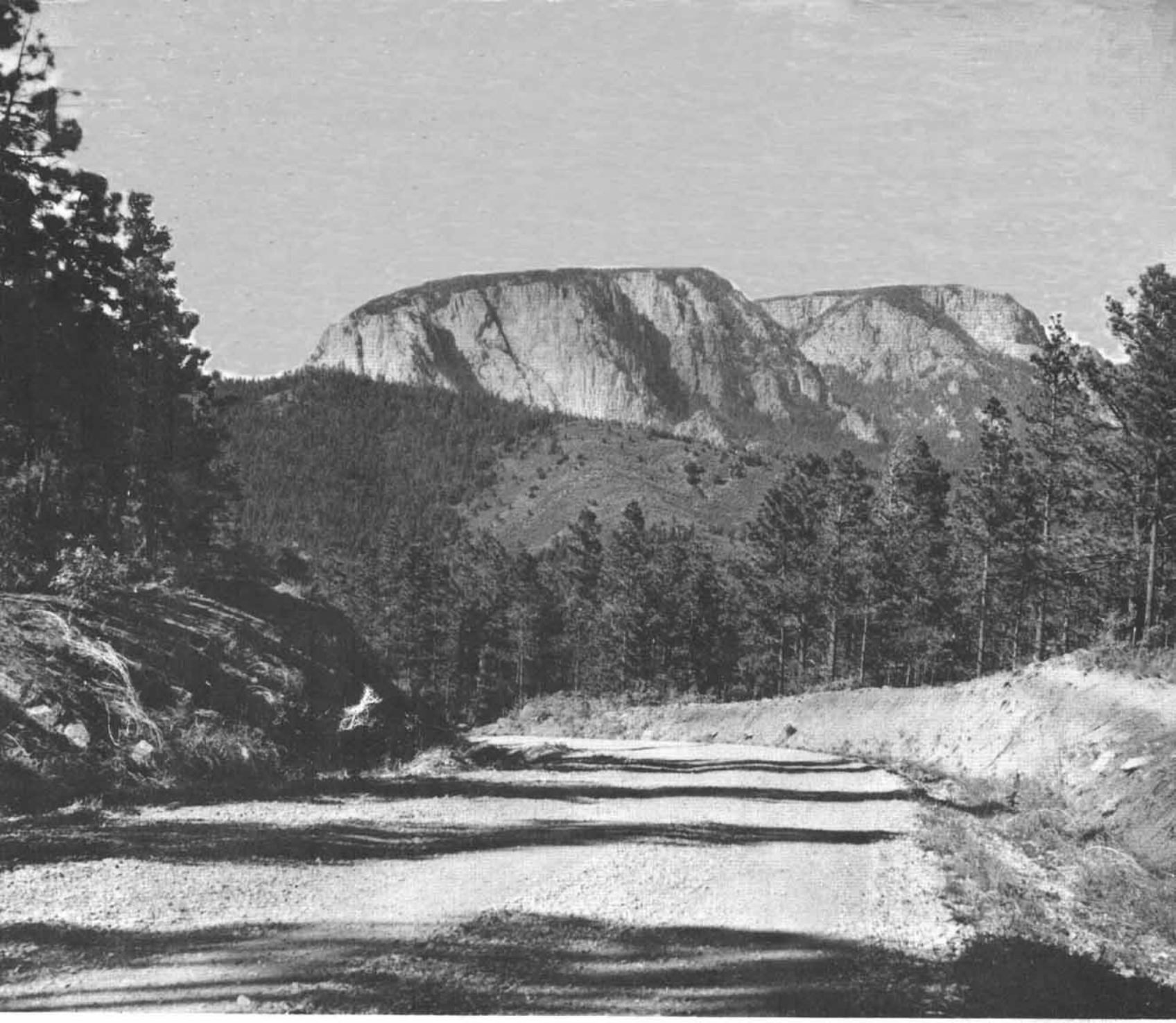
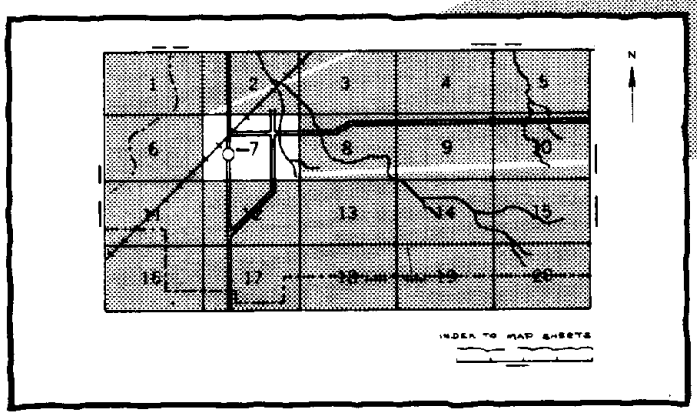


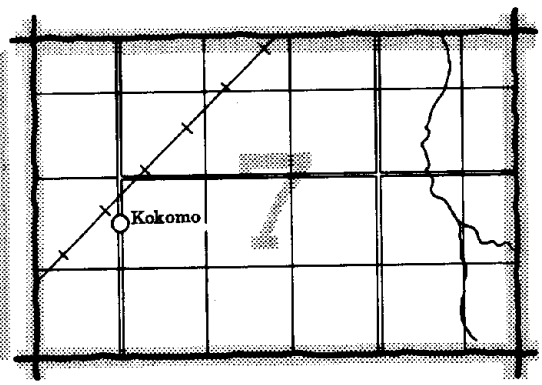
Soil Survey of
San Miguel County Area, New Mexico

United States Department of Agriculture
Soil Conservation Service and Forest Service
in cooperation with
the New Mexico Agricultural Experiment Station

HOW TO USE

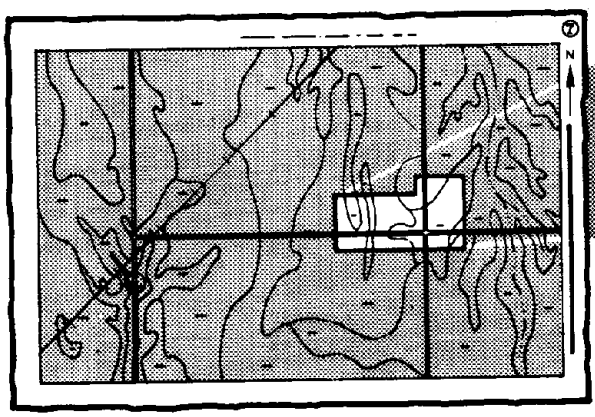
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

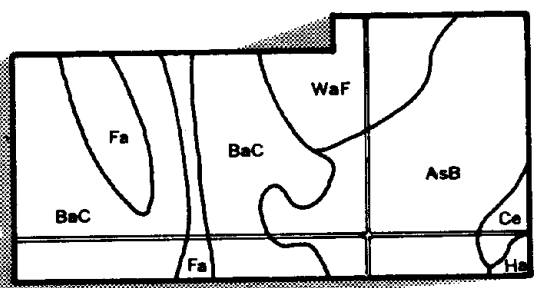




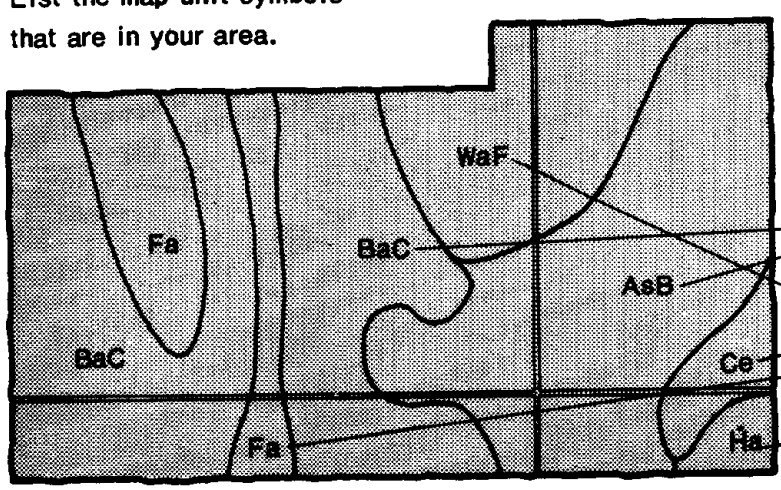
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area.

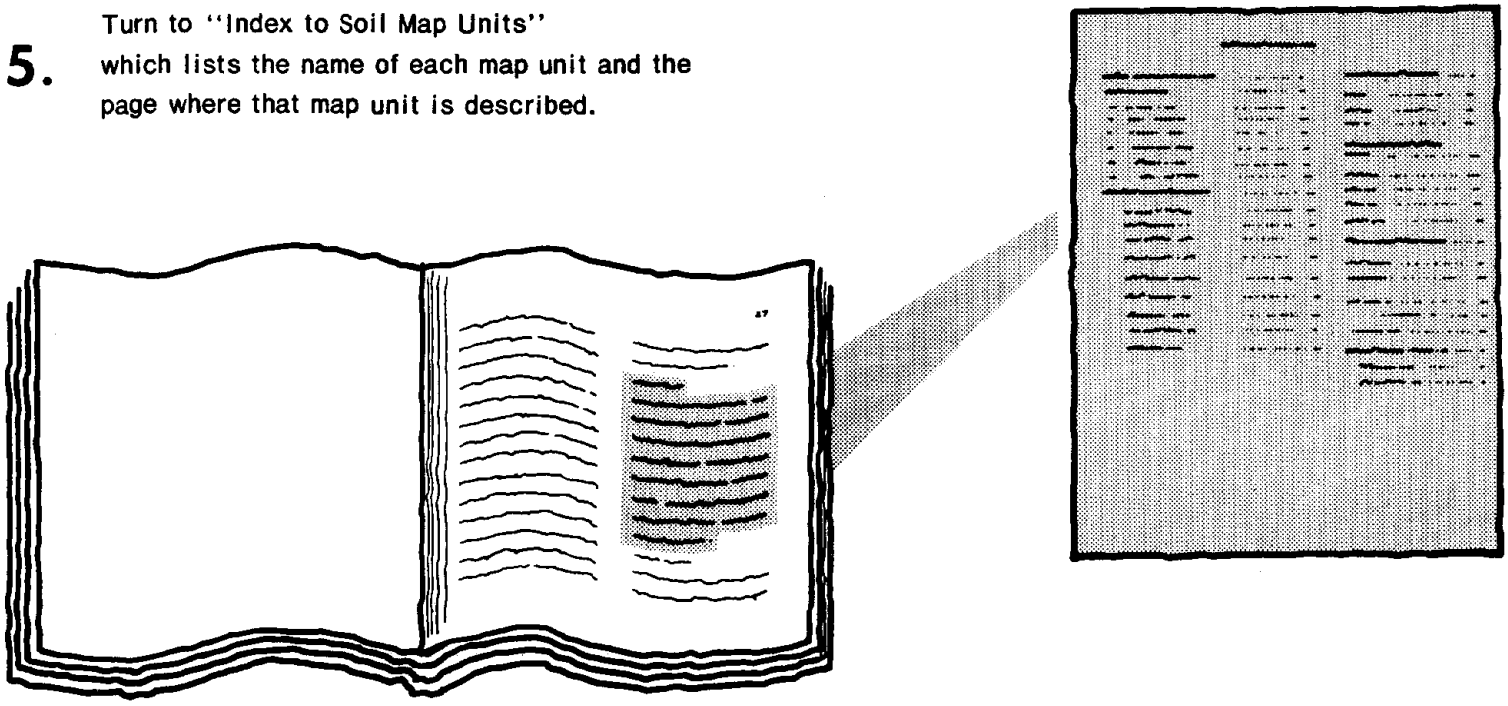


Symbols

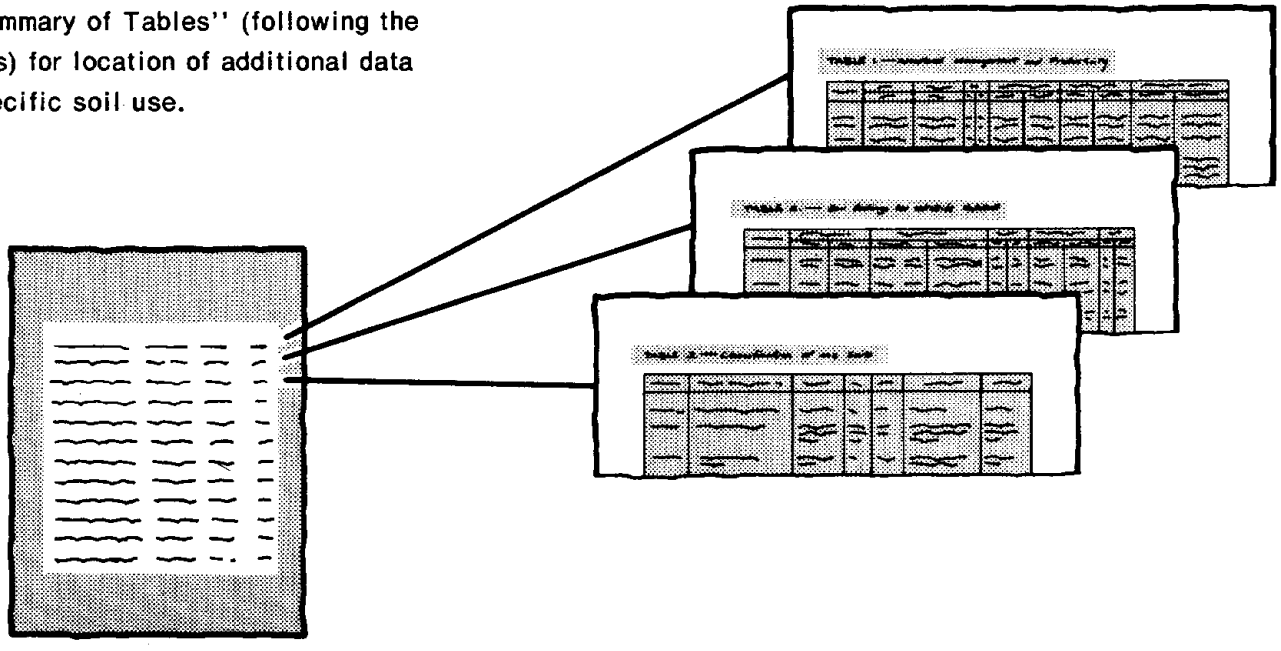
AsB
BaC
Ce
Fa
Ha
WaF

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period of 1967-77. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1977. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, and the New Mexico Agricultural Experiment Station. It is part of the technical assistance furnished to the Canadian River, Guadalupe, Mesa, Tierra y Montes, Upper Pecos, and Ute Creek Soil and Water Conservation Districts.

Soil maps in this survey may be copied without permission, but any enlargement of these maps could cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: View of Hermit Peak, a prominent landmark in the survey area.

Contents

Issued January 1981

Index to soil map units

Summary of tables

Summary of tables—Continued

Foreword

The Soil Survey of the San Miguel County Area contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

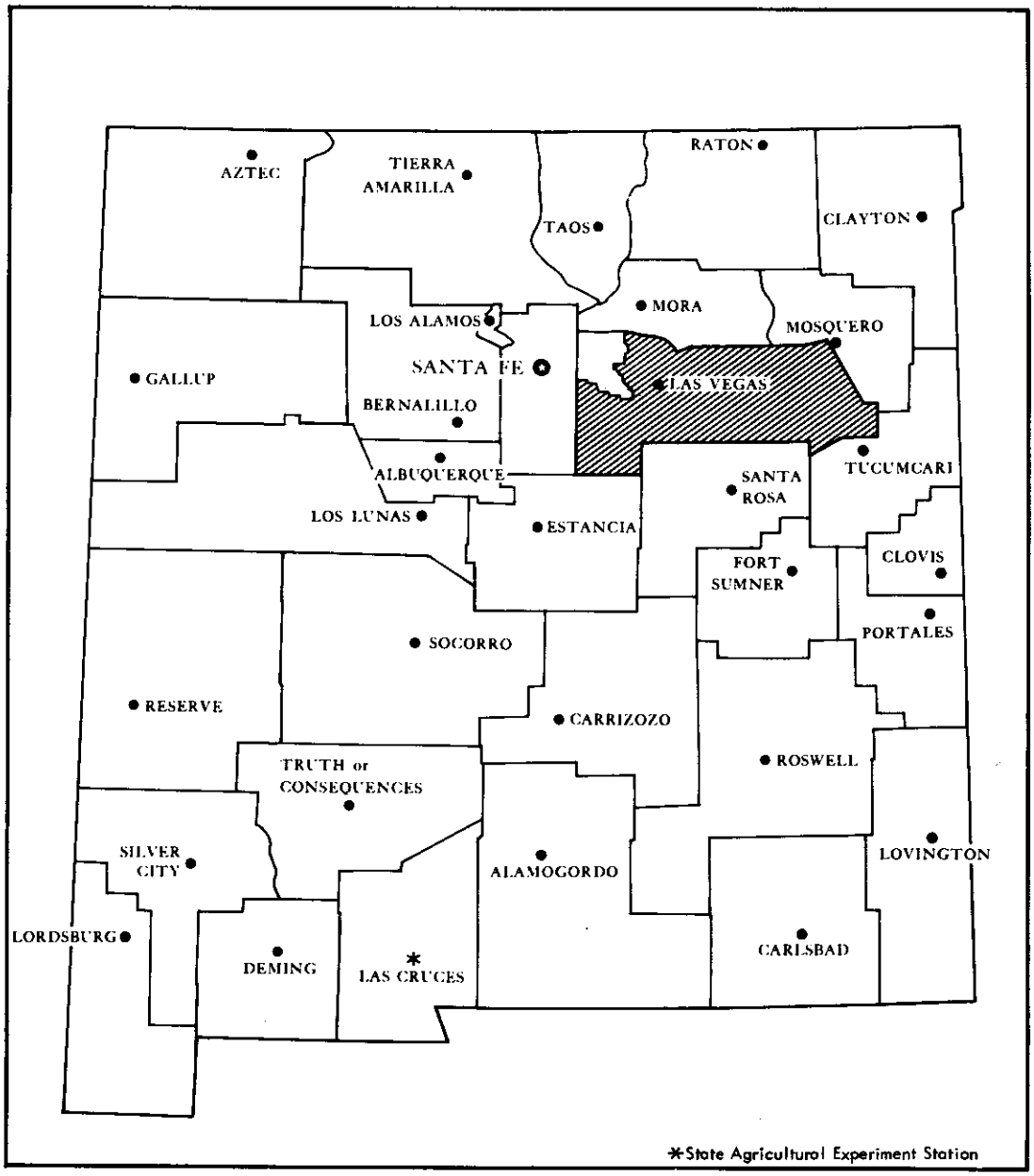
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Many people assume that soils are all more or less alike. They are unaware that great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

We believe that this soil survey can help bring us a better environment and a better life. Its widespread use can greatly assist us in the conservation, development, and productive use of our soil, water, and other resources.

Albert W. Hamelstrom
State Conservationist
Soil Conservation Service



Location of the San Miguel County Area in New Mexico.

Soil Survey of
San Miguel County Area, New Mexico

By Terry E. Hilley, Tom E. McCarty, Paul G. Martin, and Steven L. Sellnow, Soil Conservation Service, and Carl Taylor, Forest Service

Assisting in the fieldwork were George W. Anderson, Harry Cook III, Phillip S. Derr, Joseph M. Downs, Jess Epple, and Roye M. Gibson, Soil Conservation Service, and Owen J. Carleton, Forest Service

United States Department of Agriculture, Soil Conservation Service and Forest Service, in cooperation with the New Mexico Agricultural Experiment Station

SAN MIGUEL COUNTY AREA is in the northeastern part of New Mexico. It has an area of 2,733,900 acres, or 4,271 square miles. Las Vegas, the county seat of San Miguel County, has a population of 13,835 according to the 1970 census. There are several small villages in the survey area.

The survey area extends about 118 miles east to west and about 57 miles north to south. The western part is in the foothills of the Sangre de Cristo Mountains, the central part is on the undulating plains of the Las Vegas Plateau, and the eastern part is in the erosional valleys of the Canadian and Conchas Rivers.

