9	11	7	--	72	18		
18-41	A3	1.8	21.1	77.1	10.0	11.1	15.0	20.3	18.5	14.5	8.8	10	8	--	69	18		
41-74	2C1	1.8	22.5	75.7	8.2	14.3	12.2	12.2	16.8	18.4	16.1	7	47	--	83	54		
74-152	2C2	2.2	30.7	67.1	19.5	11.2	11.3	12.3	12.5	14.3	16.7	--	--	--	56	--		
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay			
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al		
0-3	A1	2.18	0.087			6.2	0.5	TR	0.4	7.1	4.7	0.1	11.8	9.1		4.14		
3-18	A2	1.64	0.058			6.9	0.6	TR	0.4	7.9	5.2	0.1	13.1	8.9		5.24		
18-41	A3	0.64	0.027			3.3	0.4	TR	0.5	4.2	2.8	0.1	7.0	5.0		2.78		
41-74	2C1	0.52	0.017			3.3	0.7	0.1	0.8	4.9	2.6	TR	7.5	6.0		3.33		
74-152	2C2	0.03	0.002			1.1	0.3	0.4	0.7	2.5	0.8	TR	3.3	2.9		1.32		
Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %			
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al							
0-3	A1		60	78	8.2	5.1	5.8	0.12	0.12	0.00	0.07	58		4.6	2.09			
3-18	A2		60	89	9.2	5.4	6.3	0.11	0.11	0.00	0.09	59		3.5	2.06			
18-41	A3		60	84	8.9	5.6	6.5	0.05	0.10	0.02	0.08	59		3.1	1.72			
41-74	2C1		65	82	8.0	5.6	6.5	0.03	0.04	0.01	0.04	58		4.2	2.33			
74-152	2C2		76	86	8.8	6.7	7.4	0.02	0.02	0.00	0.02	56		3.9	1.77			
Depth	Horizon	Fraction	Clay Mineralogy (.022 mm)						Sand - Silt Mineralogy (2.0 - 0.002 mm)									
			X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent							
				DSC	TGA	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			Thermal (%)		Total Retain.	Optical Grain Count 7Bla				
				7A6	7A4b						DTA 7A3b	TGA 7A4b						
0-3	A1							VFS							GS72, OT17, GA12			
3-18	A2	TCLY	KK 1	KK 5			2.6	0.7	VFS						GS80, OT15, GA 5			
18-41	A3	TCLY	MI1, KK1	KK12			3.6	0.9	VFS						GS72, OT19, GA 9			
41-74	2C1								VFS						GS59, GA21, OT20			
74-152	2C2	TCLY	MI 1	KK27			1.9	1.1	VFS						GS94, OT 6, GAtr			

DITH-CIT-Extractable (all depths) FE 6C2B-0.2, 0.2, 0.2, 0.2, 0.1 & AL 6G7A-0.1, 0.1, 0.1, TR, TR BULK DENISTY (depths 2, 3, 5) 1/3 Bar-1.24, 1.31, 1.61 & oven dry 4A1H-1.25, 1.32, 1.62 & Whole Soil 4D1-0.002, 0.002, 0.002 & (all depths) KOH Al-0.1, 0.1, 0.1, 0.0, 0.0 & HUMIC COLOR-0.0, 0.0, 0.0, 0.0, 0.0 & HLC-HF COLOR-0.09, 0.13, 0.05, 0.03, 0.02

SUPPLEMENTAL CHARACTERIZATION DATA

Soil Survey- S86CA-051-009		Map Unit 115					Pedon No. - 86P 982					Soil Classification - Vitrandic Xerorthents, ashy, warm															
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve												Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at						Atterberg (pct)		Gradation					
		Inches						Number			Microns			Millimeter			Percentile			LL	PI	CU	CC				
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05					60	50	10	
0-1	A1	100	100	100	100	100	98	95	89	60	29	10	5	2	77	63	49	35	20	0.43	0.264	0.019			23.0	0.8	
1-7	A2	100	100	100	100	100	97	94	83	55	24	10	5	1	73	59	44	29	18	0.53	0.329	0.020			26.6	1.1	
7-16	A3	100	100	100	100	100	96	92	82	59	26	10	5	1	75	63	48	31	19	0.44	0.277	0.021			21.2	1.0	
16-29	2C1	100	100	100	100	100	77	53	46	28	14	5	2	1	39	30	22	17	11	5.79	3.259	0.042			>100	1.0	
29-60	2C2	100	100	100	100	100	100	100	100	66	39	22	10	2	83	69	57	44	33	0.30	0.154	0.005			60.4	1.0	
Depth (in)	Horizon	Weight Fractions												Weight Per Unit Volume G/CC								Void Ratios					
		Whole Soil (mm)						<75 mm Fraction						Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar									
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moist	Saturated	1/3 Bar	15 Bar	Oven Dry	Moist	Saturated	Whl Soil	Bar <2 mm		
0-1	A1	11	--	--	11	--	5	6	89	11	--	5	6	89	1.53												
1-7	A2	17	--	--	17	--	6	11	83	17	--	6	11	83	1.19	1.20	1.34	1.00	1.24	1.25	1.25	1.44	1.00	0.002	0.15		
7-16	A3	18	--	--	18	--	8	10	82	18	--	8	10	82	1.24	1.25	1.38	1.00	1.31	1.32	1.32	1.49	1.00	0.002	0.14		
16-29	2C1	54	--	--	54	--	47	7	46	54	--	47	7	46	1.92												
29-60	2C2	--	--	--	--	--	--	--	100	--	--	--	--	100	1.61	1.62	1.72	1.00	1.61	1.62	1.62	1.73	1.00	0.002	0.06		
Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil												C/N Ratio	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)				
		>2	250-up	250-75	75-2	75-20	20-5	5-2	<2	2-.05	.05-.002	LT .002	Pores D		F	Fine Clay	CEC		-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil				<2mm		
																		Sum CATS	NH ₄ OAc			-15 Bar	Oven Dry	-15 Bar	Oven Dry	Whole Soil	<2mm
0-1	A1	6	--	--	6	--	3	3	94	40	10	1	42		25		5.41	4.14	2.09								
1-7	A2	20	--	--	20	--	7	13	80	29	7	1		14	28		7.71	5.24	2.06	0.176		0.3	0.3	0.3	0.3	0.12	0.15
7-16	A3	22	--	--	22	--	10	12	78	29	8	1			24		3.89	2.78	1.72	0.167		0.3	0.3	0.3	0.3	0.11	0.14
16-29	2C1	39	--	--	39	--	34	5	61	25	8	1	28		31		4.17	3.33	2.33								
29-60	2C2	--	--	--	--	--	--	--	100	41	19	1		10	15		1.50	1.32	1.77	0.091		0.02	0.2	0.2	0.2	0.06	0.06
Depth (in)	Horizon	Weight Fraction - Clay Free												Texture Determined <2mm	PSDA (mm) Pct of 2mm			<2mm Electrical			Whole Soil						
		Whole Soil Pct. of >2mm + Sand + Silt						<2mm Fraction / Pct of Sand + Silt																			
		>2	75-2	20-2	2-.05	.05-.002	LT .002	VC	M	F	VF	C	F		Clay	In field	By PSDA	Sand 2-.05	Silt .05-.002	Clay LT .002	PH Ca-CL ₂ .01M	Re-sist OHMS	Conduct Mmhos	MG/ KG	1/3 Bar to 15 Bar Airdry		
0-1	A1	11	11	11	71	18	2	13	16	16	16	18	11	10	2	COS	LCOS	77.7	20.1	2.2	5.1						
1-7	A2	17	17	17	66	17	1	12	18	17	19	13	10	10	2	COS	LCOS	78.2	20.1	1.7	5.4						
7-16	A3	18	18	18	64	18	1	9	15	19	21	15	11	10	2	COS	LS	77.1	21.1	1.8	5.6						
16-29	2C1	54	54	54	35	10	1	16	19	17	12	12	15	8	2		LCOS	75.7	22.5	1.8	5.6						
29-60	2C2				69	31	2	17	15	13	13	12	11	20	2		COSL	67.1	30.7	2.2	6.7						

SOIL CHARACTERIZATION DATA

Map Unit Symbol		111		Soil Classification- Vitrandic Xerorthents, ashly (Inclusion)						Pedon No-86P983			Soil Survey ID No. -S86CA-051-010				(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight					
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75		
3-0	OE	1.7	23.2	75.1	10.6	12.6	15.5	21.6	14.5	12.5	11.0	7	12	--	67	19	
0-10	A	1.7	23.3	75.0	10.7	12.6	15.6	22.7	15.2	12.5	9.0	6	6	2	65	14	
10-36	BW	1.3	21.5	77.2	10.0	11.5	16.6	24.1	17.4	11.9	7.2	7	6	--	36	13	
36-58	2C1	1.1	20.0	78.9	9.6	10.4	14.3	27.0	18.5	11.0	8.1	7	3	--	68	10	
58-119	2C3	1.5	15.0	83.5	7.4	7.6	13.8	35.2	19.8	9.5	5.2	5	7	18	79	50	
119-152	2C3	2.9	21.9	75.2	14.0	8.0	16.7	31.4	12.8	9.7	4.6	1	TR	--	59	1	
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)							CEC (meg/100g)			CEC/Clay	
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc	Bases Plus Al		
3-0	OE	2.81	0.102			7.8	0.7	TR	0.4	8.9	7.5		16.4	11.5		6.76	
0-10	A	2.69	0.107			13.9	0.8	0.1	0.6	15.4	5.0		20.4	13.9		8.18	
10-36	BW	0.72	0.029			4.3	0.3	TR	0.4	5.0	3.5		8.5	5.8		4.46	
36-58	2C1	0.36	0.011			3.1	0.3	TR	0.5	3.9	1.7		5.6	4.0		3.64	
58-119	2C3	0.25	0.005			1.9	0.4	0.1	0.6	3.0	2.3		5.3	3.7		2.47	
119-152	2C3	0.22	0.005			2.8	0.2	TR	1.4	4.4	2.0		6.4	4.8		1.66	

Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/Clay %
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al				
3-0	OE		54	77	8.7	5.1	5.8	0.18	0.11	0.01	0.14	58		5.1	3.00
0-10	A		75	100	9.3	6.0	6.6	0.23	0.12	0.02	0.13	58		6.9	4.06
10-36	BW		59	86	9.1	5.6	6.4	0.08	0.09	0.03	0.12	58		3.1	2.38
36-58	2C1		70	97	8.3	5.9	6.7	0.04	0.08	0.01	0.05	58		2.9	2.64
58-119	2C3		57	81	7.9	5.1	6.0	0.02	0.02	0.00	0.02	58		5.0	3.33
119-152	2C3		69	92	8.8	5.9	6.7	0.02	0.00	0.00	0.04	56		4.3	1.48

Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)						
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent				
				DSC	TGA	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			Thermal (%)		Total Retain.	Optical Grain Count 7Bla	
				7A6	7A4b						DTA 7A3b	TGA 7A4b			
3-0	OE								VFS						GS75, OT17, GA 7
0-10	A	TCLY	MT1 KK1 MI1	Gltr			2.3	0.8	VFS						GS71, OT23, GA 7
10-36	BW	TCLY	MT1 KK1 MI1	KK 5			3.4	0.8	VFS						GS76, OT18, GA 6
36-58	2C1								VFS						GS75, OT19, GA 6
58-119	2C3								VFS						GS70, OT22, GA 8
119-152	2C3	TCLY	KK 2 MI 1	KK51			2.3	0.9	VFS						GS75, OT22, GA 3

DITH-CIT-Extractable (all depths) FE-0.2, 0.2, 0.2, 0.2, 0.2, 0.2 & AL-0.1, 0.1, 0.1, TR, TR, TR

BULK DENISTY (depths 2, 3, 6) 1/3 Bar 4A1D-1.10, 1.25, 1.35 & Oven Dry-1.10, 1.25, 1.35 & Whole Soil 4D1---, --, -- & WATER CONTENT 1/3 Bar 4B1C-15.6, 7.9, 14.1