Elevation in the area ranges from about 3,800 feet where the Canadian River crosses the boundary between San Miguel and Quay Counties to about 9,000 feet near the village of Rociada, near the western boundary of the survey area.

The trading center for the eastern part of the survey area is Tucumcari and for the southwestern part is Santa Fe. Raising livestock is the principal economic enterprise. There is some lumbering and woodcutting in the western part of the area. Recreational enterprises are important around Conchas Lake, in the eastern part of the area, and in the high, mountainous western part.

Climate

By Frank E. Houghton, climatologist for New Mexico, National Weather Service, U. S. Department of Commerce.

Temperature and precipitation data for areas at elevations below 5,000 feet in the survey area were recorded at Bell Ranch. Data for areas between elevations of 5,000 and 7,000 feet were recorded at Las Vegas Airport. These data are summarized in Tables 1 and 1A.

An increase in elevation in the survey area generally is accompanied by a decrease in temperature. Although total annual precipitation is about the same throughout the area, there are seasonal differences in precipitation between Bell Ranch and Las Vegas Airport. Rainfall is heavier in spring in the eastern plains area and is heavier in summer in the mountainous area. The average number of days with 0.10 inch or more of precipitation in summer is greater in the mountainous area, and days with 0.50 inch or more precipitation are more frequent on the eastern plains. Precipitation also increases more markedly on the eastern plains in May than in the western mountains and foothills.

The main source of moisture in the survey area is the moisture-laden air that crosses the area from the Gulf of Mexico during the warmer part of the year. This moist air moves from the southeast and south and flows upslope, which results in brief but often intense showers that are occasionally accompanied by hail. Winter, when the main source of moisture is from over the Pacific Ocean, is the drier part of the year. Much of this moisture condenses and falls over the mountains to the west of New Mexico. Rainfall and snowfall in winter are generally light east of the mountains.

Average annual snowfall ranges from less than 18 inches in the east to about 36 inches in the mountain foothills. December through February is the usual season for snow, but in some years the season may start or end a month earlier or later. Occasional snowfalls of as much as 24 inches in a day may produce a snow cover for

several consecutive days. Snow cover data recorded at Las Vegas Airport are summarized in Table 1A.

Summer temperatures of 90 degrees F or more are frequent on the eastern plains but are few at the higher elevations. The temperature at Las Vegas has reached 100 degrees only once during the period of record. Minimum temperatures in winter are mostly below zero, but few days have such low temperatures. The lowest temperature in the area, 39 degrees below zero, was recorded at Las Vegas on January 13, 1963, and the highest temperature, 110 degrees, was recorded at Conchas Dam on June 25, 1952.

Selected probabilities of minimum temperatures at Bell Ranch, where the average frost-free period is 180 days, are given in Table 2. These temperatures are generally representative of those at elevations below 5,000 feet. Selected probabilities of minimum temperatures at Las Vegas Airport, where the average frost-free period is only 150 days, are given in Table 2A. These temperatures are representative of those at elevations of about 5,000 feet.

Evaporation, measured from a Class A pan at Conchas Dam, averages about 70 inches during May through October. It is estimated at 90 inches for a full year. Pan evaporation can be expected to be within 8 inches of the average in two-thirds of the years.

The amount of sunshine received averages about 3,200 hours annually, or about 75 percent of the total possible.

Relative humidity at Las Vegas ranges from an average of about 65 percent early in the morning to about 30 percent in the warmer part of the day. Relative humidity in the eastern part of the area is a few percent lower, mainly because of the warmer temperature.

Prevailing winds are generally southwesterly in San Miguel County Area, but in winter they become more southerly near the northwestern mountains. Average annual windspeed, as measured at Las Vegas Airport, is 12 miles per hour. In the windier months of spring, the average is 15 miles per hour. Windspeed of more than 24 miles per hour occurs 7 percent of the time, and winds are mainly from the southwest. Similar winds occur on the eastern plains.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests (*13*). The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, home buyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, the map units for broad land use planning described in this survey (*7*). Each unit is a unique natural landscape that has a distinct pattern of soils and of relief and drainage features. A unit typically consists

of one or more soils of major extent and some soils of minor extent. It is named for the major soils. The kinds of soil in one unit can occur in other units, but in a different pattern.

The map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are generally suitable for certain kinds of farming or other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit ordinarily differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The general soil map at the back of this survey does not join, in all instances, with the general soil maps of adjacent survey areas. Differences in the maps have resulted from the differences in the occurrence of soil patterns and from recent advances in classification.

The 10 map units in this survey area are described in the following pages.

1. Rocio-Stout

Very shallow, shallow, and deep, gently sloping to very steep, well drained soils that formed in alluvium, colluvium, and residuum; on mountains

This map unit is on gently sloping to very steep mountainsides. It consists of irregularly shaped areas in the northwestern part of the survey area. Slope is dominantly 3 to 65 percent. Elevation is 7,200 to 9,200 feet. The average annual precipitation is about 23 inches, and the average annual temperature is about 43 degrees F.

This unit makes up about 3 percent of the survey area. About 40 percent of the unit is Rocio and similar soils, and 20 percent is Stout soils. The remaining 40 percent is components of minor extent (fig. 1).

Figure 1.—Typical area of map unit 1.

Rocio soils are deep and well drained. They formed in alluvium and colluvium on mountains. Typically, the surface layer is dark grayish brown gravelly loam. The subsurface layer is pale brown gravelly fine sandy loam. The subsoil to a depth of 60 inches or more is brown and light brown clay.

Stout soils are very shallow and shallow and well drained. They formed in residuum on mountains. Typically, the surface layer is grayish brown cobbly sandy loam. The underlying material is pale brown cobbly sandy loam. Sandstone is at a depth of about 10 inches.

Of minor extent in this unit are Brycan and Kiln soils and Rock outcrop, which consists of sandstone, limestone, and shale. Brycan soils are in valleys. Kiln soils are on mountains. Rock outcrop is throughout the unit.

The vegetation on this unit is dominantly ponderosa pine, Douglas-fir, white fir, and oak on mountains and cool-season grasses in the included valleys.

This unit is used for timber production, livestock grazing, firewood, recreation homesites, and wildlife habitat.

This unit provides habitat that is used primarily by woodland wildlife species such as mule deer, turkey, chipmunk, hermit thrush, and mountain bluebird. This unit can produce good wildlife habitat if livestock grazing and timber production are properly managed and it is protected from wildfire.

2. Tricon-Crews-Partri

Very shallow to deep, gently undulating to moderately undulating, well drained soils that formed in mixed material; on uplands

This map unit consists of gently undulating to moderately undulating uplands. It occurs as irregularly shaped areas, mainly in the north-central part of the survey area. Elevation is 5,300 to 7,200 feet. Slope is dominantly 0 to 5 percent. The average annual precipitation is about 16 inches, and the average annual temperature is about 50 degrees F.

This unit makes up about 5 percent of the survey area. About 35 percent of the unit is Tricon soils, 25 percent is Crews soils, and 20 percent is Partri soils. The remaining 20 percent is components of minor extent (fig. 2).

Tricon soils are moderately deep and well drained. They formed in mixed alluvial material. Typically, the surface layer is grayish brown silt loam. The subsoil is brown clay loam. Indurated caliche is at a depth of about 23 inches.

Crews soils are very shallow and shallow and are well drained. They formed in mixed material. Typically, the surface layer is dark grayish brown loam, the subsoil is dark grayish brown clay loam and clay. Indurated caliche is at a depth of about 16 inches.

Partri soils are deep and well drained. They formed in mixed alluvial material. Typically, the surface layer is dark grayish brown loam. The subsoil is brown silty clay loam and clay. The substratum to a depth of 60 inches or more is pink and pinkish white, calcareous silty clay loam.

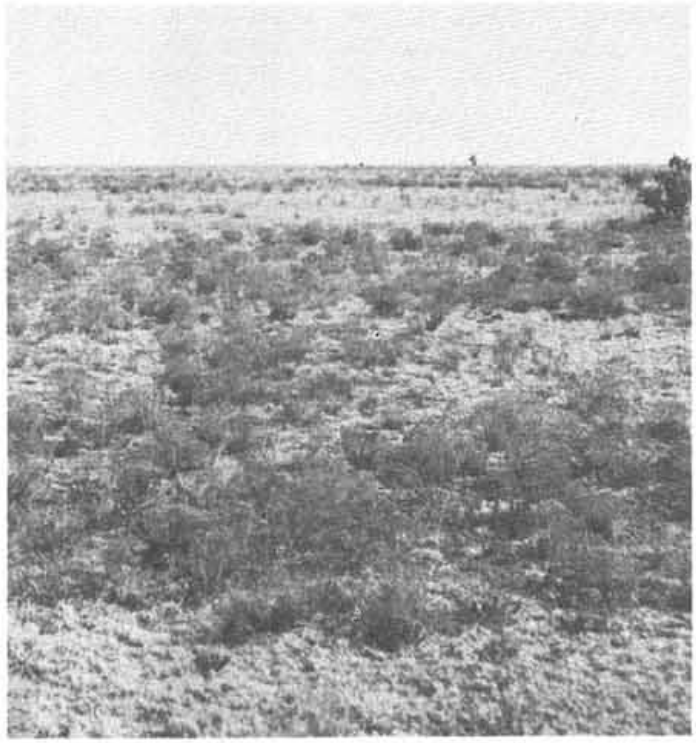


Figure 2.—Typical area of map unit 2.

Of minor extent in this unit are Bernal, Carnero, La Brier, Manzano, and Tuloso soils and Rock outcrop. Bernal and Carnero soils are on approaches to drainageways. La Brier and Manzano soils are in swales. Tuloso soils and Rock outcrop are along drainageways and slope breaks.

The vegetation on this unit is dominantly grass.

This unit is used for grazing and as wildlife habitat.

Wildlife habitat is limited by the lack of diversity in the vegetation. The unit is used by insect- and seed-eating birds such as the horned lark, meadowlark, lark bunting, and cassin sparrow. Although burrowing rodents are not numerous, there are sufficient numbers of other small mammals to attract such predators as hawks and coyotes. Swate areas provide important habitat. A small number of pronghorn antelope use this unit.

3. Partri-Carnero

Moderately deep and deep, gently undulating to moderately undulating, well drained soils that formed in residuum and mixed alluvium; on uplands

This map unit consists of gently undulating to moderately undulating uplands. It occurs as irregularly shaped areas in the north-central part of the survey area. Slope

is dominantly 0 to 5 percent. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, and the average annual temperature is about 50 degrees F.

This unit makes up about 11 percent of the survey area. About 45 percent of the unit is Partri and similar soils, and 20 percent is Carnero soils. The remaining 35 percent is components of minor extent.

Partri soils are deep and well drained. They formed in mixed alluvium. Typically, the surface layer is dark grayish brown loam. The subsoil is brown silty clay loam and clay. The substratum to a depth of 60 inches or more is pink and pinkish white, calcareous silty clay loam.

Carnero soils are moderately deep and well drained. They formed in alluvium and residuum. Typically, the surface layer is brown loam. The subsoil is reddish brown and dark reddish brown silty clay and clay. The substratum is reddish yellow, calcareous clay. Sandstone is at a depth of about 27 inches.

Of minor extent in this unit are Bernal, Crews, Manzano, Sombordoro, Tricon, and Tuloso soils. Bernal, Crews, and Tricon soils generally occupy the highest positions on uplands. La Brier and Manzano soils are in swales. Sombordoro and Tuloso soils are along canyons.

The vegetation on this unit is mainly grass and minor amounts of pinyon and juniper.

This unit is used for livestock grazing and wildlife habitat.

This unit supports only a limited number of wildlife species. Populations of most species are low, but there may be a large seasonal concentration of songbirds and hawks. The scattered small canyons and swales provide habitat for the greatest number of species.

4. Colmor-Vermejo-Mion

Shallow and deep, nearly level to hilly, well drained and moderately well drained soils that formed in material weathered from shale; on uplands and valley floors

This map unit consists of nearly level to hilly uplands and valley floors. It occurs as irregularly shaped areas in the north-central part of the survey area. Slope is dominantly 0 to 25 percent. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, and the average annual temperature is about 50 degrees F.

This unit makes up about 4 percent of the survey area. About 25 percent of the unit is Colmor and similar soils, 20 percent is Vermejo soils, and 20 percent is Mion and similar soils. The remaining 35 percent is components of minor extent (fig. 3).

Figure 3.—Typical area of map unit 4.

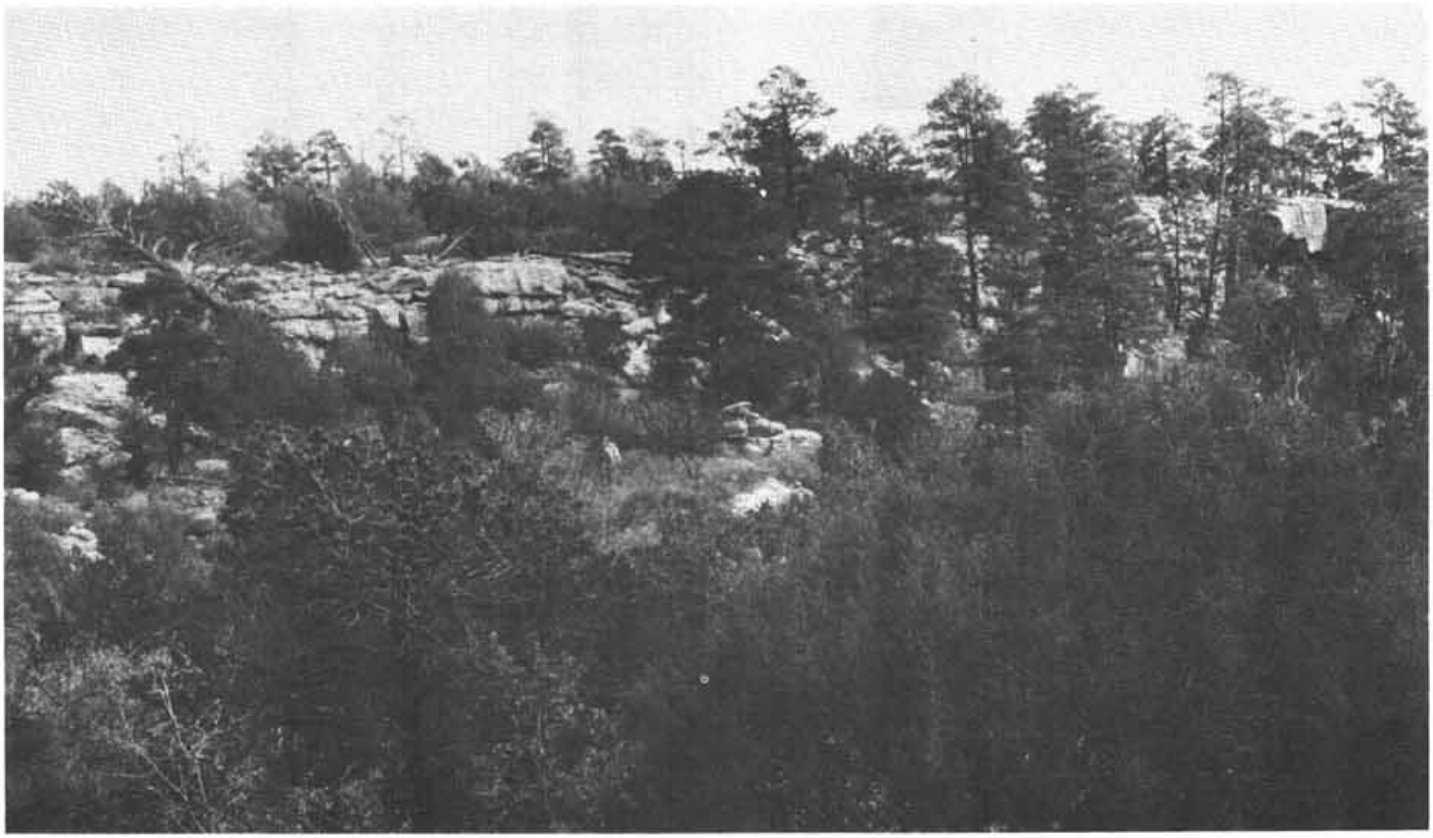


Figure 4.—Typical area of map unit 5.

Colmor soils are deep and well drained. They formed in material weathered from shale on uplands. Typically, the surface layer is brown silt loam and silty clay loam. The subsoil is brown and light yellowish brown, calcareous silty clay loam. The substratum to a depth of 60 inches or more is light yellowish brown and very pale brown, calcareous loam.

The Vermejo soils are deep and moderately well drained. They formed in alluvium derived from shale on valley floors. Typically, the surface layer is grayish brown silty clay loam. The next layer is grayish brown clay. The underlying material to a depth of 60 inches or more is grayish brown clay.

The Mion soils are shallow and well drained. They formed in material weathered from shale on uplands. Typically, the surface layer is dark grayish brown silty clay loam. The underlying material is dark grayish brown clay. Shale is at a depth of about 12 inches.

Of minor extent in this unit are La Brier, Litle, and Swastika soils. The La Brier soils are in swales. The Litle soils are on low hills and fans. The Swastika soils are on uplands.

The vegetation on this unit is mainly grass and minor amounts of pinyon and juniper.

This unit is used for cultivated crops, livestock grazing, and wildlife habitat.

This unit provides a variety of wildlife habitat. Typical wildlife species include cottontail, meadowlark, mourning dove, and pocket gopher.

5. Tuloso-Sombordoro-Rock outcrop

Very shallow and shallow, moderately rolling to steep, well drained soils that formed in material weathered from sandstone, and Rock outcrop; on mesas, ridges, and uplands

This map unit consists of moderately rolling to steep mesas, ridges, and uplands. It is made up of irregularly shaped areas that occur throughout the survey area. Slope is dominantly 0 to 35 percent. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, and the average annual temperature is about 50 degrees F.

This unit makes up about 15 percent of the survey area. About 35 percent of the unit is Tuloso soils, 25 percent is Sombordoro soils, and 15 percent is Rock outcrop. The remaining 25 percent is components of minor extent (fig. 4).

Tuloso soils are shallow and well drained. They formed in material weathered from sandstone on ridges. Typically, the surface layer is light brown stony sandy loam. The subsoil is yellowish red very stony loam. Sandstone is at a depth of about 11 inches.

Sombordoro soils are very shallow and shallow and well drained. They formed in material weathered from sandstone on uplands. Typically, the surface layer is light brown and yellowish red very stony fine sandy loam. The subsoil is yellowish red extremely stony clay. Sandstone is at a depth of about 16 inches.

Rock outcrop is generally sandstone and is in the form of chimneys, ledges, and escarpments that occur throughout the unit.

Of minor extent in this unit are Bernal and Carnero soils and Torriorthents. These soils are throughout the unit.

The vegetation on this unit is pinyon, juniper, and oak with a grass understory.

This unit is used for livestock grazing, firewood production, and wildlife habitat.

This unit provides valuable habitat for mule deer and turkey. It also provides habitat for wood rat, pinyon mouse, pinyon jay, and plains pit mouse.

6. Rock outcrop-Ustorthents

Rock outcrop, and very shallow to deep, very steep, well drained soils that formed in material weathered from sandstone, limestone, and shale; on escarpments and sides of mesas

This map unit consists of very steep escarpments and sides of mesas. It is made up of irregularly shaped areas that occur throughout the survey area. Slope is dominantly 25 percent to nearly vertical. Elevation is 4,800 to 5,300 feet. The average annual precipitation is about 14 inches, and the average temperature is about 60 degrees F.

This unit makes up about 14 percent of the survey area. About 50 percent of the unit is Rock outcrop and about 20 percent is Ustorthents and similar soils. The remaining 30 percent is components of minor extent (fig. 5).

Figure 5.—Typical area of map unit 6.

Rock outcrop consists of sandstone, shale, and limestone. It is on ridges and escarpments.

Ustorthents are very shallow to deep and well drained. These soils have a wide range of characteristics. They formed in material weathered from sandstone on sides of mesas.

Of minor extent in this unit are Haploborolls. They are throughout the unit.

The vegetation on this unit is pinyon, juniper, and oak and an understory of grass.