(all depths) KOH AL-0.1, 0.1, 0.1, 0.0, 0.0, 0.0 & HUMIC COLOR-6.3, 0.0, 0.0, 0.0, 0.0 & HCL-HF COLOR-0.18, 0.23, 0.09, 0.09, 0.05, 0.05

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 111		Soil Classification - Vitrandic Xerorthents, ashy (Inclusion)													Pedon No - 86P 983			NCSS Sample No									
Soil Survey- S86CA-051-010		Laboratory													Sample Date												
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve												Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at						Atterberg (pct)		Gradation					
		Inches						Number			Microns			Millimeter			Percentile			LL	PI	CU	CC				
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05	60	50	10			unifmty.	curvtur	
1-0	OE	100	100	100	100	100	94	88	81	59	27	10	5	1	72	62	50	33	20	0.45	0.247	0.020			22.2	0.8	
0-4	A	100	99	99	98	98	95	92	86	64	29	11	5	1	78	68	54	35	21	0.34	0.203	0.017			19.8	1.1	
4-14	BW	100	100	100	100	100	97	94	87	67	28	10	5	1	81	70	55	34	20	0.31	0.199	0.020			15.3	1.1	
14-23	2C1	100	100	100	100	100	99	97	90	69	26	10	4	1	83	73	56	32	19	0.29	0.198	0.021			14.1	1.3	
23-47	2C3	100	95	91	86	82	79	75	70	56	17	6	3	1	66	60	46	21	12	0.52	0.308	0.038			13.5	1.0	
47-60	2C3	100	100	100	100	100	100	100	99	82	33	17	8	3	94	85	72	41	25	0.17	0.130	0.007			26.3	3.4	
Depth (in)	Horizon	Weight Fractions												Weight Per Unit Volume G/CC								Void Ratios					
		Whole Soil (mm)								<75 mm Fraction				Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar				Whl Soil	Bar <2 mm				
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moi-st	Sat-urated	1/3 Bar	15 Bar	Oven Dry	Moist	Sat-urated				
1-0	OE	19	--	--	19	--	12	7	81	19	--	12	7	81	1.59												
0-4	A	14	--	--	14	2	6	6	86	14	2	6	6	86	1.08	1.08	1.22	1.00	1.10	1.10	1.10	1.27	1.00				
4-14	BW	13	--	--	13	--	6	7	87	13	--	6	7	87	1.21	1.21	1.29	1.00	1.25	1.25	1.25	1.35	1.00				
14-23	2C1	10	--	--	10	--	3	7	90	10	--	3	7	90	1.52												
23-47	2C3	50	7	21	22	13	5	4	50	30	18	7	5	70	1.87												
47-60	2C3	1	--	--	1	--	TR	1	99	1	--	TR	1	99	1.34	1.34	1.53	1.00	1.35	1.35	1.35	1.54	1.00				

Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil														C/N Rat- io	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)		
		>2	250- up	250- 75	75-2	75- 20	20- 5	5-2	<2	2- .05	.05- .002	LT .002	Pores		CEC		-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil		<2mm						
												D	F	Fine Clay	Sum CATS				NH ₄ OAc	-15 Bar H ₂ O	LE 1/3 Bar	-15 Bar	Oven Dry	-15 Bar	Oven Dry	Whole Soil	<2mm
1-0	OE	11	--	--	11	--	7	4	89	36	11	1	40		28		9.65	6.76	3.00								
0-4	A	15	--	--	15	2	7	7	85	26	8	1		13	25		12.00	8.18	4.06							0.08	0.10
4-14	BW	16	--	--	16	--	7	8	84	31	9	1		7	25		6.54	4.46	2.38							0.05	0.06
14-23	2C1	6	--	--	6	--	2	4	94	41	10	1	43		33		5.09	3.64	2.64								
23-47	2C3	36	5	15	16	9	4	3	64	30	5	1	29		49		3.53	2.47	3.33								
47-60	2C3	1	--	--	1	--	TR	1	99	37	11	1		18	43		2.21	1.66	1.48							0.13	0.13
Depth (in)	Horizon	Weight Fraction - Clay Free														Texture Determined <2mm	PSDA (mm) Pct of 2mm			<2mm Electrical			Whole Soil				
		Whole Soil Pct. of >2mm + Sand + Silt							<2mm Fraction / Pct of Sand + Silt																		
		>2	75-2	20-2	2- .05	.05- .002	LT .002		Sands					Silts			Clay	In field	By PSDA	Sand 2-.05	Silt .05- .002	Clay LT .002	PH CA-CL ₂ .01M	Re- sist OHMS	Con- duct Mmhos	Cumult. Amounts Salt inch of H ₂ O	
								VC	C	M	F	VF	C	F													
1-0	OE	19	19	19	62	19	1	11	13	15	22	16	13	11	2		LS	75.1	23.2	1.7	5.1						
0-4	A	14	14	12	65	20	1	9	13	15	23	16	13	11	2	COS	LS	75.0	23.3	1.7	6.0						
4-14	BW	13	13	13	68	19	1	7	12	18	24	17	12	10	1	S	LS	77.2	21.5	1.3	5.6						
14-23	2C1	10	10	10	72	18	1	8	11	19	27	14	11	10	1	S	LS	78.9	20.0	1.1	5.9						
23-47	2C3	50	22	9	42	8	1	5	10	20	36	14	8	8	2	S	LS	83.5	15.0	1.5	5.1						
47-60	2C3	1	1	1	77	22	3	5	10	13	32	17	8	14	3	S	LS	75.2	21.9	2.9	5.9						