This unit is used for wildlife habitat.

This map unit provides many kinds of wildlife habitat, some of which are capable of supporting large wildlife populations. The unit is used by many species of rodents and reptiles as well as by mule deer and turkey.

7. Conchas-Latom-Newkirk

Very shallow to moderately deep, gently undulating to moderately rolling, well drained soils that formed in material weathered from sandstone and shale; on uplands

This map unit consists of gently undulating to moderately rolling uplands. It occurs as irregularly shaped areas in the eastern part of the survey area. Slope is dominantly 0 to 15 percent. Elevation is 3,800 to 5,300 feet. The average annual precipitation is about 15 inches, and the average annual temperature is about 60 degrees F.

This unit makes up about 30 percent of the survey area. About 25 percent of the unit is Conchas soils, 25 percent is Latom soils, and 15 percent is Newkirk soils. The remaining 35 percent is components of minor extent.

Conchas soils are moderately deep and well drained. They formed in material weathered from sandstone and shale. Typically, the surface layer is brown, calcareous loam. The subsoil is reddish brown, calcareous loam and clay loam. Sandstone is at a depth of about 30 inches.

Latom soils are very shallow and shallow and well drained. They formed in material weathered from sandstone. Typically, the surface layer is brown, calcareous fine sandy loam. Sandstone is at a depth of about 10 inches.

Newkirk soils are very shallow and shallow and well drained. They formed in material weathered from sandstone. Typically, the surface layer is reddish brown sandy loam. The subsoil is reddish brown sandy clay loam. Sandstone is at a depth of about 13 inches.

Of minor extent in this unit are Lacita, La Lande, Redona, San Jose, and Walkon soils and Rock outcrop. Lacita and San Jose soils are on flood plains of streams. La Lande and Redona soils are on fans. Walkon soils and Rock outcrop are throughout the map unit.

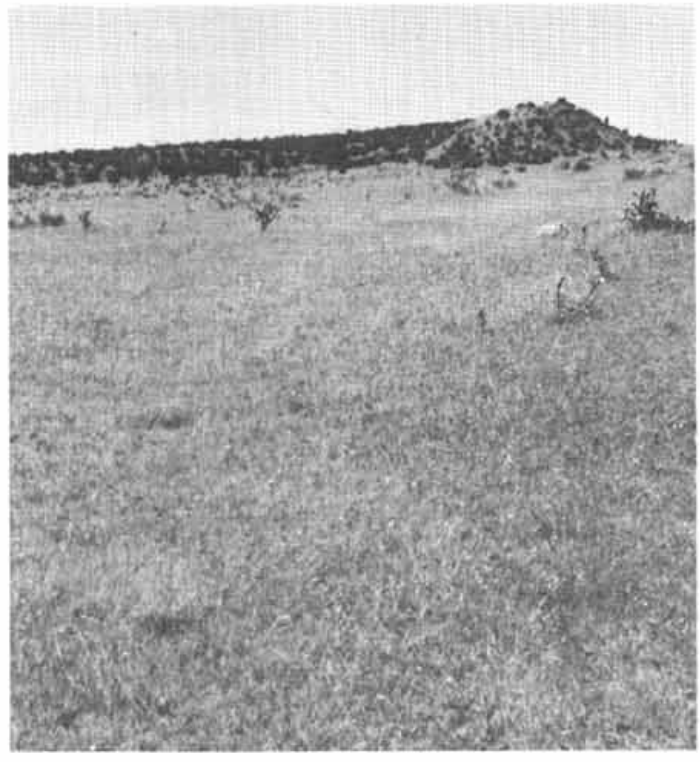


Figure 6.—Typical area of map unit 8.

The vegetation on this unit is grass and minor amounts of mesquite and juniper.

This map unit is used for livestock grazing and wildlife habitat.

Many kinds of wildlife habitat are on this unit. Typical wildlife species are cottontail, jackrabbit, mockingbird, and loggerhead shrike. The population of scaled quail and pronghorn antelope is low.

8. Redona-La Lande

Deep, gently undulating and moderately undulating, well drained soils that formed in material weathered from sandstone and shale; on fans and uplands

This map unit consists of gently undulating and moderately undulating fans and uplands. It occurs as irregularly shaped areas in the eastern part of the survey area. Slope is dominantly 0 to 7 percent. Elevation is 3,800 to 5,300 feet. The average annual precipitation is about 14 inches, and the average annual temperature is about 60 degrees F.

This map unit makes up about 11 percent of the survey area. About 40 percent of the unit is Redona soils, and 40 percent is La Lande soils. The remaining 20 percent is components of minor extent (fig. 6).

Redona soils are deep and well drained. They formed in material weathered from sandstone and shale on fans and uplands. Typically, the surface layer is reddish brown loam. The subsoil is reddish brown and light reddish brown, calcareous clay loam. The substratum to a depth of 60 inches or more is reddish brown, calcareous sandy clay loam.

La Lande soils are deep and well drained. They formed in alluvium derived from sandstone and shale on fans. Typically, the surface layer is reddish brown sandy loam. The subsoil is reddish brown sandy clay loam. The substratum to a depth of 60 inches or more is reddish brown sandy clay loam.

Of minor extent in this unit are Canez, Latom, Montoya, Newkirk, Quay, and Tucumcari soils. Canez soils are on fans and valley sides. Latom and Newkirk soils are on mesas and ridges. Montoya and Tucumcari soils are on the flood plains of intermittent streams. Quay soils are on fans.

The vegetation on this unit is mainly grass. Minor amounts of willow, cottonwood, and saltcedar are along streambeds.

This unit is used for livestock grazing and wildlife habitat.

This unit provides a moderate amount of wildlife habitat. Populations of wildlife species such as cottontail rabbit, scaled quail, and plains wood rat characteristically fluctuate widely from year to year.

9. Laporte-Rock outcrop

Shallow, moderately undulating to hilly, well drained soils that formed in material weathered from limestone, and Rock outcrop; on hills and ridges

This map unit consists of moderately undulating to hilly hills and ridges. It occurs as irregularly shaped areas in the southwestern part of the survey area. Slope is dominantly 3 to 35 percent. Elevation is 6,000 to 7,200 feet. The average annual precipitation is about 18 inches, and the average annual temperature is about 50 degrees F.

This unit makes up about 2 percent of the survey area. About 40 percent of the unit is Laporte soils, and 25 percent is Rock outcrop. The remaining 35 percent is components of minor extent (fig. 7).

Figure 7.—Typical area of map unit 9.

Laporte soils are shallow and well drained. They formed in material weathered from limestone on hills and ridges. Typically, the surface layer is grayish brown stony loam. The underlying material is brown channery loam. Limestone is at a depth of about 13 inches.

Rock outcrop consists of limestone. It is on ridges.

Of minor extent in this unit are Dean, Escabosa, Manzano, Sombordoro, Tapia, and Tuloso soils and Ustifluvents. Escabosa soils are on fans. Dean and Tapia soils are on mesas. Manzano soils and Ustifluvents are in small valleys. Tuloso and Sombordoro soils are throughout the map unit.

The vegetation on this unit is pinyon, juniper, and oak and an understory of grass.

This unit is used for livestock grazing and wildlife habitat.

This unit has potential for providing habitat of moderate to high value for wildlife. It provides habitat for mule deer and turkey, and it provides nesting sites for many kinds of songbirds and birds of prey.

10. Vibo-Tapia

Deep, moderately undulating to moderately rolling, well drained soils that formed in mixed material and in alluvial and eolian material; on fans, valley sides, and uplands

This map unit consists of moderately undulating to moderately rolling fans, valley sides, and uplands. It occurs as irregularly shaped areas in the southwestern part of the survey area. Slope is dominantly 1 to 10 percent. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 18 inches, and the average annual temperature is about 50 degrees F.

This unit makes up about 5 percent of the survey area. About 60 percent of the unit is Vibo soils, and 20 percent is Tapia and similar soils. The remaining 20 percent is soils of minor extent.

Vibo soils are deep and well drained. They formed in alluvial and eolian material on uplands, fans, and valley sides. Typically, the surface layer is brown fine sandy loam. The subsoil is reddish brown sandy clay loam. The substratum to a depth of 60 inches or more is light reddish brown and pink, calcareous sandy loam and loam.

Tapia soils are deep and well drained. They formed from mixed material on fans. Typically, the surface layer is brown loam. The subsoil is brown and light brown loam and sandy clay loam. The substratum to a depth of 60 inches or more is pink, calcareous gravelly loam.

Of minor extent in this unit are Dean, Laporte, Ribera, Sombordoro, Teco, and Tuloso soils. Dean, Sombordoro, Tuloso, and Laporte soils are on ridges. Ribera soils are on fans, and Teco soils are on uplands.

The vegetation on this unit is mainly grass and scattered stands of pinyon and juniper.

This unit is used for livestock grazing, firewood production, and wildlife habitat.

The areas of pinyon and juniper support few resident species of wildlife, but they provide important seasonal habitat for birds and winter protection for cottontail and mule deer. With proper management of livestock, the unit has potential for providing a moderate amount of wildlife habitat.

Soil maps for detailed planning

The kinds of map units shown on the detailed soil maps at the back of this publication are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each soil is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the unit on the detailed soil map. Each map unit description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated and the management concerns and practices needed are discussed.

A map unit represents an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map at the back of this publication are phases of soil series.

Soils that have profiles that are almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. All the soils in the United States having the same series name have essentially the same properties that affect their use and their response to management practices.

Soils of one series can differ in texture of the surface layer or in the substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect the use of the soils. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects

use or management. For example, Carnero loam, 1 to 3 percent slopes, is one of several phases within the Carnero series.

Some map units are made up of two or more dominant kinds of soil. Two such kinds of map units are shown on the soil map of this survey area: complexes and associations.

A *soil complex* consists of areas of two or more soils that are so intricately intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Apache-Ayon complex, rolling, is an example.

A *soil association* is made up of soils that are geographically associated and are shown as one unit on the map. A soil association has considerable regularity in geographic pattern and in the kinds of soil that make up the association. The extent of the soils can differ appreciably from one delineation to another; nevertheless, interpretations can be made for use and management of the soils. Redona-Quay association, undulating, is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. The included soils are recognized in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Rock outcrop is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 3, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

Soil descriptions

AQ—Andok-Quintana complex, moderately sloping. This map unit is on uplands. Slope is 0 to 15 percent. The vegetation is mainly grass, pinyon, and juniper. Elevation is 5,700 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 52 degrees F, and the average frost-free period is 140 to 165 days.

This unit is 50 percent Andok gravelly loam and 35 percent Quintana loam.

Included in this unit are small areas of Teco and Vibo soils in depressional areas and Rock outcrop of limestone on ridgetops. Included areas make up about 15 percent of the total acreage.

The Andok soil is deep and well drained. It formed in alluvial material derived dominantly from sandstone and shale. Slope is 5 to 15 percent. Typically, the surface layer is pale brown very gravelly and very cobbly loam about 5 inches thick. The upper 4 inches of the subsoil is light gray very gravelly loam. The lower 11 inches is pink very cobbly clay loam. The substratum to a depth of 60 inches or more is light brown and light reddish brown very gravelly sandy clay loam and sandy loam.

Permeability of the Andok soil is moderate. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Quintana soil is deep and well drained. It formed in material derived dominantly from calcareous sandstone and limestone. Slope is 0 to 5 percent. Typically, the surface layer is brown loam about 6 inches thick. The subsoil is light yellowish brown clay loam about 13 inches thick. The substratum to a depth of 60 inches or more is very pale brown gravelly sandy clay loam.

Permeability of the Quintana soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Andok soil is mainly blue grama, sideoats grama, black grama, and bottlebrush squirreltail. The potential plant commnity on the Quintana soil is mainly blue grama, western wheatgrass, sideoats grama, and scattered pinyon and juniper.

As the range deteriorates, the proportion of the preferred forage plants decreases and the proportion of the less preferred plants increases. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, sideoats grama, and blue grama. This unit is suited to such range management practices as mechanical seeding and brush management.

AY—Apache-Ayon complex, rolling. This map unit is on basalt-capped mesas and basalt flows. Slope is 1 to 15 percent. The vegetation is mainly grass. Elevation is 5,300 to 6,500 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

This unit is 40 percent Apache cobbly loam and 35 percent Ayon stony loam. The Apache soil is on mesas and basalt flows, and the Ayon soil is on fans on mesas and on basalt flows.

Included in this unit are small areas of soils that are similar to the Apache soil but that have lime-cemented layers above the bedrock. Also included are small areas of soils that are similar to the Apache soil but that are 20 to 40 inches deep over bedrock. These included soils are within areas of Apache soils. Included areas make up about 15 percent of the total acreage.

The Apache soil is very shallow and shallow and well drained. It formed in material derived dominantly from basalt. Slope is 1 to 5 percent. Typically, the surface layer is brown cobbly loam about 6 inches thick. The subsoil is brown, calcareous cobbly clay loam about 9 inches thick. The substratum is pinkish gray, calcareous cobbly loam about 4 inches thick over basalt.

Permeability of the Apache soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is slight. The hazard of soil blowing is slight.

The Ayon soil is deep and well drained. It formed in alluvial and colluvial material derived dominantly from basalt. Slope is 5 to 15 percent. Typically, the surface layer is brown stony loam about 11 inches thick. The next layer is brown stony clay loam about 11 inches thick. The underlying material to a depth of 60 inches or more is pink and light reddish brown, strongly calcareous stony loam and stony clay loam.

Permeability of the Ayon soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Apache soil is mainly sideoats grama, little bluestem, western wheatgrass, and blue grama. The potential plant community on the Ayon soil is mainly western wheatgrass, bottlebrush squirreltail, Indian ricegrass, and mountainmahogany.

As the range deteriorates, the proportion of preferred forage plants decreases and the proportion of ring muhly, threeawn, threadleaf groundsel, and broom snakeweed, which normally occur in small amounts in the potential plant community, increases. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, sideoats grama, little bluestem, and bottlebrush squirreltail. Range management practices such as mechanical seeding and mechanical brush management are not suited to this unit, because of the cobbly and stony surface.

BA—Badland. Badland consists of dissected areas on uplands. These areas consist of material derived dominantly from sandstone and shale. Slope is 0 to 65 percent. The vegetation is mainly sparse grass. Elevation is 3,800 to 7,200 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 60 degrees F, and the average frost-free period is 150 to 200 days.

Included in this unit are small areas of Lacita soils on fans, Latom soils on benches, Montoya soils on erosional remnants, and soils that are similar to San Jose soils but that are less than 20 inches thick and are in streambeds. Included areas make up about 20 percent of the total acreage.

This unit is used for wildlife habitat.

Be—Bernal loam, 3 to 5 percent slopes. This very shallow and shallow, well drained soil is on uplands. It formed in material derived dominantly from sandstone. The vegetation is mainly grass. Elevation is 5,300 to 7,000 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is brown loam about 6 inches thick. The subsoil is reddish brown sandy clay loam about 13 inches thick. Sandstone is at a depth of 19 inches.

Included in this unit are small areas of Carnero soils that occur throughout the map unit, Tuloso soils on ridges and slopes that lead to drainageways, and Rock outcrop on ridges and slopes that lead to drainageways. Included areas make up about 10 percent of the total acreage.

Permeability of the Bernal soil is moderate. Available water capacity is low. Effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community is mainly sideoats grama, blue grama, little bluestem, and New Mexico feathergrass. As the range deteriorates, the proportion of the preferred forage plants decreases and the proportion of broom snakeweed and threeawn increases. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, little bluestem, and New Mexico feathergrass. Suitability of this unit for range improvement practices is limited by very shallow and shallow depth.

BR—Bernal-Rock outcrop association, gently sloping. This map unit is on uplands and low ridges. Slope is 3 to 5 percent. The vegetation is mainly grass. Elevation is 5,300 to 7,000 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

This unit is 50 percent Bernal sandy loam and 30 percent Rock outcrop. The Bernal soil is on uplands, and Rock outcrop is on low ridges.

Included in this unit are small areas of Carnero and Partri soils in the more nearly level areas, La Brier soils in swales, Tuloso soils, and Rock outcrop, which is near areas of Tuloso soils. Included areas make up about 20 percent of the total acreage.

The Bernal soil is very shallow and shallow and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is brown loam about 5 inches thick. The subsoil is brown and reddish brown sandy clay loam about 7 inches thick. Sandstone is at a depth of 12 inches.

Permeability of the Bernal soil is moderate. Available water capacity is low. Effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

Rock outcrop consists of exposed areas of sandstone. It occurs as benches and low ridges.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Bernal soil is mainly sideoats grama, blue grama, little bluestem, and New Mexico feathergrass. As the range deteriorates, the proportion of preferred species decreases and the proportion of broom snakeweed and ring muhly increases. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, little bluestem, and New Mexico feathergrass. Suitability of this unit for range improvement practices such as mechanical treatment and earthen ponds is limited by the very shallow and shallow depth of the Bernal soil and by the areas of Rock outcrop.

CA—Canez-Ima association, undulating. This map unit is on uplands, fans, and valley sides. Slope is 1 to 5 percent. The vegetation is mainly grass. Elevation is 3,800 to 5,300 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 60 degrees F, and the average frost-free period is 175 to 200 days.

This unit is 70 percent Canez fine sandy loam and 20 percent Ima loamy fine sand. The Canez soil is on fans and valley sides, and the Ima soil is on fans and uplands.

Included in this unit are small areas of Latom and Newkirk soils on low ridges, Quay soils on small fans, and Redona soils in small depressional areas. Included areas make up about 10 percent of the total acreage.

The Canez soil is deep and well drained. It formed in alluvial and eolian material derived from mixed sources. Typically, the surface layer is brown fine sandy loam about 10 inches thick. The subsoil to a depth of 60 inches or more is reddish brown sandy clay loam.

Permeability of the Canez soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Ima soil is deep and well drained. It formed in eolian material derived from mixed sources. Typically, the surface layer is reddish brown loamy fine sand and sandy loam about 15 inches thick. The upper 31 inches of the subsoil is reddish brown sandy loam. The lower part to a depth of 60 inches or more is reddish brown, calcareous clay loam.

Permeability of the Ima soil is moderately rapid. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Canez soil is mainly blue grama, little bluestem, black grama, and sideoats grama. The potential plant community on the Ima soil is mainly little bluestem, blue grama, hairy grama, and mesa dropseed.

As the range deteriorates, the proportion of preferred species decreases and the proportion of sand dropseed, threeawn, and sandsage, which normally occur in small amounts in the potential plant community, increases. Grazing management should be designed to increase the productivity and reproduction of little bluestem, black grama, blue grama, and sideoats grama. This unit is suited to such range improvement practices as brush management and range seeding when it is invaded by mesquite.

Cb—Carnero loam, 1 to 3 percent slopes. This moderately deep, well drained soil is on uplands. It formed in material derived dominantly from sandstone. The vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is reddish brown loam about 4 inches thick. The subsoil is reddish brown and yellowish red silty clay about 20 inches thick. The substratum to a depth of 32 inches is reddish yellow sandy clay loam. Sandstone is at a depth of 32 inches.

Included in this unit are small areas of Bernal and Tuloso soils on slopes that lead to drainageways, Partri

soils in small areas throughout the map unit, and Rock outcrop on slopes that lead to drainageways. Included areas make up about 10 percent of the total acreage.

Permeability of this Carnero soil is slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

Some areas of this unit are used for irrigated crops, mainly alfalfa, pasture, and small grain. Among the other crops grown are corn, grain sorghum, and legumes. Some areas are used for livestock grazing and for wildlife habitat.

If this unit is used for irrigated crops, the main limitations are moderate depth, moderate available water capacity, and slow permeability.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Soil blowing can be reduced by using all crop residue and practicing minimum tillage. Yield of crops can be maintained or increased by applying fertilizer. Most crops, except for legumes, respond to nitrogen. Legumes respond to phosphate. Rotation grazing helps to maintain the quality and quantity of forage. Timely harvesting of crops improves their quality.

The potential plant community is mainly blue grama, western wheatgrass, buffalograss, and galleta. As the range deteriorates, the preferred species decrease and a dense, low turf that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, blue grama, and sideoats grama. This unit is suited to such range improvement practices as mechanical treatment. Use of the unit for ponds is limited by moderate depth.