SOIL CHARACTERIZATION DATA

Map Unit Symbol		111		Soil Classification- Vitrandic Xeropsamments								Pedon No-86P 984		Soil Survey ID No. -S86CA-051-011				(>2MM) Wt. % of Whole Soil
Depth (cm)	Horizon	Total			Silt (%)		Sand (%)					Course Fractions (mm) - Weight						
		% Clay	% Silt	% Sand	Fine	Coarse	V. Fine	Fine	Med.	Coarse	V. Coarse	2-5	5-20	20-75	.1-75			
0-8	A1	1.5	19.8	78.7	9.2	10.6	13.5	20.8	17.1	15.2	12.1	7	4	--	69	11		
8-18	A2	1.0	19.7	79.3	9.3	10.4	13.2	20.9	19.0	16.4	9.8	9	4	--	71	13		
18-33	BW1	1.5	19.6	78.9	8.9	10.7	14.2	23.4	19.5	14.4	7.4	7	3	--	68	10		
33-86	BW2	2.1	16.5	81.4	8.5	8.0	12.5	22.2	20.3	16.0	10.4	9	5	TR	73	14		
86-152	C	1.7	16.9	81.4	8.5	8.4	14.0	24.7	20.8	14.2	7.7	11	3	--	72	14		
Depth (cm)	Horizon	Organic C %	Total N	Extractable P	Total S	Cations (meg/100g)						CEC (meg/100g)			CEC/Clay			
						Ca	Mg	Na	K	Sum Bases	Acidity	Extractable Al	Sum. Cats.	NH ₄ OAc		Bases Plus Al		
0-8	A1	1.64	0.073			5.0	0.4	TR	0.5	5.9	3.8		9.7	7.0		4.67		
8-18	A2	0.67	0.030			2.2	0.3	TR	0.5	3.0	3.2		6.2	5.2		5.20		
18-33	BW1	0.44	0.018			1.4	0.1	TR	0.4	1.9	3.2		5.1	3.9		2.60		
33-86	BW2	0.19	0.012			2.0	0.3	0.1	0.4	2.8	1.8		4.6	3.9		1.86		
86-152	C	0.07	0.006			1.0	0.3	0.1	0.3	1.7	2.3	0.4	4.0	3.2	2.1	1.88		
Depth (cm)	Horizon	Al Sat. (%)	Base Saturation (%)		pH			Acid Oxalate Extraction (%)				P Reten. (%)	KCl Mn (ppm)	-15 Bar Water %	-15 Bar/ Clay %			
			Sum	NH ₄ OAc	NaF	CaCl ₂	H ₂ O	Optical Density	Fe	Si	Al							
0-8	A1		61	84	9.3	5.6	6.4	0.10	0.15	0.01	0.09	57		5.7	3.80			
8-18	A2		48	58	9.5	5.3	6.2	0.06	0.13	0.01	0.09	58		3.4	3.40			
18-33	BW1		37	49	9.3	4.9	5.9	0.05	0.14	0.01	0.08	58		3.2	2.13			
33-86	BW2		61	72	8.0	4.9	5.8	0.03	0.09	0.00	0.01	58		3.5	1.67			
86-152	C	19	42	53	7.8	4.3	5.4	0.02	0.06	0.00	0.00	58		3.2	1.88			
Depth	Horizon	Clay Mineralogy (.022 mm)							Sand - Silt Mineralogy (2.0 - 0.002 mm)									
		Fraction	X-Ray Peak Size 7A2i	Thermal (%)		Element			Fraction	X-Ray Peak Size 7A2i	Percent							
				DSC	TGA	Al ₂ O ₃	Fe ₂ O ₃	K ₂ O			Thermal (%)		Total Retain.	Optical Grain Count 7B1a				
				7A6	7A4b						DTA 7A3b	TGA 7A4b						
0-8	A1	TCLY	KK 1, MI 1	KKtr	--			2.9	0.6	VFS					GS62, OT25, GA14			
8-18	A2	TCLY	MT 1, KK 1	KK 9				3.9	0.8	VFS					GS76, OT19, GA 5			
18-33	BW1									VFS					GS69, OT22, GA 9			
33-86	BW2	TCLY	MT1, KK1, ML1	KK 5				3.6	0.7	VFS					GS75, OT20, GA 5			
86-152	C	TCLY	KK 2, MI 1	KK23				4.1	1.0	VFS					GS66, OT28, GA 6			

DITH-CIT - Extractable (all depths) FE-0.2, 0.2, 0.2, 0.2, 0.2 & AL-0.1, 0.1, 0.1, TR, TR

(all depths) KOH AL-0.1, 0.1, 0.1, 0.0, 0.0 & HUMIC COLOR-0.0, 0.0, 0.0, 0.0, 0.0 & HCl-HF COLOR-0.15, 0.08, 0.05, 0.09, 0.04