Cc—Carnero loam, 3 to 5 percent slopes. This moderately deep, well drained soil is on uplands. It formed in material derived dominantly from sandstone. The vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is reddish brown loam about 4 inches thick. The subsoil is reddish brown silty clay about 20 inches thick. The substratum to a depth of 32 inches is reddish yellow, calcareous sandy clay loam. Sandstone is at a depth of 32 inches.

Included in this unit are small areas of Bernal and Tuloso soils on slopes that lead to drainageways, Partri soils in drainageways, and Bernal channery loam in small areas throughout the unit. Included areas make up about 15 percent of the total acreage.

Permeability of this Carnero soil is slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

Some areas of this unit are used for irrigated crops, mainly alfalfa, pasture, and small grain. Among the other crops grown are legumes. Some areas are used for livestock grazing and for wildlife habitat.

If this unit is used for irrigated crops, the main limitations are moderate depth, moderate available water capacity, slow permeability, and gentle slopes.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Yield of crops can be maintained or increased by applying fertilizer. Most crops, except for legumes, respond to nitrogen. Legumes respond to phosphate. Timely harvesting of crops improves their quality. Rotation grazing helps to maintain the quality and quantity of forage. Soil blowing can be reduced by using all crop residue and practicing minimum tillage.

The potential plant community is mainly blue grama, western wheatgrass, buffalograss, and galleta. As the range deteriorates, the preferred species decrease and a dense, low turf that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, blue grama, and buffalograss. This unit is suited to such range management practices as mechanical treatment. It is limited for ponds because of moderate depth.

CD—Carnero-Partri association, undulating. This map unit is on uplands. Slope is 0 to 5 percent. The vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

This unit is 40 percent Carnero loam and 40 percent Partri silt loam. Included in this unit are small areas of Bernal and Tuloso soils on slopes that lead to drainageways and La Brier soils in swales. Included areas make up about 20 percent of the total acreage.

The Carnero soil is moderately deep and well drained. It formed in material derived dominantly from sandstone. Slope is 1 to 5 percent. Typically, the surface layer is brown loam about 4 inches thick. The subsoil is reddish brown and dark reddish brown silty clay and clay about 15 inches thick. The substratum is reddish yellow, calcareous clay about 8 inches thick over sandstone.

Permeability of the Carnero soil is slow. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water ero-

sion is moderate. The hazard of soil blowing is moderate.

The Partri soil is deep and well drained. It formed in alluvium derived dominantly from sandstone and limestone. Slope is 0 to 3 percent. Typically, the surface layer is dark grayish brown silt loam about 9 inches thick. The subsoil is brown clay and silty clay loam about 25 inches thick. The substratum to a depth of 60 inches or more is pink and pinkish white silty clay loam.

Permeability of the Partri soil is slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on this unit is mainly blue grama, western wheatgrass, buffalograss, and galleta. As the range deteriorates, the desirable species decrease and a dense, low turf that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, blue grama, and sideoats grama. This unit is suited to such range management practices as mechanical treatment. It is limited for ponds because of moderate depth.

Cf—Colmor loam, 1 to 3 percent slopes. This deep, well drained soil is on uplands. It formed in material derived dominantly from shale. The vegetation in areas not cultivated is mainly grass. Elevation is 6,000 to 6,500 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is brown, calcareous loam about 8 inches thick. The subsoil is brown and pale brown, calcareous silty clay loam and clay loam about 24 inches thick. The substratum to a depth of 60 inches or more is pale brown, calcareous loam.

Included in this unit are small areas of Litle and Mion soils in the slightly higher areas throughout the unit and Vermejo soils in swales. Included areas make up about 10 percent of the total acreage.

Permeability of this Colmor soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for irrigated crops, mainly alfalfa, pasture, and small grain. Among the other crops grown are corn, grain sorghum, and legumes. The unit is also used for livestock grazing and for wildlife habitat.

If this unit is used for irrigated crops, the main limitations are moderately slow permeability and high hazard of soil blowing.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Yield of crops can be maintained or increased by applying fertilizer. Most crops, except for legumes, respond to nitrogen. Legumes respond to phosphate. Timely harvesting of crops improves their quality. Rotation grazing helps to maintain the quality and quantity of forage. Soil blowing can be reduced by using all crop residue and practicing minimum tillage.

The potential plant community on this unit is mainly blue grama, western wheatgrass, wolftail, and sideoats grama. As the range deteriorates, the blue grama and ring muhly form a dense, low turf that is low in productivity. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass and sideoats grama. This unit is suited to such range management practices as mechanical treatment and earthen ponds.

Cg—Colmor silt loam, 3 to 5 percent slopes. This deep, well drained soil is on uplands. It formed in material derived dominantly from shale. The vegetation in areas not cultivated is mainly grass. Elevation is 6,000 to 6,500 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is brown, calcareous loam about 8 inches thick. The subsoil is brown and pale brown, calcareous silty clay loam and clay loam about 24 inches thick. The substratum to a depth of 60 inches or more is pale brown, calcareous loam.

Included in this unit are small areas of Litle, Mion, and Penrose soils in slightly higher areas throughout the unit. Included areas make up about 10 percent of the total acreage.

Permeability of this Colmor soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for irrigated crops, mainly alfalfa, pasture, and small grain. Among the other crops grown are corn, grain sorghum, and legumes. The unit is also used for livestock grazing and for wildlife habitat.

If this unit is used for irrigated crops, the main limitations are moderately slow permeability and high hazard of soil blowing.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Yield of crops can be maintained or increased by applying fertilizer. Most crops, except for legumes, respond to nitrogen. Legumes respond to phosphate. Timely harvesting of crops improves their quality. Rotation grazing helps to maintain the quality and quantity of forage. Soil blowing can be reduced by using all crop residue and practicing minimum tillage.

The potential plant community on this unit is mainly blue grama, western wheatgrass, wolftail, and sideoats grama. As the range deteriorates, western wheatgrass decreases and a dense, low turf of blue grama and ring muhly that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass and sideoats grama. This unit is suited to such range management practices as mechanical treatment and earthen ponds.

CH—Colmor silt loam, undulating. This deep, well drained soil is on uplands. It formed in material derived dominantly from shale. The vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is brown silt loam and silty clay loam about 12 inches thick. The subsoil is brown and light yellowish brown, calcareous silty clay loam about 20 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown and very pale brown, calcareous loam.

Included in this unit are small areas of Litle, Mion, and Penrose soils in slightly higher areas throughout the unit. Included areas make up about 10 percent of the total acreage.

Permeability of this Colmor soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on this unit is mainly blue grama, western wheatgrass, wolftail, and sideoats grama. As the range deteriorates, the western wheatgrass decreases and a dense, low turf of blue grama and ring muhly that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass and sideoats grama. This unit is suited to such range improvement practices as mechanical treatment and earthen ponds.

CK—Conchas-Latom association, undulating. This map unit is on uplands. Slope is 1 to 9 percent. The vegetation is mainly grass. Elevation is 3,800 to 5,300 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 60 degrees F, and the average frost-free period is 175 to 200 days.

This unit is 45 percent Conchas loam and 40 percent Latorn fine sandy loam.

Included in this unit are small areas of Canez soils on fans; Newkirk, Redona, and Walkon soils in nearly level depressional areas; Quay soils in areas throughout the unit; and Rock outcrop on low ridges. Included areas make up about 15 percent of the total acreage.

The Conchas soil is moderately deep and well drained. It formed in material derived dominantly from sandstone and shale. Slope is 1 to 5 percent. Typically, the surface layer is brown, calcareous loam about 2 inches thick. The subsoil is reddish brown, calcareous loam and clay loam about 28 inches thick. Sandstone is at a depth of 30 inches.

Permeability of the Conchas soil is moderately slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Latom soil is very shallow and shallow and well drained. It formed in calcareous material derived dominantly from sandstone. Slope is 2 to 9 percent. Typically, the surface layer is brown, calcareous fine sandy loam about 10 inches thick. Sandstone is at a depth of 10 inches.

Permeability of the Latom soil is moderate. Available water capacity is very low. Effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Conchas soil is mainly blue grama, black grama, galleta, and sideoats grama. The potential plant community on the Latom soil is mainly sideoats grama, blue grama, black grama, and little bluestem.

As the range deteriorates, the desirable forage plants decrease. Oneseed juniper and cholla cactus invade and ring muhly, threeawn, broom snakeweed, and yucca increase. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, blue grama, black grama, and little bluestem.

The Conchas soil is suited to such range improvement practices as cholla and juniper management. Suitability of the Latom soil for range management practices such as mechanical treatment, earthen ponds, and fences is limited by shallow depth.

CT—Crews-Tricon association, undulating. This map unit is on uplands. Slope is 0 to 5 percent. The vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

This unit is 45 percent Crews silt loam and 40 percent Tricon silt loam. The Crews soil is on short slopes and smooth ridges, and the Tricon soil is in the smoother areas of the unit.

Included in this unit are small areas of Carnero and Partri soils near the edges of mapped areas, La Brier soils in swales, and Rock outcrop throughout the unit. Included areas make up about 15 percent of the total acreage.

The Crews soil is very shallow and shallow and well drained. It formed in material derived from mixed sources. Slope is 0 to 5 percent. Typically, the surface layer is dark grayish brown loam about 5 inches thick. The subsoil is dark grayish brown clay loam and clay about 11 inches thick. Indurated caliche is at a depth of 16 inches.

Permeability of the Crews soil is moderately slow. Available water capacity is very low. Effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Tricon soil is moderately deep and well drained. It formed in alluvial and eolian material derived from mixed sources. Slope is 1 to 3 percent. Typically, the surface layer is grayish brown silt loam about 7 inches thick. The subsoil is brown clay loam about 26 inches thick. Indurated caliche is at a depth of 33 inches.

Permeability of the Tricon soil is slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Crews soil is mainly sideoats grama, blue grama, hairy grama, little bluestem, and New Mexico feathergrass. The potential plant community on the Tricon soil is mainly blue grama, western wheatgrass, galleta, sideoats grama, and buffalograss. As the range deteriorates, these species decrease and a low, dense turf of blue grama that is low in productivity develops. Broom snakeweed, ring muhly, and forbs increase. Pinyon pine and oneseed juniper increase and invade these soils. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, little bluestem, and western wheatgrass.

The Tricon soil is suited to such range management practices as brush management and range seeding. Suitability of the Crews soil for range management practices such as mechanical treatment, earthen ponds, and fences is limited by very shallow and shallow depth.

DA—Dioxice-Dean association, undulating. This map unit is on uplands. Slope is 0 to 9 percent. The vegetation in areas not cultivated is mainly grass. Elevation is 5,300 to 5,600 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

This unit is 60 percent Dioxice loam and 25 percent Dean loam. The Dioxice soil is on fans, and the Dean soil is on ridges.

Included in this unit are small areas of Carnero and Tricon soils on uplands throughout the unit and Tuloso soils on ridges. Also included are small areas of a soil that is similar to the Dioxice soil but is structureless below the surface layer; this soil is on fans. Included areas make up about 15 percent of the total acreage.

The Dioxice soil is deep and well drained. It formed in alluvial and eolian material derived from mixed sources. Slope is 0 to 5 percent. Typically, the surface layer is brown loam about 4 inches thick. The subsoil is brown and pinkish gray, calcareous loam and clay loam about 20 inches thick. The substratum to a depth of 60 inches or more is pink and pinkish white, calcareous loam.

Permeability of the Dioxice soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Dean soil is deep and well drained. It formed in material derived dominantly from limestone. Slope is 0 to 9 percent. Typically, the surface layer is brown, calcareous loam about 8 inches thick. The next layer is light grayish brown, calcareous loam about 6 inches thick. The underlying material to a depth of 60 inches or more is light brown loam and gravelly loam over weakly cemented caliche fragments.

Permeability of the Dean soil is slow. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

Some areas of this unit are used for dryland crops, mainly small grain. Among the other crops grown are grain sorghum. Some areas are used for livestock grazing and for wildlife habitat.

The Dioxice soil is well suited to dryland crops. The main limitations are the moderate hazard of water erosion and the high hazard of soil blowing. Leaving crop residue on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Keeping tillage to a minimum helps to control soil blowing. Terracing and farming on the contour reduce runoff and the risk of erosion and help to conserve moisture.

The Dean soil is poorly suited to dryland crops because of the moderate hazard of water erosion, high hazard of soil blowing, and low available water capacity.

The potential plant community on the Dioxice soil is mainly blue grama, western wheatgrass, sideoats grama, and buffalograss. The potential plant community on the Dean soil is mainly black grama, blue grama, sideoats grama, and needleandthread. As the range deteriorates, these species decrease and a dense, low turf of ring

muhly, buffalograss, blue grama, and broom snakeweed that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, western wheatgrass, and blue grama.

The Dioxice soil is suited to such range improvement practices as mechanical treatment, earthen ponds, and range seeding. Suitability of the Dean soil for such range improvement practices as mechanical treatment and earthen ponds is limited by caliche fragments at a very shallow to moderate depth.

DB—Dumas-La Brier association, undulating. This map unit is on uplands. Slope is 0 to 5 percent. The vegetation in areas not cultivated is mainly grass. Elevation is 5,300 to 5,600 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

This unit is 55 percent Dumas loam and 30 percent La Brier silt loam. The Dumas soil is on uplands, and the La Brier soil is in swales on uplands.

Included in this unit are small areas of Carnero and Partri soils near the edges of mapped areas and Dioxice soils on fans. Included areas make up about 15 percent of the total acreage.

The Dumas soil is deep and well drained. It formed in alluvium derived from mixed sources. Slope is 0 to 5 percent. Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsoil to a depth of 60 inches or more is brown, strong brown, and light reddish brown clay loam.

Permeability of the Dumas soil is moderate. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The La Brier soil is deep and well drained. It formed in alluvium derived from mixed sources. Slope is 0 to 2 percent. Typically, the surface layer is brown silt loam about 4 inches thick. The subsoil is grayish brown and brown clay about 36 inches thick. The substratum to a depth of 60 inches or more is grayish brown clay loam.

Permeability of the La Brier soil is very slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is very slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. The soil is subject to rare flooding.

Some areas of this unit are used for dryland crops, mainly small grain and grain sorghum. Other areas are used for livestock grazing and for wildlife habitat.

If this unit is used for dryland crops, the main limitations are moderate hazard of water erosion on the Dumas soil and moderate hazard of soil blowing on both soils. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Tillage should be kept to a minimum. Terracing and farming on the contour reduce runoff and the risk of erosion and help to conserve moisture.

The potential plant community on the Dumas soil is mainly blue grama, buffalograss, vine-mesquite, and sideoats grama. The potential plant community on the La Brier soil is mainly western wheatgrass, blue grama, vine-mesquite, and galleta.

As the range deteriorates, the preferred plants decrease and a dense, low turf of buffalograss, ring muhly, and threeawn that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of vine-mesquite, sideoats grama, and western wheatgrass. This unit is suited to such range improvement practices as mechanical treatment, earthen ponds, and range seeding.

GA—Gallegos very gravelly fine sandy loam, hilly. This deep, well drained soil is on terraces. It formed in alluvium derived from mixed sources. The vegetation is mainly grass. Elevation is 3,800 to 5,300 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 60 degrees F, and the average frost-free period is 175 to 200 days.

Typically, the surface layer is brown very gravelly fine sandy loam about 3 inches thick. The subsoil is reddish brown very gravelly loam about 10 inches thick. The substratum to a depth of 60 inches or more is light reddish brown very gravelly loam and light reddish brown very gravelly sandy loam.

Included in this unit are small areas of Canez soils that formed in eolian deposits downwind of mapped areas, Lacita soils in drainageways, Quay soils throughout the mapped areas, and Rock outcrop on low ridges. Included areas make up about 20 percent of the total acreage.

Permeability of this Gallegos soil is moderately rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on this unit is mainly black grama, blue grama, galleta, and sideoats grama. As the range deteriorates, the proportion of the desirable forage plants decreases and the proportion of threeawn, ring muhly, catclaw acacia, and oneseed juniper increases and mesquite invades. Grazing management should be designed to increase the productivity and reproduction of black grama, sideoats grama, and blue grama.

Range improvement practices such as mechanical treatment and earthen ponds are not suited to this soil, because of the high content of gravel in the profile.

GB—Gullied land-Manzano complex, gently sloping. This map unit is on fans and valley sides. Slope is 0 to 5 percent. The vegetation is mainly grass. Elevation is

5,300 to 7,200 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 175 days.

This unit is 50 percent Gullied land and 30 percent Manzano loam. Gullied land occurs throughout the unit, and the Manzano soil is between the gullies.

Included in this unit are small areas of Vibo, Ribera, and Partri soils on short slopes and Rock outcrop at the bottom of gullies. Included areas make up about 20 percent of the total acreage.

Gullied land consists of steep-sided gullies.

The Manzano soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is dark grayish brown loam about 14 inches thick. The subsoil to a depth of 60 inches or more is grayish brown and dark grayish brown loam.

Permeability of the Manzano soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate. The soil is subject to rare flooding.

This unit is used for wildlife habitat.

The potential plant community on the Manzano soil is mainly blue grama, western wheatgrass, galleta, and alkali sacaton. Gullied land supports little or no vegetation.

GC—Gullied land-Montoya complex, gently sloping. This map unit is on flood plains. Slope is 1 to 3 percent. The vegetation is mainly grass. Elevation is 3,800 to 5,300 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 60 degrees F, and the average frost-free period is 175 to 200 days.

This unit is 50 percent Gullied land and 20 percent Montoya clay loam.

Included in this unit are small areas of La Lande and Lacita soils on fans, Tucumcari soils in areas between gullies, and Rock outcrop at the bottom of gullies. Included areas make up about 30 percent of the total acreage.

Gullied land consists of steep-sided gullies.

The Montoya soil is deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Typically, the surface layer is reddish brown, calcareous clay loam about 2 inches thick. The subsoil is reddish brown clay about 20 inches thick. The substratum to a depth of 60 inches or more is reddish brown, calcareous clay.

Permeability of the Montoya soil is very slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high. The soil is subject to rare flooding.

This unit is used for wildlife habitat.

The potential plant community on the Montoya soil is mainly tobosa, alkali sacaton, blue grama, and vine-mesquite.

KA—Karde-Vermejo association, gently sloping. This map unit is on old lakebeds and lake shores. Slope is 0 to 5 percent. The vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

This unit is 50 percent Karde loam and 40 percent Vermejo clay loam. The Karde soil is on old lake shores, and the Vermejo soil is on old lakebeds.

Included in this unit are small areas of Bernal, Carnero, Partri, and Tuloso soils and Rock outcrop near the edges of mapped areas. Included areas make up about 10 percent of the total acreage.

The Karde soil is deep and well drained. It formed in eolian material derived from mixed sources. Slope is 1 to 5 percent. Typically, the surface layer is grayish brown, calcareous loam about 6 inches thick. The next layer is brown, calcareous clay loam about 11 inches thick. The underlying material to a depth of 60 inches or more is white and light gray, calcareous loam.

Permeability of the Karde soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. The soil is subject to rare flooding.

The Vermejo soil is deep and moderately well drained. It formed in alluvium derived dominantly from shale. Slope is 0 to 1 percent. Typically, the surface layer is dark grayish brown clay loam about 3 inches thick. Below this to a depth of 60 inches or more is grayish brown clay.

Permeability of the Vermejo soil is very slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high. The soil is subject to rare flooding.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Karde soil is mainly blue grama, western wheatgrass, bottlebrush squirreltail, and winterfat. The potential plant community on the Vermejo soil is mainly blue grama, western wheatgrass, alkali sacaton, and galleta. As the range deteriorates, the proportion of these forage plants decreases and the proportion of sand dropseed, threeawn, and broom snakeweed increases on the Karde soils. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, sideoats grama, and alkali sacaton.

This unit is suited to such range improvement practices as mechanical treatment and earthen ponds.

KR—Kiln-Rock outcrop complex, hilly. This map unit is on hills. Slope is 10 to 35 percent. The vegetation is mainly conifers, brush, and some grass. Elevation is 7,000 to 8,000 feet. The average annual precipitation is about 20 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 140 days.

This unit is 50 percent Kiln stony loam and 25 percent Rock outcrop.

Included in this unit are small areas of Brycan soils in drainageways and Dargol, Rocio, and Stout soils on hills. Included areas make up about 25 percent of the total acreage.

The Kiln soil is shallow and well drained. It formed in material derived dominantly from limestone and shale. Typically, the surface is covered with a layer of decomposing forest litter about 1 inch thick. The surface layer is dark grayish brown stony loam about 4 inches thick. The subsoil is reddish brown stony clay loam about 10 inches thick. Limestone is at a depth of 14 inches.

Permeability of the Kiln soil is moderate. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

Rock outcrop consists of exposures of limestone. It occurs as ledges and low escarpments.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on the Kiln soil is mainly ponderosa pine and an understory of Arizona fescue, mountain muhly, and blue grama. Grazing management should be designed to increase the productivity and reproduction of Arizona fescue, mountain muhly, and blue grama. Range management practices such as mechanical treatment and earthen ponds are limited by the shallow depth of the Kiln soil and the areas of Rock outcrop.

This unit is suited to the production of ponderosa pine. It is capable of producing 40 cubic feet, or 105 board feet (Scribner rule), per acre per year at culmination of mean annual increment. Stands should be maintained by thinning and selective cutting of mature trees. Management that minimizes the risk of erosion is essential in harvesting timber.

La—La Brier silty clay loam, 0 to 3 percent slopes. This deep, well drained soil is in swales. It formed in alluvium derived from mixed sources. The vegetation in areas not cultivated is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is grayish brown silty clay loam about 4 inches thick. The subsoil is dark grayish brown, brown, and grayish brown silty clay loam and clay about 36 inches thick. The substratum to a depth of 60 inches or more is grayish brown, calcareous clay loam.

Included in this unit are small areas of Carnero and Partri soils near the edges of mapped areas and Tricon soils in slightly lower areas throughout the unit. Included areas make up about 15 percent of the total acreage.

Permeability of the La Brier soil is very slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. The soil is subject to rare flooding.

This unit is used for irrigated crops, mainly alfalfa and small grain. Among the other crops grown are corn, grain sorghum, and legumes. It is also used for livestock grazing and for wildlife habitat.

If this unit is used for irrigated crops, the main limitations are very slow permeability, gentle slopes, and moderate hazards of water erosion and soil blowing.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Yield of crops can be maintained or increased by applying fertilizer. Most crops, except legumes, respond to nitrogen. Legumes respond to phosphate. Timely harvesting of crops improves their quality. Rotation grazing helps to maintain the quality and quantity of forage. Soil blowing can be reduced by using all crop residue and practicing minimum tillage.

The potential plant community is mainly western wheatgrass, blue grama, vine-mesquite, and galleta. As the range deteriorates, the desirable species decrease and a dense, low turf of blue grama that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, vine-mesquite, and alkali sacaton.

This unit receives extra water from adjoining areas, which increases the production and palatability of forage. Consequently, the unit is often heavily grazed. It is suited to such range improvement practices as mechanical treatment, earthen ponds, and seeding.

LB—Lacita-San Jose association, gently sloping. This map unit is on flood plains. Slope is 0 to 3 percent. The vegetation is mainly grass. Elevation is 3,800 to 5,300 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 60 degrees F, and the average frost-free period is 175 to 200 days.

This unit is 45 percent Lacita silty clay loam and 30 percent San Jose fine sandy loam. The Lacita soil is in the slightly higher areas on flood plains, and the San Jose soil is in the lower areas.

Included in this unit are small areas of Ustifluvents on streambeds, La Lande soils in the slightly higher areas, Ima soils on the downwind side of the beds of intermit-

tent streams, and Montoya soils in oxbows. Included areas make up about 25 percent of the total acreage.

The Lacita soil is deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is reddish brown silty clay loam about 4 inches thick. The next layer to a depth of 60 inches or more is reddish brown silty clay loam.

Permeability of the Lacita soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is subject to common, very brief periods of flooding in July, August, and September.

The San Jose soil is deep and well drained. It formed in alluvium derived from mixed sources. Typically, the surface layer is brown fine sandy loam about 12 inches thick. The substratum to a depth of 60 inches or more is brown, calcareous, stratified sandy loam to sandy clay loam.

Permeability of the San Jose soil is moderately rapid. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. This soil is subject to common, very brief periods of flooding in July, August, and September.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Lacita soil is mainly giant sacaton, alkali sacaton, vine-mesquite, and sideoats grama. The potential plant community on the San Jose soil is mainly giant sacaton, alkali sacaton, vine-mesquite, and sideoats grama. As the range deteriorates, the proportion of the desirable forage plants decreases and the proportion of blue grama, galleta, mat muhly, and broom snakeweed increases. Grazing management should be designed to increase the productivity and reproduction of giant sacaton, alkali sacaton, vine-mesquite, and western wheatgrass. Forage production is reduced in areas where gullies have formed.

This unit receives extra water from adjoining areas, which increases the production and palatability of the forage. Consequently, it is often heavily grazed. This unit is suited to such range improvement practices as mechanical treatment, earthen ponds, and seeding.

LC—La Lande-Redona association, undulating. This map unit is on fans. Slope is 3 to 7 percent. The vegetation is mainly grass. Elevation is 3,800 to 5,300 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 60 degrees F, and the average frost-free period is 175 to 200 days.

This unit is 65 percent La Lande sandy loam and 20 percent Redona loam. The La Lande soil is on the rougher parts of fans, and the Redona soil is on the smoother parts of fans.

Included in this unit are small areas of Lacita soils along drainageways, Latom soils near the edges of mapped areas, and Tucumcari soils in the less sloping areas throughout the unit. Included areas make up about 15 percent of the total acreage.

The La Lande soil is deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Slope is 3 to 7 percent. Typically, the surface layer is reddish brown sandy loam about 3 inches thick. The subsoil is reddish brown loam and sandy clay loam about 28 inches thick. The substratum to a depth of 60 inches or more is reddish brown sandy clay loam.

Permeability of the La Lande soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Redona soil is deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Slope is 3 to 5 percent. Typically, the surface layer is reddish brown loam about 5 inches thick. The subsoil to a depth of 60 inches or more is reddish brown clay loam.

Permeability of the Redona soil is moderate. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the La Lande soil is mainly blue grama, little bluestem, black grama, and sand dropseed. The potential plant community on the Redona soil is mainly blue grama, yucca, galleta, and sideoats grama. As the range deteriorates, the proportion of these forage plants decreases and the proportion of yucca, threeawn, sand dropseed, and broom snakeweed increases. Mesquite and cholla invade. Grazing management should be designed to increase the productivity and reproduction of black grama, blue grama, and little bluestem. This unit is suited to such range improvement practices as brush management and earthen ponds.

LE—Laporte-Escabosa association, hilly. This map unit is on hills, ridges, and fans. Slope is 3 to 15 percent. The vegetation is mainly pinyon pine, juniper, and grass. Elevation is 6,000 to 7,200 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 165 days.

This unit is 40 percent Laporte channery loam and 30 percent Escabosa channery loam. The Laporte soil is on ridges and hills, and the Escabosa soil is on fans.

Included in this unit are small areas of Dean soils on erosional remnants, Manzano soils in drainageways, Sombordoro and Tuloso soils on hills, and Rock outcrop on ridges and hills. Included areas make up about 30 percent of the total acreage.

The Laporte soil is shallow and well drained. It formed in material derived dominantly from limestone. Typically, the surface layer is dark grayish brown, calcareous channery loam about 5 inches thick. The substratum to a depth of 13 inches is brown, calcareous channery loam. Limestone is at a depth of 13 inches.

Permeability of the Laporte soil is moderate. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Escabosa soil is moderately deep and well drained. It formed in alluvium and colluvium derived dominantly from limestone and sandstone. Typically, the surface layer is brown channery loam about 3 inches thick. The subsoil is dark grayish brown cobbly clay loam about 17 inches thick. The substratum to a depth of 28 inches is light gray cobbly loam. Limestone is at a depth of 28 inches.

Permeability of the Escabosa soil is moderate. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on the Laporte soil is mainly pinyon and juniper and an understory of sideoats grama and little bluestem. The potential plant community on the Escabosa soil is mainly pinyon and juniper and an understory of sideoats grama and pinyon ricegrass. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, little bluestem, pinyon ricegrass, and blue grama. Range management practices such as earthen ponds and brush management are limited by shallow and moderate depth and the included areas of Rock outcrop.

This unit is well suited to the production of pinyon and juniper, which are used for fuel and fenceposts. It can produce 12 cords per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. Brushy plants such as oak limit natural regeneration of pinyon and juniper.

LF—Laporte-Rock outcrop complex, steep. This map unit is on hills, ridges, and fans. Slope is 15 to 30 percent. The vegetation is mainly pinyon pine, juniper, and grass. Elevation is 6,000 to 7,200 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the frost-free period is 140 to 165 days.

This unit is 45 percent Laporte stony loam, 30 percent Rock outcrop, and 15 percent Escabosa stony loam. The Laporte soil is on hills, Rock outcrop is on ridges, and the Escabosa soil is on fans.

Included in this unit are small areas of Dean soils on hills. Included areas make up about 10 percent of the total acreage.

The Laporte soil is shallow and well drained. It formed in material derived dominantly from limestone. Slope is 15 to 30 percent. Typically, the surface layer is grayish brown stony loam about 5 inches thick. The substratum to a depth of 13 inches is brown channery loam. Limestone is at a depth of 13 inches.

Permeability of the Laporte soil is moderate. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

Rock outcrop consists of exposures of limestone and sandstone. It occurs as ledges and escarpments.

The Escabosa soil is moderately deep and well drained. It formed in alluvial and colluvial material derived dominantly from limestone and sandstone. Slope is 15 to 25 percent. Typically, the surface layer is brown stony loam about 2 inches thick. The subsoil is dark grayish brown cobbly clay loam about 14 inches thick. The substratum to a depth of 26 inches is light gray cobbly loam. Limestone is at a depth of 26 inches.

Permeability of the Escabosa soil is moderate. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on the Laporte soil is mainly pinyon and juniper and an understory of little bluestem, blue grama, and sideoats grama. The potential plant community on the Escabosa soil is mainly pinyon and juniper and an understory of sideoats grama and pinyon ricegrass.

As the range deteriorates, the proportion of the desirable forage plants decreases and the proportion of the less preferred plants increases. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, little bluestem, blue grama, and pinyon ricegrass. Management practices such as mechanical treatment and earthen ponds are limited by shallow and moderate depth and by the areas of Rock outcrop.

This unit is well suited to the production of pinyon and juniper, which are used for fuel and fenceposts. It can produce 12 cords per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. Brushy plants such as oak limit natural regeneration of pinyon and juniper.

LN—Latom-Newkirk-Rock outcrop association, rolling. This map unit is on ridges and low hills. Slope is 1 to 15 percent. The vegetation is mainly grass. Elevation is 3,800 to 5,300 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 60 degrees F, and the average frost-free period is 175 to 200 days.

This unit is 50 percent Latom fine sandy loam, 25 percent Newkirk fine sandy loam, and 15 percent Rock outcrop.

Included in this unit are small areas of Conchas soils on smooth fans, Quay soils on low ridges, and Redona and Walkon soils in nearly level areas. Included areas make up about 10 percent of the total acreage.

The Latom soil is very shallow and shallow and well drained. It formed in material derived dominantly from sandstone. Slope is 2 to 15 percent. Typically, the surface layer is reddish brown, calcareous fine sandy loam about 13 inches thick. Sandstone is at a depth of 13 inches.

Permeability of the Latom soil is moderate. Available water capacity is very low. Effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Newkirk soil is very shallow and shallow and well drained. It formed in material derived dominantly from sandstone. Slope is 1 to 10 percent. Typically, the surface layer is reddish brown sandy loam about 4 inches thick. The subsoil is reddish brown sandy clay loam about 9 inches thick. Sandstone is at a depth of 13 inches.

Permeability of the Newkirk soil is moderate. Available water capacity is very low. Effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

Rock outcrop consists of areas of exposed sandstone. It occurs as escarpments, ridges, and sheets.

This unit is used for livestock grazing, homesite development, and wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, black grama, blue grama, and little bluestem. As the range deteriorates, the proportion of these forage plants decreases and the proportion of less desirable plants increases. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, black grama, and little bluestem.

This unit is not suited to such range improvement practices as mechanical treatment and earthen ponds, because of very shallow and shallow depth and the areas of Rock outcrop. Suitability of this unit for such range management practices as fences is limited by very shallow and shallow depth and the areas of Rock outcrop.

This unit is poorly suited to homesite development. The main limitations are very shallow and shallow depth, the areas of Rock outcrop, and slope.

Lo—Litle clay loam, 1 to 3 percent slopes. This moderately deep, well drained soil is on uplands. It formed in material derived dominantly from shale and limestone. The native vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is grayish brown clay loam about 5 inches thick. The subsoil is grayish brown clay about 18 inches thick. Shale is at a depth of 23 inches.

Included in this unit are small areas of Colmor soils on fans, Mion and Penrose soils in the slightly higher areas, and Vermejo soils in swales. Included areas make up about 10 percent of the total acreage.

Permeability of the Litle soil is very slow. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, urban development, and wildlife habitat.

The potential plant community is mainly blue grama, western wheatgrass, sideoats grama, and galleta. As the range deteriorates, the proportion of these forage plants decreases, the proportion of ring muhly and threeawn increases, and blue grama forms a dense turf that is low in productivity. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, vine-mesquite, and fourwing saltbush.

This unit is suited to such range management practices as mechanical treatment and range seeding. Suitability of this unit for such range improvement practices as earthen ponds is limited by moderate depth.

This unit is poorly suited to urban development. The main limitations are high shrink-swell potential, low strength, and moderate depth to rock.

Lp—Litle clay loam, 3 to 5 percent slopes. This moderately deep, well drained soil is on uplands. It formed in material derived dominantly from shale and limestone. The vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is grayish brown clay loam about 5 inches thick. The subsoil is grayish brown clay about 18 inches thick. Shale is at a depth of 23 inches.

Included in this unit are small areas of Vermejo soils in swales and Mion and Penrose soils on ridges. Included areas make up about 10 percent of the total acreage.

Permeability of this Litle soil is very slow. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

This unit is used for livestock grazing, urban development, and wildlife habitat.

The potential plant community is mainly blue grama, western wheatgrass, sideoats grama, and galleta. As the range deteriorates, the proportion of these forage plants decreases, the proportion of ring muhly and threeawn increases, and blue grama forms a dense turf that is low in productivity. Grazing management should be designed

to increase the productivity and reproduction of western wheatgrass, vine-mesquite, and fourwing saltbush.

This unit is suited to such range improvement practices as mechanical treatment and seeding. Suitability of this unit for such range improvement practices as earthen ponds is limited by moderate depth.

This unit is poorly suited to urban development. The main limitations are high shrink-swell potential, low strength, and moderate depth to rock.

MA—Manter loamy fine sand, undulating. This deep, well drained soil is on uplands. It formed in eolian material. The vegetation is mainly grass. Elevation is 6,000 to 7,200 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is brown loamy fine sand about 5 inches thick. The subsoil is brown fine sandy loam about 28 inches thick. The substratum to a depth of 60 inches or more is brown loamy fine sand.

Included in this unit are small areas of Crews and Tricon soils along the edges of mapped areas. Also included are small areas of outcrops of rock and caliche on slope breaks. Included areas make up about 15 percent of the total acreage.

Permeability of this Manter soil is rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is very high.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on this unit is mainly blue grama, Indian ricegrass, needlegrass, sand dropseed, and western wheatgrass. As the range deteriorates, the proportion of these forage plants decreases and the proportion of sand dropseed, yucca, sand sagebrush, and broom snakeweed increases. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, Indian ricegrass, New Mexico feathergrass, and blue grama.

Livestock grazing should be managed to protect the unit from excessive erosion. Range improvement practices such as mechanical treatment are not suited to this unit because of the loamy fine sand surface layer. The unit is suited to such range management practices as earthen ponds and fences. Placement of watering facilities on this unit increases the hazard of soil blowing.

Mb—Manzano fine sandy loam, 1 to 3 percent slopes. This deep, well drained soil is on fans and flood plains. It formed in alluvium. The vegetation in areas not cultivated is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 175 days.

Typically, the surface layer is dark grayish brown fine sandy loam and loam about 10 inches thick. The subsoil is dark grayish brown and grayish brown loam about 50 inches thick.

Included in this unit are small areas of La Brier soils in oxbows, Manzano loam on terraces, and Ustifluvents adjacent to stream channels. Included areas make up about 10 percent of the total acreage.

Permeability of this Manzano soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for irrigated crops, mainly alfalfa, pasture, and small grain. Among the other crops grown are corn, grain sorghum, and legumes. The unit is also used for livestock grazing and for wildlife habitat.

If this unit is used for irrigated crops, the main limitations are high hazard of soil blowing, moderately slow permeability, and moderate hazard of water erosion.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Soil blowing can be reduced by using all crop residue and practicing minimum tillage. Yield can be maintained or increased by applying fertilizer. Most crops, except for legumes, respond to nitrogen. Legumes respond to phosphate. Rotation grazing helps to maintain the quality and quantity of forage. Timely harvesting of crops improves their quality.

The potential plant community is mainly blue grama, western wheatgrass, alkali sacaton, and vine-mesquite. As the range deteriorates, the proportion of the desired forage plants decreases and the proportion of galleta, ring muhly, and sleepygrass increases. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, blue grama, and buffalograss. This unit is suited to such range improvement practices as mechanical treatment, earthen ponds, and seeding.

MC—Manzano loam, gently sloping. This deep, well drained soil is in valleys and swales. It formed in alluvium derived from mixed sources. The vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 175 days.

Typically, the surface layer is dark grayish brown loam about 3 inches thick. The subsoil is dark grayish brown loam about 33 inches thick. The substratum to a depth of 60 inches or more is light brownish gray loam.

Included in this unit are small areas of La Brier and Vermejo soils in the slightly lower areas and Ustifluvents

adjacent to stream channels. Included areas make up about 10 percent of the total acreage.

Permeability of this Manzano soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate. The soil is subject to rare flooding.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community is mainly blue grama, western wheatgrass, galleta, and buffalograss. As the range deteriorates, the proportion of the preferred forage plants decreases and the proportion of galleta, ring muhly, and sleepygrass increases. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, vine-mesquite, blue grama, and alkali sacaton. Forage production is reduced in areas where gullies have formed.

This unit is suited to such range improvement practices as mechanical treatment, earthen ponds, and seeding.

Md—Manzano clay loam, 1 to 3 percent slopes. This deep, well drained soil is on fans and flood plains. It formed in alluvium derived from mixed sources. The vegetation in areas not cultivated is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 175 days.

Typically, the surface layer is grayish brown clay loam about 11 inches thick. The subsoil is dark grayish brown loam about 49 inches thick.

Included in this unit are small areas of La Brier soils in oxbows and swales and Ustifluvents adjacent to stream channels. Included areas make up about 10 percent of the total acreage.

Permeability of this Manzano soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for irrigated crops, mainly alfalfa, small grain, vegetables, and orchards. Among the other crops grown are corn, grain sorghum, and legumes. This unit is also used for livestock grazing and for wildlife habitat.

If this unit is used for irrigated crops, the main limitations are moderately slow permeability and moderate hazards of soil blowing and water erosion.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Soil blowing can be reduced by using all crop residue and practicing minimum tillage. Yield can be maintained or increased by applying fertilizer. Most crops, except for legumes, respond to nitrogen. Legumes respond to phosphate. Rotation grazing helps to maintain the quality and quantity of forage. Timely harvesting of crops improves their quality.

The potential plant community on the Manzano soil is mainly western wheatgrass, blue grama, alkali sacaton, and vine-mesquite. As the range deteriorates, the proportion of these forage plants decreases and the proportion of galleta, ring muhly, and broom snakeweed increases. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, blue grama, and buffalograss. Forage production is reduced in areas where gullies have formed.

This unit is suited to such range improvement practices as mechanical treatment, earthen ponds, and seeding.