SUPPLEMENTAL CHARACTERIZATION DATA

Map Unit 111		Soil Classification - Vitrandic Xeropsamments										Pedon No -86P 984			Soil Survey -S86CA-051-011											
Depth (in)	Horizon	Engineering PSDA Percentage Passing Sieve											Cumulative Curve Fractions (<75mm) USDA < than Diameters (mm) at							Atterberg (pct)		Gradation				
		Inches						Number					Millimeter				Percentile			LL	PI	CU	CC			
		3	2	3/2	1	3/4	3/8	4	10	40	200	20	5	2	1.	.5	.25	.10	.05					60	50	10
0-3	A1	100	100	100	100	100	98	96	89	61	26	10	5	1	78	65	49	31	19	0.40	0.256	0.021			19.3	1.1
3-7	A2	100	100	100	100	100	98	96	87	60	25	9	4	1	78	64	48	29	18	0.42	0.276	0.022			18.9	1.1
7-13	BW1	100	100	100	100	100	99	97	90	66	26	9	5	1	83	70	53	32	19	0.33	0.221	0.021			15.6	1.2
13-34	BW2	100	100	100	100	100	98	95	86	59	22	9	5	2	77	63	46	27	16	0.44	0.295	0.023			19.5	1.4
34-60	C	100	100	100	100	100	99	97	86	63	23	9	4	1	79	67	49	28	16	0.38	0.257	0.023			16.2	1.3
Depth (in)	Horizon	Weight Fractions											Weight Per Unit Volume G/CC										Void Ratios			
		Whole Soil (mm)							<75 mm Fraction				Whole Soil Soil Survey Engineering				<2mm Fraction Soil Survey Engineering at 1/3 Bar									
		>2	250-up	250-75	75-2	75-50	20-5	5-2	<2	75-2	75-20	20-5	5-2	<2	1/3 Bar	Oven Dry	Moi-st	Satur-ated	1/3 Bar	15 Bar	Oven Dry	Moist	Satur-ated	Whl Soil	Bar <2 mm	
0-3	A1	11	--	--	11	--	4	7	89	11	--	4	7	89	1.52											
3-7	A2	13	--	--	13	--	4	9	87	13	--	4	9	87	1.54											
7-13	BW1	10	--	--	10	--	3	7	90	10	--	3	7	90	1.52											
13-34	BW2	14	--	--	14	TR	5	9	86	14	TR	5	9	86	1.56											
34-60	C	14	--	--	14	--	3	11	86	14	--	3	11	86	1.55											
Depth (in)	Horizon	Volume Fractions Whole Soil (mm) at 1/3 Bar Pct. of Whole Soil													C/N Ratio	Ratios to Clay 2mm Fraction				Linear Extensibility 1/3 Bar to (Pct)				WRD (in./in.)		
		>2	250-up	250-75	75-2	75-20	20-5	5-2	<2	2-.05	.05-.002	LT .002	D Pores F	Fine Clay		CEC	-15 Bar H ₂ O	LE 1/3 Bar	Whole Soil	<2mm						
		Sum CATS	NH ₄ OAc																							
0-3	A1	6	--	--	6	--	2	4	94	40	10	1	43	22		6.47	4.67	3.80								
3-7	A2	8	--	--	8	--	2	5	92	40	10	1	42	22		6.20	5.20	3.40								
7-13	BW1	6	--	--	6	--	2	4	94	41	10	1	43	24		3.40	2.60	2.13								
13-34	BW2	8	--	--	8	TR	3	5	92	40	8	1	41	16		2.19	1.86	1.67								
34-60	C	8	--	--	8	--	2	6	92	41	9	1	41	12		2.35	1.88	1.88								
Depth (in)	Horizon	Weight Fraction - Clay Free													Texture Determined <2mm	PSDA (mm) Pct of 2mm			<2mm Electrical			Whole Soil				
		Whole Soil Pct. of >2mm + Sand + Silt							<2mm Fraction / Pct of Sand + Silt							In field	By PSDA	Sand 2-.05	Silt .05-.002	Clay LT .002	PH CA-CL ₂ .01M	Re-sist OHMS	Conduct Mmhos	Cumult. Amounts Salt inch of H ₂ O		
		>2	75-2	20-2	2-.05	.05-.002	LT .002		VC	C	M	F	VF	C										F		MG/ KG
0-3	A1	11	11	11	71	18	1	12	15	17	21	14	11	9	2	COS	LCOS	78.7	19.8	1.5	5.6					
3-7	A2	13	13	13	70	17	1	10	17	19	21	13	11	9	1	COS	LCOS	79.3	19.7	1.0	5.3					
7-13	BW1	10	10	10	72	18	1	8	15	20	24	14	11	9	2	COS	LS	78.9	19.6	1.5	4.9					
13-34	BW2	14	14	14	71	14	2	11	16	21	23	13	8	9	2	COS	LCOS	81.4	16.5	2.1	4.9					
34-60	C	14	14	14	71	15	1	8	14	21	25	14	9	9	2	COS	LS	81.4	16.9	1.7	4.3					

References

- (1) U.S. Forest Service. May 1976. Region 5 supplement: Preliminary copy of FSH 2509.14, Soil Survey Procedures Handbook.
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- (4) U.S. Forest Service, Pacific Southwest Region. Regional Ecology Group. 1981. CALVEG, A Classification of California Vegetation.
- (5) United States Department of Agriculture. 1951. Soil Survey Manual. United States Department of Agriculture Handbook 18, 503 pp., illus. (Various supplements replacing various parts, issued December 1979 to October 1994).
- (6) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conservation Service, United States Department of Agriculture Handbook 436, 754 pp., illus.
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Glossary

- Adamellite.** A phaneritic rock containing major plagioclase, orthoclase and quartz, with minor amounts of biotite and hornblende.
- Alkaline Soil.** Any soil having a pH higher than 7.0.
See Reaction, soil.
- Alluvial depressions.** Low-lying areas subject to alluvial deposition. These include playas, basins, stream valleys, washes and other drainages.
- Alluvial fan.** A sloping, fan-shaped mass of sediment deposited by a stream where it emerges from an upland onto a plain.
- Alluvial terrace.** An old alluvial plain, ordinarily flat or hummocky, bordering a river, lake or sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.
- Alluvium.** Material, such as sand, silt, or clay, deposited on land by water action.
- Andesite.** A volcanic rock composed essentially of andesine and one or more mafic constituents.
- Argillic horizon.** **See Diagnostic horizons.**
- Aspect.** The direction a slope is facing; its exposure in relation to the sun.
- Association, soil.** A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.
- Available water capacity (available moisture capacity).** The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It commonly is expressed in inches of water per inch of soil.
- Ballena.** A ridgecrest (literally, a whale).
- Basalt.** An extrusive rock composed primarily of calcic plagioclase and pyroxene, with or without olivine.
- Base saturation.** The degree to which material having cation exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K) expressed as a percentage of the total cation exchange capacity.
- Bedrock.** Solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.
- Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.
- Calcareous soil.** A soil containing enough calcium carbonate (commonly occurring with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.
- Calcic horizon.** **See Diagnostic horizons.**
- Cambic horizon.** **See Diagnostic horizons.**
- Canyon.** A long, deep, narrow, very steep-sided valley with high and precipitous walls in an area of high local relief.
- Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.
- Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value.
- Cirque.** Semicircular, concave, bowl-like areas that have steep faces primarily resulting from glacial ice and snow abrasion.
- Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
- Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels
Synonyms: Clay coating, clay skin.

Claypan. A dense, compact layer in the subsoil having a much higher clay content than the overlying material, from which it is separated by a sharply defined boundary; formed by downward movement of clay or by synthesis of clay in place during soil formation. Claypans mainly are hard when dry and plastic and sticky when wet. They generally impede the movement of water and air and the growth of plant roots.

Cobble. A fragment of rock 3 to 10 inches (7.62 to 25.40 cm) in diameter.

Colluvial slope. An inclined surface usually at the base of mountainsides formed by material transported and deposited by mass wasting (direct gravitational action) and local unconcentrated runoff.

Colluvium. A deposit of soil material, rock fragments, or both, accumulated on steep slopes or at the base of steep slopes primarily by the action of gravity but facilitated by the overland flow of water.

Color. See **Munsell notation**.

Compaction, soil. Densifying or increasing the unit weight of a soil mass and inversely decreasing its porosity. The degree of compaction is a function of soil moisture, the nature of soil involved, and pressure applied.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate geographical pattern or so small in area that it is not practical to map them separately at the selected scale of mapping.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose. Noncoherent when dry or moist; does not hold together in a mass.

Friable. When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm. When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic. When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky. When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard. When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft. When dry, breaks into powder or individual grains under very slight pressure.

Cemented. Hard; little affected by moistening.

Consociation, soil. A map unit in which only one kind of soil or miscellaneous area dominates.

Control Section. That part of a soil profile containing the horizons that determine the placement of the soil in the new system of soil classification. Generally, these horizons are between a depth of 10 inches and 40 inches.

Cryic soil temperature regime. A soil temperature regime where mean annual soil temperature is higher than 32° F. (0°C), but lower than 47° F (8°C). and the mean summer soil temperature is less than 59° F. (15°C), at a depth of 20 inches or at a lithic or paralithic contact, whichever is shallower.

Depth Class. The distance from the surface of the soil to underlying bedrock, consolidated substratum, or other material that would greatly restrict either root distribution or soil moisture and nutrient supply.

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

Diagnostic horizons. As used in the soil classification system of the National Cooperative Soil Survey in the United States, combinations of specific characteristics that indicate certain classes of soils. Those that occur at the soil's surface are called epipedons. Those below the surface are called diagnostic subsurface horizons.

Argillic horizon. A subsurface horizon into which clay has moved. It has more than 1.2 times the amount of clay that the horizons above it have. The presence of clay films on ped surfaces and in soil pores is evidence of clay movement.

Calci horizon. A horizon of accumulation of calcium carbonate or of calcium carbonate and magnesium carbonate, usually in the C horizon, but may also be in other horizons such as a mollic epipedon, an argillic or a natric horizon, or a duripan.

Cambic horizon. A subsurface horizon that is finer than loamy fine sand in texture and in which materials have been altered or removed, but have not accumulated. Elimination of fine stratification; changes caused by wetness, such as gray color and mottling; redistribution of carbonates; and yellower or redder color than in underlying horizons are evidence of alteration.

Mollic epipedon. A dark-colored surface horizon, generally more than 7 inches thick. It contains more than 1 percent organic matter and has more than 50 percent base saturation. It is not both hard and massive when dry. Color is darker than 3.5 in value when moist and 5.5 in value when dry, and is less than 3.5 in chroma when moist.

Ochric epipedon. A surface horizon that is too light in color (higher in value or chroma than a mollic epipedon), too low in organic matter or too thin to be a mollic or umbric epipedon.

Pachic epipedon. A dark-colored surface horizon, similar to the Mollic epipedon, but thicker than 20 inches.

Dolomite. A mineral, $\text{CaMg}(\text{CO}_3)_2$, commonly with some Fe replacing the Mg.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained. Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained. Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained. Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained. Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained. Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained. Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, or nearly continuous rainfall, or a combination of these.

Very poorly drained. Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Very poorly drained soils are commonly level or depressed and are frequently ponded.

Drainages, modern. A drainage whose capacity to transport a load is greater than the load it is called upon to carry. These drainages usually have a steep gradient and therefore swift water movement. (Contrast with a mature drainage, whose capacity to transport a load is equal to the load it is called upon to carry.)

Drainages, recent. See **Drainages, modern.**

Durinodes. Silica-cemented soil aggregates.

Duripan. A subsurface horizon that is cemented by silica to the point that fragments from the air-dry horizon will not slake after prolonged soaking in water or hydrochloric acid.

Effective Rooting Depth. The depth to which a soil is readily penetrated by roots and used for extraction of water and plant nutrients. The classes of effective rooting depth are very deep (more than 60 inches), deep (40 to 60 inches), moderately deep (20 to 40 inches), shallow (10 to 20 inches) and very shallow (less than 10 inches).

Effervescence. The reaction of soil carbonates to 1 Normal hydrochloric acid. The classes of effervescence are slightly, strongly and violently effervescent. Soils with slight effervescence form readily observable gas bubbles; soils with strong effervescence form a low gas foam; and soils with violent effervescence form a thick gas foam, which "jumps" up.

Eluviation. The movement of material from one place to another within the soil, in either true solution or colloidal suspension. Soil horizons that have lost material through eluviation are said to be eluvial, while those that receive material are illuvial.

Eolian. Soil material accumulated through wind action.

Epipedon. A horizon at the soil surface which has been either appreciably darkened by organic matter or eluviated, or, as a minimum, the rock structure has been destroyed. Also see Diagnostic horizons.

Erosion. The wearing away of the land surface by running water, waves, moving ice, wind, or other geologic processes, such as mass wasting or gravitational creep. Also, the detachment and movement of soil or rock. Geologic erosion refers to natural processes occurring over long periods of time. Accelerated erosion is erosion much more rapid than natural geologic erosion, primarily as a result of the influence of the activities of man or, in some cases, of animals.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and produced by erosion or faulting. The steep face frequently presented by the abrupt termination of stratified rocks.

Family, soil. A grouping of soils within a subgroup having similar physical and chemical properties that affect their responses to management and manipulation for use.

Forb. Any herbaceous plant that is not a grass nor a sedge.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the oven-dry

weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain.

Flood plain. The land bordering a stream, built up of sediments from overflow of the stream and subject to inundation when the stream is at flood stage.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet and fringes a mountain range or high-plateau escarpment.