ME—Mion-Penrose association, hilly. This map unit is on ridges and on slopes that lead to drainageways. Slope is 3 to 25 percent. The vegetation is mainly grass. Elevation is 6,000 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

This unit is 30 percent Mion silty clay loam, 20 percent Penrose channery loam, 15 percent Rock outcrop, and 15 percent Litle clay loam. The Mion soil is on ridges and on slopes that lead to drainageways, the Penrose soil is on ridges, and the Litle soil is on fans.

Included in this unit are small areas of Colmor soils on fans and La Brier and Vemejo soils in swales. Included areas make up about 20 percent of the total acreage.

The Mion soil is shallow and well drained. It formed in material derived dominantly from shale. Slope is 5 to 25 percent. Typically, the surface layer is dark grayish brown silty clay loam about 4 inches thick. Below this is dark grayish brown clay about 8 inches thick. Shale is at a depth of 12 inches.

Permeability of the Mion soil is very slow. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

The Penrose soil is shallow and well drained. It formed in material derived dominantly from limestone. Slope is 5 to 8 percent. Typically, the surface layer is grayish brown channery silt loam about 4 inches thick. The subsoil is grayish brown channery clay loam about 10 inches thick. Limestone is at a depth of 14 inches.

Permeability of the Penrose soil is moderate. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Litle soil is moderately deep and well drained. It formed in material derived dominantly from shale. Slope is 3 to 8 percent. Typically, the surface layer is grayish

brown clay loam about 5 inches thick. The subsoil is grayish brown clay about 18 inches thick. Shale is at a depth of 23 inches.

Permeability of the Litle soil is very slow. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is high.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Mion soil is mainly sideoats grama, little bluestem, blue grama, and needleandthread. The potential plant community on the Penrose soil is mainly true mountainmahogany, blue grama, needlegrass, and little bluestem. The potential plant community on the Litle soil is mainly blue grama, western wheatgrass, sideoats grama, and galleta. As the range deteriorates, the proportion of these forage plants decreases and the proportion of ring muhly, blue grama, pricklypear, and oneseed juniper increases. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, western wheatgrass, and little bluestem.

Proper distribution of livestock grazing on this unit is limited by the moderately steep slopes. Range improvement practices such as mechanical treatment and earthen ponds are limited by shallow depth of the soils.

MF—Montoya-Tucumcari association, gently sloping. This map unit is on flood plains and fans. Slope is 0 to 3 percent. The vegetation is mainly grass. Elevation is 3,800 to 5,300 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 60 degrees F, and the average frost-free period is 175 to 200 days.

This unit is 45 percent Montoya clay loam, 30 percent Tucumcari loam, and 15 percent Lacita silty clay loam. The Montoya soil is on flood plains, and the Tucumcari and Lacita soils are on fans.

Included in this unit are small areas of La Lande soils on fans, Redona soils on fans and in slightly higher areas, Walkon soils in slightly higher areas, and Montoya fine sandy loam near areas of Canez and Ima soils. Included areas make up about 10 percent of the total acreage.

The Montoya soil is deep and well drained. It formed in material derived dominantly from shale. Slope is 0 to 3 percent. Typically, the surface layer is reddish brown, calcareous clay loam about 4 inches thick. The subsoil is reddish brown and light reddish brown, calcareous clay about 20 inches thick. The substratum to a depth of 60 inches or more is reddish brown, calcareous clay.

Permeability of the Montoya soil is very slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Tucumcari soil is deep and well drained. It formed in material derived dominantly from shale. Slope is 0 to 3 percent. Typically, the surface layer is reddish brown loam about 4 inches thick. The subsoil is reddish brown, calcareous silty clay loam and silty clay about 47 inches thick. The substratum to a depth of 60 inches or more is reddish brown, calcareous silty clay loam.

Permeability of the Tucumcari soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Lacita soil is deep and well drained. It formed in alluvium derived dominantly from shale. Slope is 1 to 3 percent. Typically, the surface layer is reddish brown, calcareous silty clay loam about 4 inches thick. The next layer is reddish brown, calcareous silty clay loam about 9 inches thick. The substratum to a depth of 60 inches or more is reddish brown, calcareous silty clay loam.

Permeability of the Lacita soil is moderately slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Montoya soil is mainly alkali sacaton, tobosa, blue grama, and vine-mesquite. The potential plant community on the Tucumcari soil is mainly blue grama, alkali sacaton, galleta, and sideoats grama. The potential plant community on the Lacita soil is mainly blue grama, sand dropseed, galleta, and alkali sacaton.

As the range deteriorates, the proportion of desirable forage plants decreases and threeawn, ring muhly, and buffalograss increase. Mesquite and cholla invade. Grazing management should be designed to increase the productivity and reproduction of alkali sacaton, vine-mesquite, giant sacaton, and sideoats grama.

This unit receives extra water from adjoining areas and therefore produces more palatable forage than do the surrounding areas. Consequently, it is often overused. This unit is suited to such range improvement practices as mechanical treatment, earthen ponds, and mechanical brush management.

MG—Moreno-Brycan association, sloping. This map unit is on fans and on valley sides. Slope is 3 to 9 percent. The vegetation in areas not cultivated is mainly grass. Elevation is 7,000 to 9,000 feet. The average annual precipitation is about 20 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 100 to 140 days.

This unit is 45 percent Moreno loam and 35 percent Brycan loam (fig. 8).

Included in this unit are small areas of Kiln and Stout soils and Borolls that occur throughout the unit. Also included are small areas of wet soils adjacent to streams. Included areas make up about 20 percent of the total acreage.

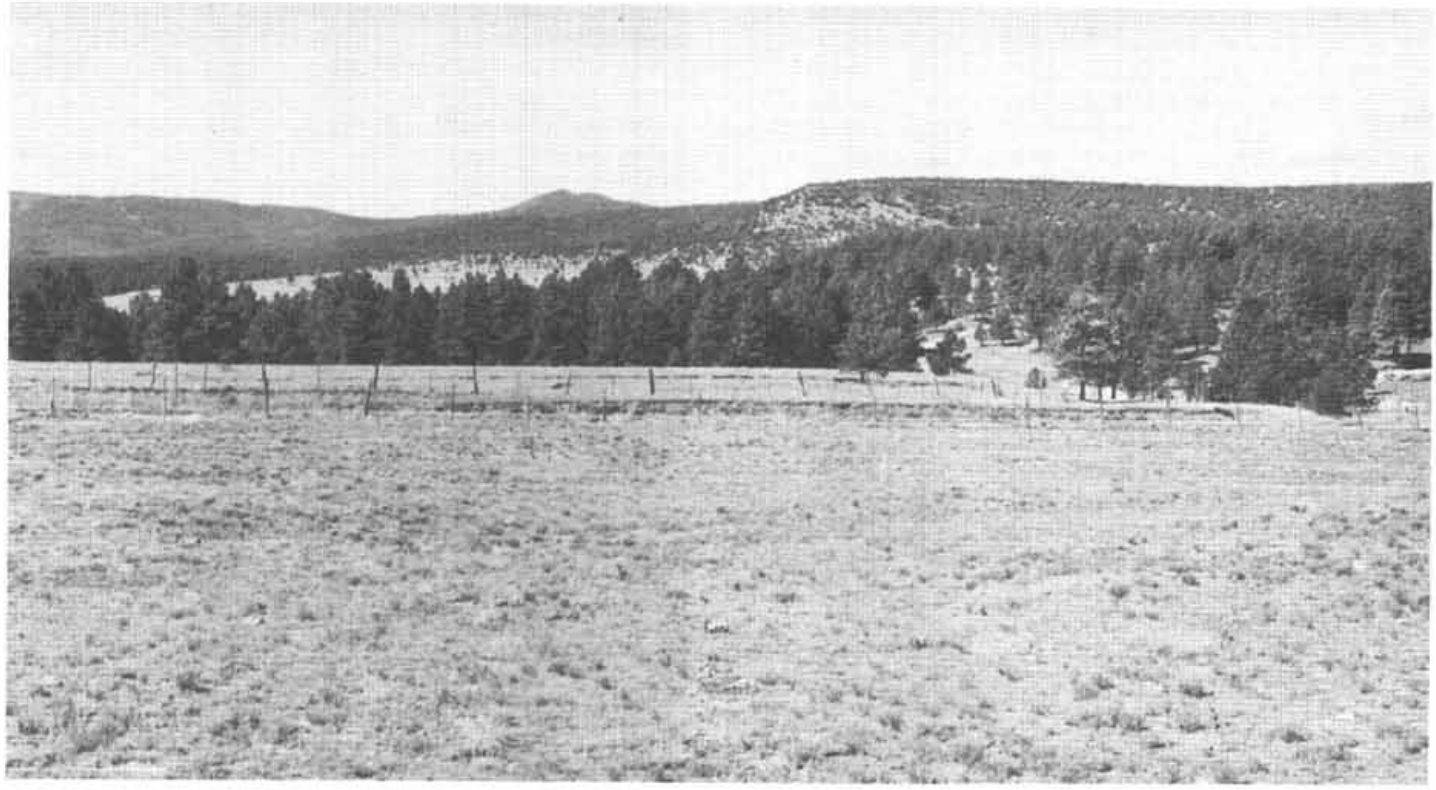


Figure 8.—Area of Moreno-Brycan association, sloping, in foreground and of Rocio-Dargol-Stout association, hilly, in background.

The Moreno soil is deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Slope is 3 to 9 percent. Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsoil is dark grayish brown and brown clay and clay loam about 49 inches thick. The substratum to a depth of 60 inches or more is brown clay loam.

Permeability of the Moreno soil is slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Brycan soil is deep and well drained. It formed in alluvium derived from mixed sources. Slope is 3 to 5 percent. Typically, the surface layer is very dark grayish brown loam about 8 inches thick. The subsoil is brown loam about 42 inches thick. The substratum to a depth of 60 inches or more is brown loam.

Permeability of the Brycan soil is moderate. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for irrigated crops, mainly alfalfa and pasture. Among the other crops grown are legumes. This unit is also used for livestock grazing and for wildlife habitat.

If this unit is used for irrigated crops, the main limitations are moderate slope, the slow permeability of the Brycan soil, and moderate hazards of water erosion and soil blowing.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Soil blowing can be reduced by using all crop residue and practicing minimum tillage. Yield can be maintained or increased by applying fertilizer. Most crops, except for legumes, respond to nitrogen. Legumes respond to phosphate. Timely harvesting of crops improves their quality. Rotation grazing helps to maintain the quality and quantity of forage.

The potential plant community on the Moreno soil is mainly little bluestem, western wheatgrass, mountain muhly, and blue grama. The potential plant commnity on the Brycan soil is mainly little bluestem, blue grama, mountain brome, and western wheatgrass.

As the range deteriorates, the proportion of the desirable forage plants decreases and the proportion of blue

grama, Kentucky bluegrass, and broom snakeweed increases. Grazing management should be designed to increase the productivity and reproduction of mountain muhly, western wheatgrass, Arizona fescue, and little bluestem. This unit is suited to such range improvement practices as mechanical treatment, earthen ponds, and range seeding.

NW—Newkirk-Walkon-Conchas association, undulating. This map unit is on uplands. Slope is 0 to 7 percent. The vegetation is mainly grass. Elevation is 3,800 to 5,300 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 60 degrees F, and the average frost-free period is 175 to 200 days.

This unit is 45 percent Newkirk sandy loam, 25 percent Walkon fine sandy loam, and 20 percent Conchas loam. The Newkirk soil is on low ridges, the Walkon soil is on fans and uplands, the Conchas soil is on uplands.

Included in this unit are small areas of Lacita and La Lande soils in drainageways, Latom soils on low ridges, Redona soils in areas of Walkon soils, and Rock outcrop on low ridges. Included areas make up about 10 percent of the total acreage.

The Newkirk soil is very shallow and shallow and well drained. It formed in material derived dominantly from sandstone. Slope is 3 to 7 percent. Typically, the surface layer is reddish brown sandy loam about 4 inches thick. The subsoil is reddish brown sandy clay loam about 9 inches thick. Sandstone is at a depth of 13 inches.

Permeability of the Newkirk soil is moderate. Available water capacity is very low. Effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Walkon soil is moderately deep and well drained. It formed in material derived dominantly from sandstone and shale. Slope is 1 to 3 percent. Typically, the surface layer is reddish brown fine sandy loam about 4 inches thick. The subsoil is reddish brown clay loam about 20 inches thick. The substratum to a depth of 31 inches is light reddish brown, calcareous silt loam. Sandstone is at a depth of 31 inches.

Permeability of the Walkon soil is moderately slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Conchas soil is moderately deep and well drained. It formed in material derived dominantly from sandstone and shale. Slope is 1 to 5 percent. Typically, the surface layer is brown, calcareous loam about 5 inches thick. The subsoil is reddish brown, calcareous clay loam about 25 inches thick. Sandstone is at a depth of 30 inches.

Permeability of the Conchas soil is moderately slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Newkirk soil is mainly black grama, blue grama, little bluestem, and New Mexico feathergrass. The potential plant community on the Walkon soil is mainly blue grama, black grama, galleta, and sideoats grama. The potential plant community on the Conchas soil is mainly blue grama, black grama, galleta, and yucca.

As the range deteriorates, the proportion of the desirable forage plants decreases and the proportion of threeawn, galleta, yucca, and oneseed juniper increases. Mesquite and cholla invade. Grazing management should be designed to increase the productivity and reproduction of black grama, little bluestem, sideoats grama, and New Mexico feathergrass.

The Conchas and Walkon soils are suited to such range improvement practices as mechanical treatment. Range improvement practices such as earthen ponds and brush management are limited by the moderate depth of the Conchas and Walkon soils. The Newkirk soils are not suited to range improvement practices such as mechanical treatment and earthen ponds, because of very shallow and shallow depth.

Pa—Partri loam, 1 to 3 percent slopes. This deep, well drained soil is on uplands. It formed in alluvium derived dominantly from limestone and sandstone. The vegetation in areas not cultivated is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsoil is brown clay and silty clay loam about 25 inches thick. The substratum to a depth of 60 inches or more is pink and pinkish white, calcareous silty clay loam.

Included in this unit are small areas of Carnero soils that occur throughout mapped areas. Also included are small areas of La Brier soils in swales. Included areas make up about 10 percent of the total acreage.

Permeability of this Partri soil is slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for irrigated crops, mainly alfalfa, pasture, and small grain. Among the other crops grown are legumes. This unit is also used for livestock grazing, urban development, and wildlife habitat.

If this unit is used for irrigated crops, the main limitations are slow permeability and moderate hazards of water erosion and soil blowing.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Soil blowing can be reduced by using all crop residue and practicing minimum tillage. Yield can be maintained or increased by applying fertilizer. Most crops, except for legumes, respond to nitrogen. Legumes respond to phosphate. Rotation grazing helps to maintain the quality and quantity of forage. Timely harvesting of crops improves their quality.

The potential plant community is mainly blue grama, western wheatgrass, galleta, and sideoats grama. As the range deteriorates, the preferred species decrease and a dense, low turf of blue grama and ring muhly that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, sideoats grama, and winterfat.

This unit is suited to such range improvement practices as mechanical treatment, earthen ponds, and range seeding.

This unit is poorly suited to urban development. The main limitations are high shrink-swell potential, low strength, slow permeability, and the high content of clay in the subsoil.

Pb—Partri loam, 3 to 5 percent slopes. This deep, well drained soil is on uplands. It formed in alluvium derived dominantly from sandstone and limestone. The vegetation in areas not cultivated is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The subsoil is brown clay and silty clay loam about 25 inches thick. The substratum to a depth of 60 inches or more is pinkish white, calcareous silty clay loam.

Included in this unit are small areas of Bernal soils on slopes that lead to drainageways, Carnero soils that occur throughout the unit, La Brier soils in swales, and a Partri channery loam that occurs throughout the unit. Included areas make up about 10 percent of the total acreage.

Permeability of this Partri soil is slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for irrigated crops, mainly alfalfa, pasture, and small grain. Among the other crops grown are legumes. The unit is also used for livestock grazing, urban development, and wildlife habitat.

If this unit is used for irrigated crops, the main limitations are slow permeability and moderate hazards of water erosion and soil blowing.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Soil blowing can be reduced by using all crop residue and practicing minimum tillage. Yield can be maintained or increased by applying fertilizer. Most crops, except for legumes, respond to nitrogen. Legumes respond to phosphate. Timely harvesting of crops improves their quality. Rotation grazing helps to maintain the quality and quantity of forage.

The potential plant community is mainly blue grama, western wheatgrass, galleta, and sideoats grama. As the range deteriorates, the preferred species decrease and a dense, low turf of blue grama and ring muhly that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, sideoats grama, and winterfat.

This unit is suited to such range improvement practices as mechanical treatment, earthen ponds, and range seeding.

This unit is poorly suited to urban development. The main limitations are high shrink-well potential, low strength, slow permeability, and the high content of clay in the subsoil.

PC—Partri loam, undulating. This deep, well drained soil is on uplands. It formed in alluvium derived dominantly from sandstone and limestone. The vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about l6 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is dark grayish brown loam about 4 inches thick. The subsoil is brown clay and silty clay loam about 25 inches thick. The substratum to a depth of 60 inches or more is pink and pinkish white, calcareous silty clay loam.

Included in this unit are small areas of Bernal and Carnero soils that occur throughout the unit, La Brier soils in swales, and Tricon soils in the slightly higher areas. Included areas make up about 10 percent of the total acreage.

Permeability of this Partri soil is slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing, urban development, and wildlife habitat.

The potential plant community is mainly blue grama, western wheatgrass, sideoats grama, and galleta. As the range deteriorates, the preferred species decrease and a

dense, low turf of blue grama and ring muhly that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, sideoats grama, and winterfat.

This unit is suited to such range improvement practices as mechanical treatment and earthen ponds.

This unit is poorly suited to urban development. The main limitations are high shrink-swell potential, low strength, slow permeability, and high content of clay in the subsoil.

PD—Partri-Tricon association, undulating. This map unit is on uplands. Slope is 1 to 5 percent. The vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

This unit is 55 percent Partri silt loam and 30 percent Tricon silt loam.

Included in this unit are small areas of Bernal and Carnero soils within areas of the Partri soil, Crews soils within areas of the Tricon soil, and La Brier soils in swales. Included areas make up about 15 percent of the total acreage.

The Partri soil is deep and well drained. It formed in alluvium derived dominantly from sandstone and limestone. Slope is 1 to 3 percent. Typically, the surface layer is dark grayish brown silt loam about 4 inches thick. The subsoil is brown clay and silty clay loam about 25 inches thick. The substratum to a depth of 60 inches or more is pink and pinkish white, calcareous silty clay loam.

Permeability of the Partri soil is slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Tricon soil is moderately deep and well drained. It formed in alluvial and eolian material. Slope is 1 to 5 percent. Typically, the surface layer is grayish brown silt loam about 7 inches thick. The subsoil is brown clay loam about 26 inches thick. Indurated caliche is at a depth of 33 inches.

Permeability of the Tricon soil is slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Partri soil is mainly blue grama, western wheatgrass, sideoats grama, and galleta. The potential plant community on the Tricon soil is mainly blue grama, western wheatgrass, sideoats grama, and buffalograss. As the range deteriorates, the desirable species decrease and a dense, low turf of ring muhly, threeawn, and blue grama that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, sideoats grama, blue grama, and winterfat.

This unit is suited to such range improvement practices as mechanical treatment. Range management practices such as earthen ponds are limited by the moderate depth of the Tricon soil.

PM—Penrose-Litle-Mion association, undulating. This map unit is on uplands and fans. Slope is 0 to 9 percent. The vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

This unit is 45 percent Penrose channery silt loam, 25 percent Litle clay, and 15 percent Mion clay loam. The Penrose soil is on the tops of low, smooth hills, the Litle soil is on fans, and the Mion soil is on the sides of low, smooth hills.

Included in this unit are small areas of Colmor soils on fans, Vermejo soils in swales, and Rock outcrop on slopes that lead to drainageways. Included areas make up about 15 percent of the total acreage.