Frigid Soil Temperature regime. A soil temperature regime that has a mean annual soil temperature lower than 47°F (8°C) and the difference between mean winter and mean summer soil temperature is more than 9° F. (5°C) at a depth of 20 inches (50 centimeters) or at a lithic or paralithic contact, whichever is shallower.

Glacial moraine. See **Moraine.**

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial melt water.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, gravel, and boulders transported and deposited by glacial ice.

Granitic rock. Light-colored, coarse-grained rock formed by solidification from a molten or partially molten state.

Granodiorite. A plutonic rock consisting of quartz, calcic oligoclase or andesite, and orthoclase with biotite, hornblende or pyroxene.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 mm. to 7.5 cm.) in diameter. An individual piece is a pebble.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. It is larger than 4 inches (10 centimeters) deep and 6 inches (15 centimeters) wide.

Hard bedrock. See **Lithic Contact.**

Hardpan. Synonymous with **Duripan.**

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soils are as follows:

O horizon. An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon. The mineral horizon forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material.

B horizon. The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused by (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) by a combination of these.

C horizon. The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizons. The material of a C horizon may be either like or unlike that in which the solum is presumed to have formed. If the material is known to differ from that in the solum, the number 2 precedes the letter C.

R layer. Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have

Igneous rock. Rock that formed from the cooling and solidification of magma and that has not been changed appreciably since its formation.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. Since part of the fine clay in the B horizon (subsoil) of many soils has moved into the B horizon from the

A horizon above, the B horizon is called an illuvial horizon.

Inclusions. Soils occurring in the map unit that are not identified by their names because the area they occupy is too small.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Lava flow. See **Volcanic flow.**

Limestone. A bedded sedimentary deposit consisting chiefly of calcium carbonate.

Lithic contact. The boundary between soil and continuous, coherent, underlying material (hard rock), which is hard enough to prohibit digging with hand tools and if fractured the pieces are not displaced relative to each other.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Marble. A metamorphic rock composed essentially of calcite and/or dolomite.

Miscellaneous area. An area that has little or no natural soil material capable of supporting vegetation (for example, Rock outcrop).

Mesic soil temperature regime. A soil temperature regime in which the mean annual soil temperature is 47°F. (8°C) or higher but lower than 59° F. (15°C), and the difference between mean summer and mean winter soil temperature is more than 9° F. (5°C) at a depth of 20 inches (50 centimeters) or at a lithic or paralithic contact, whichever is shallower.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition or structure by heat, pressure and movement. Nearly all such rocks are crystalline.

Metasedimentary rock. Sedimentary rock altered in mineralogical composition, chemical composition or structure by heat, pressure and movement.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of an organic soil.

Mollic epipedon. See **Diagnostic horizons**.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (related to a plateau) and generally having steep sides and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Munsell notation. A designation of color by degrees of the three single variables; hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Nutrient, plant. Any element taken in by a plant that is essential to its growth. Plant nutrients are mainly nitrogen, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron and zinc obtained from the soil; and carbon, hydrogen and oxygen obtained from the air and water.

Ochric epipedon. See **Diagnostic horizons**.

Older alluvial fan. An alluvial fan that is a remnant of old landslides or debris flows.

Organic layer. A layer of fresh and decaying plant residue at the surface of a mineral soil.

Organic matter, soil. The organic fraction of the soil including plant and animal residues at various stages of decomposition, cells and tissues of soil organisms, and substances synthesized by organisms living in the soil. Soil organic matter commonly is determined by measuring the amount of organic material in a soil sample passed through a 2-millimeter sieve.

Pachic epipedon. See **Diagnostic horizons**.

Paralithic contact. A boundary between soil and continuous coherent underlying material. If the underlying material is a single mineral, it has a hardness by Moh's scale of less than 3. If it is not a single mineral, chunks of gravel size that can be broken out will disperse more or less completely during 15 hours of end-over-end shaking in water or in sodium

hexametaphosphate solution and, when moist, the material can be dug with difficulty with a spade. There may be cracks in the rock, but the horizontal spacing between cracks should be 10 cm or more.

Parent material. The unconsolidated and more or less chemically weathered mineral or organic matter from which the solum of soils is developed by pedogenic processes.

Particle-size class. The grain-size distribution of the whole soil. It is not the same as texture, which refers to the fine-earth fraction (material 2 mm is smaller). The following are those recognized in this survey area:

Sandy-skeletal. Rock fragments 2 mm in diameter or larger make up 35 percent or more of the soil by volume, there is enough fine earth to fill the interstices larger than 1 mm, and the fraction finer than 2 mm is sandy, as defined for the sandy particle-size class.

Loamy-skeletal. Rock fragments make up 35 percent or more of the soil by volume, there is enough fine earth to fill interstices larger than 1 millimeter, and the fraction finer than 2 millimeters is loamy, as defined for the loamy particle-size class.

Clayey-skeletal. Rock fragments make up 35 percent or more of the soil by volume, there is enough fine earth to fill interstices larger than 1 millimeter and the fraction finer than 2 millimeters is clayey, as defined for the clayey particle-size class.

Sandy. The texture of the fine earth is a sand or loamy sand that is coarser than very fine sand or loamy very fine sand respectively, and rock fragments make up less than 35 percent by volume.

Loamy. The texture of the fine earth is loamy very fine sand, very fine sand or finer, but the amount of clay is less than 35 percent, and the rock fragments are less than 35 percent by volume.

Coarse-loamy. By weight, 15 percent or more of the particles are fine sand (0.25 to 0.1 millimeter in diameter) or coarser, including fragments up to 7.5 centimeters in diameter; and there is less than 18 percent clay in the fine-earth fraction.

Fine-loamy. By weight, 15 percent or more of the particles are fine sand (0.25 to 0.1 millimeters in diameter) or coarser, including fragments up to 7.5 centimeters in diameter; and there is

18 through 34 percent clay in the fine-earth fraction.

Clayey. The fine earth contains 35 percent or more clay by weight, and the rock fragments are less than 35 percent by volume.