The Penrose soil is shallow and well drained. It formed in material derived dominantly from limestone. Slope is 0 to 5 percent. Typically, the surface layer is grayish brown channery silt loam about 4 inches thick. The substratum to a depth of 14 inches is grayish brown clay loam. Limestone is at a depth of 14 inches.

Permeability of the Penrose soil is moderate. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Litle soil is moderately deep and well drained. It formed in material derived dominantly from shale. Slope is 3 to 9 percent. Typically, the surface layer is grayish brown clay about 5 inches thick. The subsoil is grayish brown and light brownish gray clay about 18 inches thick. Shale is at a depth of 23 inches.

Permeability of the Litle soil is very slow. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Mion soil is shallow and well drained. It formed in material derived dominantly from shale. Slope is 3 to 9 percent. Typically, the surface layer is dark grayish brown clay loam about 4 inches thick. The underlying layer is dark grayish brown silty clay about 8 inches thick. Shale is at a depth of 12 inches.

Permeability of the Mion soil is very slow. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Penrose soil is mainly true mountainmahogany, blue grama, needlegrass, and little bluestem. The potential plant community on the Litle soil is mainly blue grama, western wheatgrass, sideoats grama, and galleta. The potential plant community on the Mion soil is mainly sideoats grama, little bluestem, blue grama, and needleandthread.

As the range deteriorates, the proportion of the desirable forage plants decreases and the proportion of ring muhly, galleta, pricklypear, and oneseed juniper increases. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, western wheatgrass, and little bluestem.

The Litle soil is suited to such range improvement practices as mechanical treatment. Range management practices such as mechanical treatment and earthen ponds are limited by the shallow depth of the Penrose and Mion soils.

QU—Quintana gravelly loam, moderately sloping. This deep, well drained soil is on uplands. It formed in material derived dominantly from limestone, shale, and calcareous sandstone. The vegetation is mainly pinyon and juniper and an understory of grass. Elevation is 5,700 to 6,500 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 52 degrees F, and the average frost-free period is 140 to 165 days.

Typically, the surface layer is brown gravelly loam about 6 inches thick. The subsoil is light yellowish brown clay loam about 13 inches thick. The upper 22 inches of the substratum is very pale brown sandy clay loam and sandy loam. The lower part to a depth of 60 inches or more is yellow very gravelly sandy loam.

Included in this unit are small areas of Andok soils on ridges. Included areas make up about 15 percent of the total acreage.

Permeability of this Quintana soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community is mainly pinyon and juniper and an understory of blue grama and western wheatgrass. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, sideoats grama, and blue grama.

This unit is suited to such range improvement practices as mechanical treatment and earthen ponds.

This unit is suited to the production of pinyon and juniper, which are used for fuel and fenceposts. When the crown density increases to more than 25 percent, forage production is reduced. To increase forage production, the crown density should be selectively reduced.

RE—Redona-Quay association, undulating. This map unit is on fans and uplands. Slope is 0 to 5 percent. The vegetation is mainly grass. Elevation is 3,800 to 5,300 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 60 degrees F, and the average frost-free period is 175 to 200 days.

This unit is 55 percent Redona loam and 25 percent Quay loam. The Redona soil is on fans, and the Quay soil is on fans and low ridges.

Included in this unit are small areas of Conchas soils in the slightly higher areas, Lacita soils on fans, Montoya and Tucumcari soils in swales, and Walkon soils in areas of the Redona soil. Included areas make up about 20 percent of the total acreage.

The Redona soil is deep and well drained. It formed in material derived dominantly from sandstone and shale. Slope is 0 to 5 percent. Typically, the surface layer is reddish brown loam about 5 inches thick. The subsoil is reddish brown and light reddish brown, calcareous clay loam about 32 inches thick. The substratum to a depth of 60 inches or more is reddish brown, calcareous sandy clay loam.

Permeability of the Redona soil is moderate. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Quay soil is deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Slope is 0 to 5 percent. Typically, the surface layer is light brown, calcareous loam about 6 inches thick. The subsoil is light reddish brown and pink, calcareous clay loam about 20 inches thick. The substratum to a depth of 60 inches or more is pink and light brown, calcareous silty clay loam.

Permeability of the Quay soil is moderate. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Redona soil is mainly blue grama, yucca, galleta, and vine-mesquite. The potential plant community on the Quay soil is mainly blue grama, galleta, black grama, and western wheatgrass.

As the range deteriorates, the proportion of the productive forage plants decreases and the proportion of galleta, ring muhly, and broom snakeweed increases. Mesquite and cholla invade. Grazing management should be designed to increase the productivity and reproduction of blue grama, black grama, sideoats grama, and western wheatgrass.

This unit is suited to such range improvement practices as mechanical treatment and earthen ponds.

RF—Ribera-Sombordoro-Vibo association, moderately sloping. This map unit is on uplands and valley sides. Slope is 1 to 10 percent. The vegetation is mainly pinyon and juniper and an understory of grass. Elevation is 6,500 to 7,200 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 165 days.

This unit is 40 percent Ribera loam, 25 percent Sombordoro very stony fine sandy loam, and 20 percent Vibo sandy loam. The Ribera soil is on valley sides, the Sombordoro soil is on ridges, and the Vibo soil is in valleys.

Included in this unit are small areas of Bernal and Tuloso soils on ridges. Also included are small areas of Rock outcrop on ridges. Included areas make up about 15 percent of the total acreage.

The Ribera soil is moderately deep and well drained. It formed in alluvial and eolian material derived dominantly from sandstone and shale. Slope is 3 to 9 percent. Typically, the surface layer is brown loam about 5 inches thick. The subsoil is brown clay loam about 21 inches thick. The substratum to a depth of 31 inches is light brown, calcareous loam. Sandstone is at a depth of 31 inches.

Permeability of the Ribera soil is moderate. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Sombordoro soil is very shallow and well drained. It formed in material derived dominantly from sandstone. Slope is 3 to 9 percent. Typically, the surface layer is light brown and yellowish red very stony fine sandy loam about 7 inches thick. The subsoil is yellowish red extremely stony clay about 9 inches thick. Sandstone is at a depth of 16 inches.

Permeability of the Sombordoro soil is slow. Available water capacity is very low. Effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Vibo soil is deep and well drained. It formed in alluvial and eolian material. Slope is 1 to 5 percent. Typically, the surface layer is brown fine sandy loam about 8 inches thick. The subsoil is reddish brown sandy clay loam about 16 inches thick. The substratum to a depth of 60 inches or more is light reddish brown and pink, calcareous sandy loam and loam.

Permeability of the Vibo soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Ribera soil is mainly blue grama, western wheatgrass, pinyon ricegrass, and sideoats grama. The potential plant community on the Sombordoro soil is mainly pinyon, juniper, blue grama, and pinyon ricegrass. The potential plant community on the Vibo soil is mainly blue grama, western wheatgrass, sideoats grama, and little bluestem.

Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, pinyon ricegrass, sideoats grama, and little bluestem. The Vibo soil is suited to such range improvement practices as mechanical treatment. Range improvement practices such as earthen ponds on the Ribera and Sombordoro soils are limited by moderate and shallow depth.

This unit is suited to the production of pinyon and juniper. It can produce 10 cords per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot.

RG—Rocio-Dargol-Stout association, hilly. This map unit is on hills and mountains. Slope is 5 to 35 percent. The vegetation is mainly conifers and an understory of grass. Elevation is 7,200 to 9,000 feet. The average annual precipitation is about 25 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is 100 to 140 days.

This unit is 35 percent Rocio stony loam, 25 percent Dargol stony loam, and 20 percent Stout cobbly sandy loam. The Rocio soil is on the less strongly sloping hills and mountains, the Dargol soil is on the more strongly sloping hills and mountains, and the Stout soil is on benches and ridges of mountains.

Included in this unit are small areas of Brycan soils in valleys, Kiln soils on benches, Moreno soils on fans, and Rock outcrop on ridges and in areas where slope changes. Included areas make up about 20 percent of the total acreage.

The Rocio soil is deep and well drained. It formed in alluvium and colluvium derived dominantly from sandstone and shale. Slope is 9 to 35 percent. Typically, the surface layer is dark grayish brown stony loam about 5 inches thick. The subsurface layer is light brown stony sandy loam about 13 inches thick. The subsoil is brown clay about 42 inches thick.

Permeability of the Rocio soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Dargol soil is moderately deep and well drained. It formed in residuum derived dominantly from sandstone and shale. Slope is 5 to 15 percent. Typically, the surface is covered with a mat of decomposing forest litter about 1 inch thick. The surface layer is dark grayish brown stony loam about 3 inches thick. The subsurface layer is pale brown loam about 6 inches thick. The subsoil is light yellowish brown and pale brown clay about 21 inches thick. The substratum to a depth of 37 inches is brown and light brownish gray clay. Sandstone is at a depth of 37 inches.

Permeability of the Dargol soil is very slow. Available water capacity is moderate. Effective rooting depth is 20

to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

The Stout soil is very shallow and shallow and well drained. It formed in material derived dominantly from sandstone. Slope is 5 to 10 percent. Typically, the surface layer is grayish brown cobbly sandy loam about 4 inches thick. The substratum to a depth of 10 inches is pale brown cobbly sandy loam. Sandstone is at a depth of 10 inches.

Permeability of the Stout soil is rapid. Available water capacity is very low. Effective rooting depth is 6 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, woodland, homesites, and wildlife habitat.

The potential plant community on the Rocio and Dargol soils is mainly ponderosa pine and an understory of mountain muhly, pine dropseed, and Arizona fescue. The potential plant community on the Stout soil is mainly ponderosa pine and an understory of sideoats grama, Arizona fescue, and mountain muhly. Grazing management should be designed to increase productivity and reproduction of Arizona fescue, mountain muhly, and blue grama.

The Rocio soil is suited to such range improvement practices as earthen ponds. Mechanical treatment is limited on the Rocio and Dargol soils by the cobbly and stony surface layer. Management practices such as earthen ponds and fences are limited by moderate depth on the Dargol soil. The Stout soil is not suited to practices such as mechanical treatment and earthen ponds, because of very shallow and shallow depth.

This unit is suited to the production of ponderosa pine. It can produce about 3,150 cubic feet, or 7,630 board feet (International rule) of merchantable timber per acre from a fully stocked stand of even-aged trees 80 years old. Stands should be maintained by thinning and by selective cutting of mature trees.

This unit is poorly suited to homesite development. If the Rocio soil is used for homesite development, the main limitations are high shrink-swell potential, low strength, and moderately steep to very steep slopes. If the Dargol soil is used for homesite development, the main limitations are high shrink-swell potential, low strength, moderate depth, and moderate slope. If the Stout soil is used for homesite development, the main limitations are very shallow and shallow depth and moderate slope.

Sites for recreational homes on this unit should be carefully selected.

RH—Rock outcrop-Haploborolls complex, very steep. This map unit is on ridges and mountainsides. Slope is 30 to 75 percent. The vegetation is mainly pinyon and oak. Elevation is 7,200 to 9,000 feet. The average annual precipitation is about 20 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 100 to 140 days.

This unit is 50 percent Rock outcrop and 40 percent Haploborolls.

Included in this unit are small areas of Bernal, Mion, and Tuloso soils on the lower edges of mapped areas; Dargol, Kiln, and Rocio soils on west-facing slopes; and Stout soils on ridges. Included areas make up about 10 percent of the total acreage.

Rock outcrop consists of exposed areas of sandstone, limestone, and shale. It occurs as sheets, ridges, and escarpments.

Haploborolls are cold soils that have a dark colored surface layer. These soils are highly variable in properties.

This unit is used for wildlife habitat.

The potential plant community on the Haploborolls is mainly pinyon, oak, and ponderosa pine and an understory of grass.

RT—Rock outcrop-Torriorthents complex, very steep. This map unit is on escarpments. Slope is 15 to 100 percent. The vegetation is mainly grass. Elevation is 4,800 to 5,300 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 60 degrees F, and the average frost-free period is 175 to 200 days.

This unit is 70 percent Rock outcrop and 20 percent Torriorthents.

Included in this unit are small areas of La Lande and Redona soils near the edges of mapped areas and Latom soils on ridges. Included areas make up about 10 percent of the total acreage.

Rock outcrop consists of exposed areas of sandstone and shale.

Torriorthents are stony soils that are variable in depth, texture, and other properties.

This unit is used for wildlife habitat.

The potential plant community on Torriorthents is mainly little bluestem, sideoats grama, blue grama, and galleta.

SR—Stout-Rocio-Dargol association, very steep. This map unit is on mountains. Slope is 9 to 65 percent. The vegetation is mainly conifers and an understory of grass. Elevation is 7,000 to 9,000 feet. The average annual precipitation is about 25 inches, the average annual air temperature is about 40 degrees F, and the average frost-free period is 100 to 140 days.

This unit is 30 percent Stout cobbly fine sandy loam, 20 percent Rocio gravelly loam, and 15 percent Dargol stony loam. The Stout soil is on ridges, the Rocio soil is on long slopes of mountainsides, and the Dargol soil is on short slopes of mountainsides.

Included in this unit are areas of Rock outcrop of sandstone; small areas of Moreno soils on fans; small areas of soils, on ridges, that are similar to the Stout soil

but are moderately deep; and small areas of soils, on long mountainsides, that are similar to the Rocio soil but do not have a dark-colored surface layer. Included areas make up about 35 percent of the total acreage.

The Stout soil is very shallow and shallow and well drained. It formed in material derived dominantly from sandstone. Slope is 9 to 30 percent. Typically, the surface layer is grayish brown cobbly fine sandy loam about 4 inches thick. The substratum to a depth of 10 inches is light yellowish brown cobbly sandy loam. Sandstone is at a depth of 10 inches.

Permeability of the Stout soil is rapid. Available water capacity is very low. Effective rooting depth is 6 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is high.

The Rocio soil is deep and well drained. It formed in alluvium and colluvium derived dominantly from sandstone and shale. Slope is 45 to 65 percent. Typically, the surface is covered with a mat of decomposing forest litter about 1 inch thick. The surface layer is dark grayish brown gravelly loam about 5 inches thick. The subsurface layer is pale brown gravelly fine sandy loam about 13 inches thick. The subsoil to a depth of 60 inches or more is brown and light brown clay.

Permeability of the Rocio soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

The Dargol soil is moderately deep and well drained. It formed in residuum derived dominantly from sandstone and shale. Slope is 25 to 45 percent. Typically, the surface layer is dark gray stony loam about 3 inches thick. The next layer is very pale brown loam about 9 inches thick. The subsoil is pale brown gravelly clay loam about 10 inches thick. Sandstone is at a depth of 22 inches.

Permeability of the Dargol soil is very slow. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used for livestock grazing, woodland, homesite development, and wildlife habitat.

The present vegetation in most areas is mainly Arizona fescue, mountain muhly, bluegrass, and ponderosa pine. Grazing management should be designed to increase the productivity and reproduction of Arizona fescue, mountain muhly, and bluegrass. Management practices such as mechanical treatment and earthen ponds are limited by steep to extremely steep slopes, the cobbly and stony surface layer, and very shallow depth.

This unit is suited to the production of ponderosa pine. It can produce about 3,150 cubic feet, or 7,630 board feet (International rule) of merchantable timber per acre from a fully stocked stand of even-aged trees 80 years old. Stands should be maintained by thinning and selective cutting of mature trees. Management that minimizes the risk of erosion is essential in harvesting timber.

This unit is poorly suited to homesite development. If the Stout soil is used for homesite development, the main limitations are very shallow and shallow depth and moderate slope. If the Rocio soil is used for homesite development, the main limitations are high shrink-swell potential, low strength, and extremely steep slopes. If the Dargol soil is used for homesite development, the main limitations are high shrink-swell potential, low strength, moderate depth, and very steep slopes.

Sites for recreational homes on this unit should be carefully selected.

SW—Swastika silt loam, undulating. This deep, well drained soil is on uplands. It formed in material derived dominantly from shale. The native vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is dark grayish brown silt loam about 2 inches thick. The subsoil is brown and yellowish brown clay loam and clay about 28 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown and very pale brown, calcareous silty clay loam.

Included in this unit are small areas of Colmor soils on fans, La Brier soils in swales, and Vermejo soils on lakebeds. Included areas make up about 15 percent of the total acreage.

Permeability of this Swastika soil is slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing, urban development, and wildlife habitat.

The potential plant community is mainly blue grama, western wheatgrass, wolftail, and galleta. As the range deteriorates, the western wheatgrass decreases and a dense, low turf of blue grama and ring muhly that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, blue grama, and sideoats grama.

This unit is suited to such range improvement practices as mechanical treatment, earthen ponds, and range seeding.

This unit is poorly suited to urban development. The main limitations are high shrink-swell potential, low strength, and slow permeability.

Sx—Swastika clay loam, 1 to 3 percent slopes. This deep, well drained soil is on uplands. It formed in material derived dominantly from shale. The vegetation in areas not cultivated is mainly grass. Elevation is 6,000 to 6,300 feet. The average annual precipitaion is about 16 inches, the average annual air temperature is about 50

degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is dark grayish brown clay loam about 3 inches thick. The subsoil is brown and yellowish brown clay and clay loam about 28 inches thick. The substratum to a depth of 60 inches or more is very pale brown, calcareous silty clay loam.

Included in this unit are small areas of Colmor and Carnero soils near the edge of mapped areas and La Brier and Vermejo soils in swales. Included areas make up about 10 percent of the total acreage.

Permeability of this Swastika soil is slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for irrigated crops, mainly alfalfa, pasture, and small grain. Among the other crops grown are corn, grain sorghum, and legumes. The unit is also used for livestock grazing, urban development, and wildlife habitat.

If this unit is used for irrigated crops, the main limitations are slow permeability and moderate hazards of water erosion and soil blowing.

Furrow, border, corrugaton, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Soil blowing can be reduced by using all crop residue and practicing minimum tillage. Yield of crops can be maintained or increased by applying fertilizer. Most crops, except for legumes, respond to nitrogen. Legumes respond to phosphate. Timely harvesting of crops improves their quality. Rotation grazing helps to maintain the quality and quantity of forage.

The potential plant community is mainly blue grama, western wheatgrass, wolftail, and galleta. As the range deteriorates, the western wheatgrass decreases and a dense, low turf of blue grama and ring muhly that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, blue grama, and sideoats grama. This unit is suited to such range improvement practices as mechanical treatment, earthen ponds, and range seeding.

This unit is poorly suited to urban development. The main limitations are high shrink-swell potential, low strength, and slow permeability.

Sy—Swastika clay loam, 3 to 5 percent slopes. This deep, well drained soil is on uplands. It formed in material derived dominantly from shale. The vegetation in areas not cultivated is mainly grass. Elevation is 6,000 to 6,300 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is dark grayish brown clay loam about 2 inches thick. The subsoil is brown and yellowish brown clay and clay loam about 28 inches thick. The substratum to a depth of 60 inches or more is very pale brown, calcareous silty clay loam.

Included in this unit are small areas of Colmor and Carnero soils near the edge of mapped areas, other Swastika soils throughout mapped areas, and La Brier and Vermejo soils in swales. Included areas make up about 10 percent of the total acreage.

Permeability of this Swastika soil is slow. Available water capacity is very high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for irrigated crops, mainly alfalfa, pasture, and small grain. Among the other crops grown are legumes. It is also used for livestock grazing, urban development, and wildlife habitat.

If this unit is used for irrigated crops, the main limitations are slow permeability and moderate hazards of water erosion and soil blowing. Furrow, border, corrugation, and sprinkler irrigation systems are suitable. The method used generally is governed by the crop. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Soil blowing can be reduced by using all crop residue and practicing minimum tillage. Yield of crops can be maintained or increased by applying fertilizer. Most crops, except for legumes, respond to nitrogen. Legumes respond to phosphate. Timely harvesting of crops improves their quality. Rotation grazing helps to maintain the quality and quantity of forage.

The potential plant community is mainly blue grama, western wheatgrass, wolftail, and galleta. As the range deteriorates, the western wheatgrass decreases and a dense, low turf of ring muhly and blue grama that is low in productivity develops. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, blue grama, and sideoats grama.

This unit is suited to such range improvement practices as mechanical treatment, earthen ponds, and range seeding.