Pebble. A fragment of rock, up to 3 inches (7.62 centimeters) in diameter. An individual piece of gravel.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedogenesis. Soil genesis or soil formation; the natural development of horizons. (See Soil formation factors).

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit the study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Pergelic soil temperature regime. A soil temperature regime in which the mean annual soil temperature is lower than 32°F (0°C), at a depth of 20 inches (50 centimeters), or at a lithic or paralithic contact, whichever is shallower.

Permeability. The quality of the soil that enables water to move downward through the profile.

Phase, soil. A subdivision of a soil family or other unit in the soil classification system, based on differences in the soil that affect its use and management but are too small to justify making it a separate taxonomic unit. The phases used in this survey are based on differences in slope, climate, depth, or stoniness. Phases used are:

pH value. A numerical designation of acidity and alkalinity in soil. See **Reaction, soil**.

Plutonic rock. An igneous rock formed at great depth by magmatic crystallization or chemical alteration.

Precipitation, mean annual. The average precipitation received annually by an area. It includes both rainfall and snow.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Pyroclastic rock. Any rock consisting of unworked solid material of whatever size, explosively or aerially ejected from a volcanic vent.

Quartz monzonite. Synonymous with **Adamellite**.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity (pH) is expressed as:

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum or residual soil material. Unconsolidated, weathered or partly weathered mineral materials accumulated by disintegration of consolidated rock in place.

Rhyolite. The aphanitic (fine rock texture) equivalent of granite.

Rhyolitic tuff. A rock formed from compacted rhyolite fragments, generally less than 4 millimeters in diameter.

Ridge. A long, narrow elevation of the land surface, usually sharp crested with steep sides.

Rill. A steep-sided channel in the soil surface less than 4 inches (10 centimeters) deep and 6 inches (15 centimeters) wide, caused by the washing away of soil material.

Riverwash. Barren alluvial land, usually coarse-textured, exposed along streams at low water and subject to shifting during normal high water. A miscellaneous land type.

Roadcut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters (0.078 inches) or more; in order of increasing size, gravel (pebbles), cobbles, stones, and boulders.

Rubbleland. An area with 90 percent or more surface cover of stones and boulders.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. A cemented or otherwise compacted detrital sediment composed predominantly of quartz grains.

Sediment. Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, or ice, and has come to rest on the earth's surface.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Sensitivity. The relative susceptibility of a soil to a decrease of its inherent productivity after being disturbed.

Shale. A sedimentary rock formed by induration of a clay or silty clay deposit and having the tendency to split into thin layers.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. A very fine-grained consolidated clastic rock composed predominantly of particles of the silt grade.

Slate. A fine-grained metamorphic rock possessing a well-developed fissility (slaty cleavage).

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Soft bedrock. See **Paralithic contact**.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil Depth Class. The depth classes used in this survey area are:

Shallow. Less than 20 inches to a lithic or paralithic contact, or a duripan.

Moderately deep. 20 to 40 inches to the contact.

Deep. 40 to 60 inches to the contact.

Very deep. Greater than 60 inches to the contact.

Soil formation factors. The variables - parent material, climate, organisms, topography, and time-active in and responsible for the formation of soil.

Soil pores. That part of the bulk volume of soil not occupied by soil particles; the interstices or voids.

Soil Separates. The individual size-groups of mineral particles. See **Clay, Silt, and Sand**.

Soil survey. The systematic examination, description, classification, and mapping of soils in an area. Soil surveys are classified according to the kind and intensity of field examination.

Soil Temperature regimes. Are based on mean annual soil temperature and difference between mean summer and mean winter temperature. Soil temperature is determined at a depth of 20 inches (50 cm) or at a lithic or paralithic contact, whichever is shallower. Unless indicated in a higher category, soil temperature classes are used at the family level. See **Mesic, Frigid, Cryic and Pergelic soil temperature regimes**.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are

active. The solum in mature soils consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Strata. Layers in sedimentary rock formations.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. The soil structure grades are structureless, weak, moderate, and strong. Structureless soils are either single grained (noncoherent) or massive (coherent).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "A horizon."

Talus. Fragments of rock and other soil material accumulated at the foot of cliffs or steep slopes.

Temperature, mean annual. The average air temperature of an area on a yearly basis.

Temperature, mean annual soil. The average soil temperature at a depth of 20 inches (50 centimeters), on a yearly basis.

Temperature, mean summer soil. The average soil temperature at a depth of 20 inches (50 centimeters), for the months of June, July and August.

Temperature, mean winter soil. The average soil temperature at a depth of 20 inches (50 centimeters), for the months of December, January and

February.

Temperature regimes, soil. See **Thermic, Mesic, Frigid, Cryic and Pergelic soil temperature regimes.**

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." See **Clay, Silt and Sand.**

Texture modifier. Adjective included in a soil textural class name, based on the percentage of rock fragments in the soil. Examples:

Gravelly	15 to 35 percent
Very gravelly	35 to 60 percent
Extremely gravelly	over 60 percent

Thermic soil temperature regime. A soil temperature regime that has mean annual soil temperature of 59° F. (15°C) or higher but lower than 72° F. (22°C), and the difference between mean summer and mean winter soil temperatures is more than 9° F (5°C) at a depth of 20 inches (50 centimeters) or at a lithic or paralithic contact, whichever is shallower.

Till plain. An extensive flat to undulating area underlain by glacial till.

Toeslope. The geomorphic component that forms the outermost, gently-inclined surface at the base of a mountainside.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Upland basin. A nearly level to gently sloping depressed area in mountains with limited or no surface outlet.

Volcanic flow. A mass of deep-seated igneous material extruded onto the earth's surface typically forming a gently to moderately sloping, relatively flat incline.

Volcanic rock. The class of igneous rocks that have been poured out or ejected at or near the earth's surface.

Water table. The upper surface of ground water or that level in the ground where water is at atmospheric pressure.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Wilting point. The moisture content of soil, on an oven-dry basis, at which a plant wilts so much that it does not recover when placed in a humid, dark chamber.

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