This unit is poorly suited to urban development. The main limitations are high shrink-swell potential, low strength, and slow permeability.

TD—Tapia-Dean association, undulating. This map unit is on mesas and fans. Slope is 1 to 5 percent. The vegetation is mainly grass and scattered pinyon and juniper. Elevation is 6,000 to 7,200 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 165 days.

This unit is 45 percent Tapia loam and 35 percent Dean loam. The Tapia soil is on mesas and fans, and the Dean soil is in the slightly higher areas.

Included in this unit are small areas of Laporte soils and Rock outrop on ridges, Tuloso soils on canyon walls, and Vibo and Ribera soils within areas of Tapia soils. Included areas make up about 20 percent of the total acreage.

The Tapia soil is deep and well drained. It formed in material derived from mixed sources. Slope is 1 to 3 percent. Typically, the surface layer is brown loam about 5 inches thick. The subsoil is brown and light brown loam and sandy clay loam about 17 inches thick. The substratum to a depth of 60 inches or more is pink, calcareous gravelly loam.

Permeability of the Tapia soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Dean soil is deep and well drained. It formed in material derived dominantly from limestone. Slope is 1 to 5 percent. Typically, the surface layer is light brownish gray, calcareous loam about 5 inches thick. The next layer is light grayish brown, calcareous loam about 8 inches thick. The underlying material to a depth of 60 inches or more is light brown, calcareous loam and very pale brown gravelly loam.

Permeability of the Dean soil is slow. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on the Tapia soil is mainly blue grama, western wheatgrass, galleta, and pinyon ricegrass. The potential plant community on the Dean soil is mainly pinyon pine and an understory of blue grama, sideoats grama, little bluestem, and pinyon ricegrass. As the range deteriorates, the proportion of the desirable forage plants decreases and ring muhly, blue grama, and broom snakeweed increase. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, little bluestem, and pinyon ricegrass.

The Tapia soil is suited to such range improvement practices as mechanical treatment, earthen ponds, and range seeding. Suitability of the Dean soil to such range management practices as mechanical treatment and earthen ponds is limited by caliche fragments at a very shallow to moderate depth.

The Dean soil is well suited to the production of pinyon and juniper, which are used for firewood. Maximum production of understory forage can be obtained by reducing the crown density of the overstory.

TE—Teco loam, moderately sloping. This deep, well drained soil is on uplands. It formed in alluvium derived dominantly from sandstone. The vegetation is mainly grass. Elevation is 5,700 to 6,000 feet. The average annual precipitation is about 14 inches, the average annual air temperature is about 52 degrees F, and the average frost-free period is 140 to 165 days.

Typically, the surface layer is brown and pale brown loam about 6 inches thick. The subsoil is yellowish red clay loam about 22 inches thick. The substratum to a depth of 60 inches or more is pink and light red clay loam and gravelly fine sandy loam.

Included in this unit are small areas of Andok and Quintana soils on ridges. Included areas make up about 15 percent of the total acreage.

Permeability of this Teco soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Teco soil is mainly blue grama, sideoats grama, galleta, and pinyon ricegrass. As the range deteriorates, the proportion of the desirable forage plants decreases and the proportion of ring muhly, threeawn, and blue grama increases. Grazing management should be designed to increase the productivity and reproduction of blue grama, sideoats grama, and western wheatgrass.

This unit is suited to such range improvement practices as mechanical treatment, earthen ponds, and fences.

TG—Tinaja gravelly loam, hilly. This deep, well drained soil is on terraces. It formed in alluvium derived from mixed sources. The vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 175 days.

Typically, the surface layer is light brown gravelly loam about 7 inches thick. The subsoil is light brown gravelly loam about 7 inches thick. The substratum to a depth of 60 inches or more is light brown and brown, calcareous very gravelly sandy loam and very gravelly loamy coarse sand.

Included in this unit are small areas of Bernal, Partri, Penrose, and Tuloso soils near the edge of mapped areas. Also included are small areas of Manzano soils and Ustifluvents on fans and flood plains. Included areas make up about 20 percent of the total acreage.

Permeability of this Tinaja soil is moderately rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on this unit is mainly sideoats grama, blue grama, little bluestem, and New Mexico feathergrass. As the range deteriorates, the proportion of the desirable forage plants decreases and the proportion of threeawn, wolftail, blue grama, and Gambel oak increases. Oneseed juniper invades. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, little bluestem, and New Mexico feathergrass.

Range improvement practices such as mechanical treatment and earthen ponds are limited by high content of rock fragments in the soil.

TR—Tuloso-Rock outcrop-Sombordoro association, steep. This map unit is on ridges and canyon walls. Slope is 5 to 35 percent. The vegetation is mainly pinyon and juniper and an understory of grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 175 days.

This unit is 35 percent Tuloso stony sandy loam, 35 percent Rock outcrop, and 20 percent Sombordoro very stony sandy loam. The Tuloso soil is on benches and fans, Rock outcrop is on ridges, and the Sombordoro soil is on uplands.

Included in this unit are small areas of Carnero soils on uplands, Crews soils near the edge of mapped areas, and Penrose soils in mapped areas in the southwest part of the survey area. Included areas make up about 10 percent of the total acreage.

The Tuloso soil is shallow and well drained. It formed in material derived dominantly from sandstone. Slope is 20 to 35 percent. Typically, the surface layer is light brown stony sandy loam about 3 inches thick. The subsoil is yellowish red very stony loam about 8 inches thick. Sandstone is at a depth of 11 inches.

Permeability of the Tuloso soil is moderately rapid. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

Rock outcrop consists of exposed areas of sandstone. It occurs as benches and escarpments.

The Sombordoro soil is very shallow and shallow and well drained. It formed in material derived dominantly from sandstone. Slope is 5 to 8 percent. Typically, the surface layer is light brown very stony fine sandy loam about 7 inches thick. The subsoil is yellowish red extremely stony clay about 9 inches thick. Sandstone is at a depth of 16 inches.

Permeability of the Sombordoro soil is slow. Available water capacity is very low. Effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on the Tuloso soil is mainly pinyon, juniper, hairy grama, sideoats grama, and little bluestem. The potential plant community on the Sombordoro soil is mainly pinyon pine, juniper, blue grama, pinyon ricegrass, and sideoats grama. As the range deteriorates, the proportion of the desirable forage plants decreases and the proportion of pinyon and juniper increases. Grazing management should be designed to increase the productivity and reproduction of sideoats grama, pinyon ricegrass, and little bluestem.

Proper distribution of livestock grazing on this unit is limited by steepness of slope. Practices that can be used to improve the distribution of livestock are fencing and properly locating salt and livestock watering facilities. Range management practices such as mechanical treatment and earthen ponds are limited by very shallow and shallow depth and steepness of slope.

This unit is well suited to the production of pinyon and juniper, which are used as firewood. Annual production in a stand that averages 5 inches in diameter at a height of 1 foot is about 10 cords per acre. Maximum understory forage production can be obtained by reducing the crown density of the overstory.

TS—Tuloso-Sombordoro-Rock outcrop complex, moderately sloping. This map unit is on ridges and along escarpments. Slope is 0 to 15 percent. The vegetation is mainly pinyon and juniper and an understory of grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 175 days.

This unit is 40 percent Tuloso stony sandy loam, 30 percent Sombordoro very stony loam, and 25 percent Rock outcrop (fig. 9). The Tuloso soil is on benches and in depressions, the Sombordoro soil is commonly on north-facing and east-facing slopes, and Rock outcrop is throughout mapped areas.

Included in this unit are small areas of Carnero soils on uplands, Crews soils near the edge of mapped areas, and Penrose soils on ridges. Included areas make up about 5 percent of the total acreage.

The Tuloso soil is shallow and well drained. It formed in material derived dominantly from sandstone. Slope is 5 to 15 percent. Typically, the surface layer is light brown very stony sandy loam about 3 inches thick. The subsoil is yellowish red very stony loam about 8 inches thick. Sandstone is at a depth of 11 inches.

Permeability of the Tuloso soil is moderate. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Sombordoro soil is very shallow and shallow and well drained. It formed in material derived dominantly from sandstone. Slope is 0 to 15 percent. Typically, the

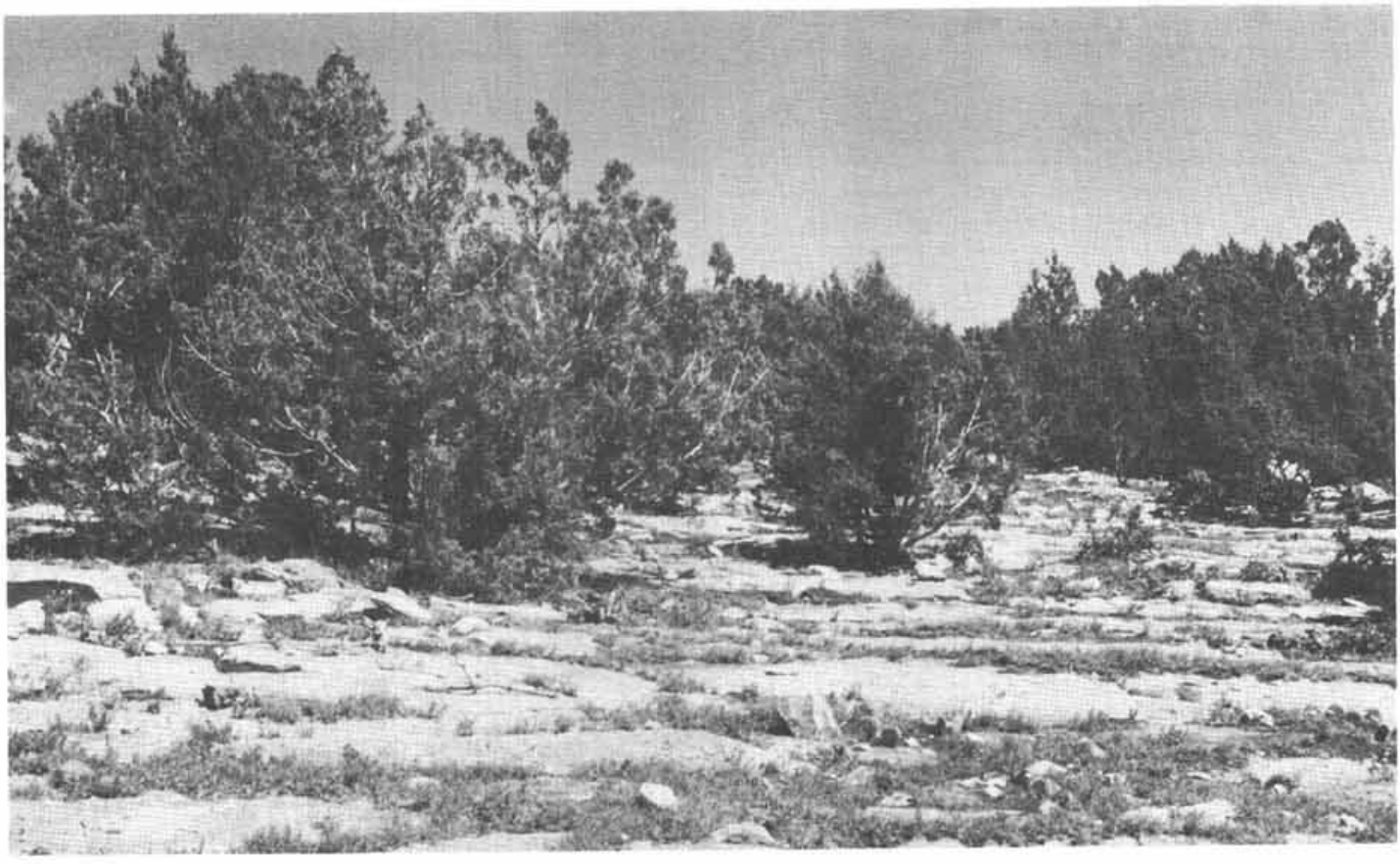


Figure 9.—Typical area of Tuloso-Sombordoro-Rock outcrop complex, moderately sloping.

surface layer is brown very stony loam aout 3 inches thick. The subsoil is brown very stony sandy clay about 8 inches thick. Sandstone is at a depth of 11 inches.

Permeability of the Sombordoro soil is slow. Available water capacity is very low. Effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

Rock outcrop consists of exposed areas of sandstone. It occurs as ridges and escarpments.

This unit is used for livestock grazing and for wildlife habitat.

The potential plant community on the Tuloso soil is mainly pinyon, juniper, blue grama, hairy grama, and sideoats grama. The potential plant community on the Sombordoro soil is mainly pinyon, juniper, sideoats grama, pinyon ricegrass, and blue grama. As the range deteriorates, the proportion of the desirable forage plants decreases and the proportion of pinyon and juniper increases. Grazing management should be designed to increase the productivity and reproduction of sideoats grama and pinyon ricegrass.

Proper distribution of livestock grazing on this unit is limited by moderate slope and the presence of escarpments. Practices that can be used to improve the distribution of livestock are fencing and properly locating salt and livestock watering facilities. Range management practices such as mechanical treatment and earthen ponds are limited by very shallow and shallow depth.

This unit is well suited to the production of pinyon and juniper, which are used as firewood. Annual production in a stand that averages 5 inches in diameter at a height of 1 foot is about 10 cords per acre. Maximum understory forage production can be obtained by reducing the crown density of the overstory.

UF—Ustifluvents, frequently flooded. This map unit is on flood plains. It formed in alluvium derived from mixed sources. The vegetation is mainly grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 17 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 175 days.

Ustifluvents consist of soils that are variable in their characteristics. No one area of Ustifluvents has a profile that is typical of all Ustifluvents.

Included in this unit are small areas of La Brier soils in oxbows and Manzano soils on benches and terraces. Included areas make up about 10 percent of the total acreage. This unit is subject to brief periods of flooding in July, August, and September.

This unit is used mainly for wildlife habitat.

Livestock grazing is limited to the small areas of included soils in this unit.

UR—Ustorthents-Rock outcrop complex, very steep. This map unit is on slopes of mesas and plateaus. Slope is 15 to 100 percent. The vegetation is mainly grass, brush, and scattered pinyon and juniper. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 200 days.

This unit is 40 percent Ustorthents and 40 percent Rock outcrop (fig. 10). Ustorthents are on benches, and Rock outcrop is on escarpments.

Included in this unit are small areas of Bernal, Carnero, and Tuloso soils in the higher positions; Latom, Newkirk, and Redona soils in the lower positions; and Alfisols in areas at an elevation of more than 6,000 feet. Included areas make up 20 percent of the total acreage.

Ustorthents consist of soils that are variable in their characteristics. No given area of Ustorthents has a profile that is typical of Ustorthenis.

Rock outcrop consists of areas of exposed sandstone and shale. It occurs as ledges and escarpments.

This unit is used for wildlife habitat.

The potential plant community is sideoats grama, pinyon, juniper, and oak.

Va—Vermejo silty clay loam, 0 to 3 percent slopes. This deep, moderately well drained soil is on fans and

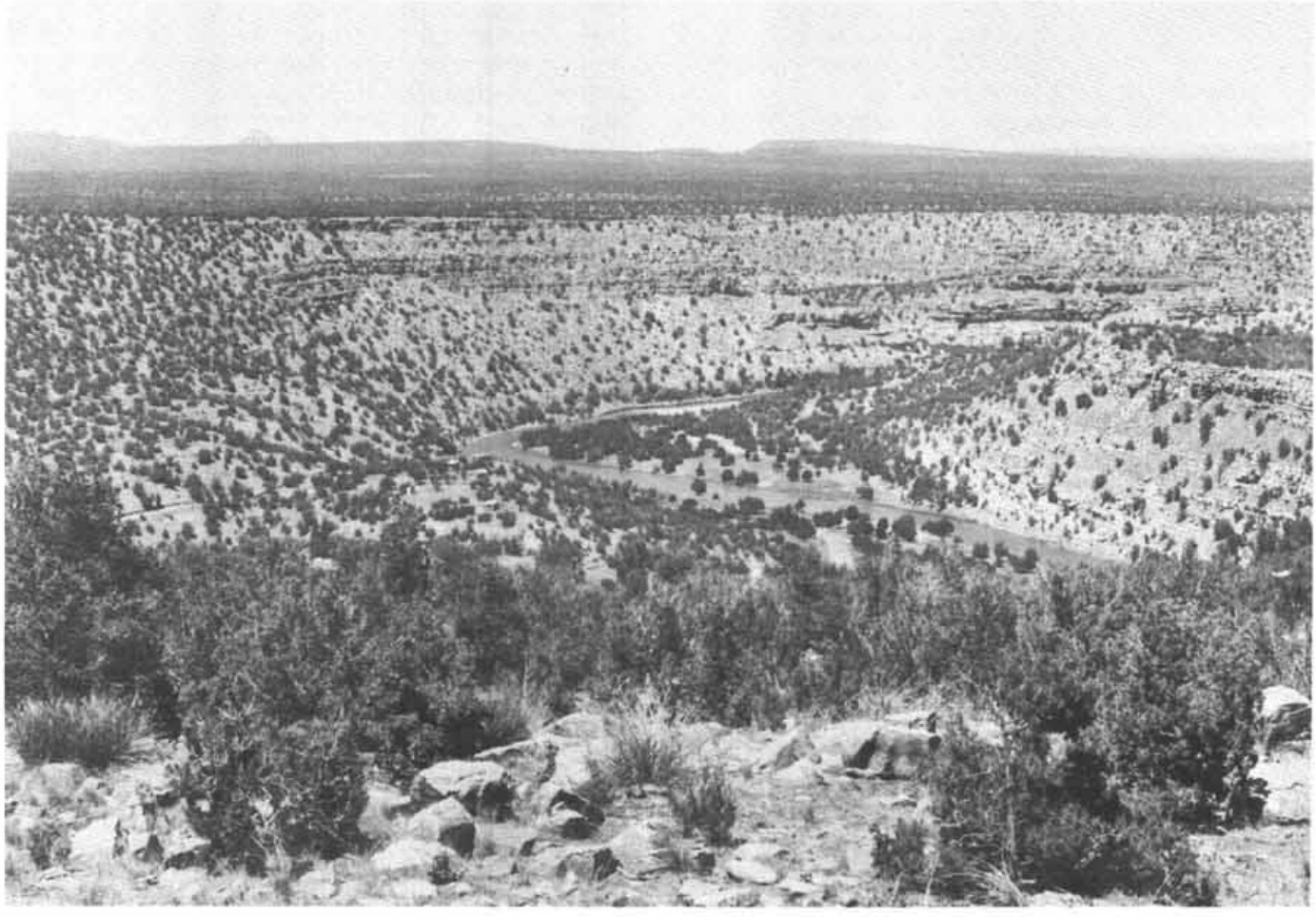


Figure 10.—Typical area of Ustorthents-Rock outcrop complex, very steep. This area is part of the Pecos River Canyon.

valley bottoms. It formed in alluvium derived dominantly from shale. The vegetation in areas not cultivated is mainly grass. Elevation is 6,000 to 7,000 feet. The average annual precipitation is about 16 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 150 to 175 days.

Typically, the surface layer is grayish brown silty clay loam about 2 inches thick. The next layer is grayish brown clay about 8 inches thick. The underlying material to a depth of 60 inches or more is grayish brown clay.

Included in this unit are small areas of Litle and Mion soils in the slightly higher areas and Rock outcrop in the slightly higher areas and on the side of gullies. Included areas make up about 15 percent of the total acreage.

Permeability of this Vermejo soil is very slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high. The soil is subject to rare flooding.

Some areas of this unit are used for irrigated crops, mainly alfalfa, pasture, and small grain. Some areas are used for livestock grazing, urban development, and wildlife habitat.

If this unit is used for irrigated crops, the main limitations are very slow permeability, fine texture in the root zone, and high hazard of soil blowing.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop. Water should be applied in amounts sufficient to wet the root zone but in amounts small enough to minimize the leaching of plant nutrients.

Soil blowing can be reduced by using all crop residue and practicing minimum tillage. Yield can be maintained or increased by applying fertilizer. Most crops, except for legumes, respond to nitrogen. Legumes respond to phosphate. Timely harvesting of crops improves their quality. Rotation grazing helps to maintain the quality and quantity of forage.

The potential plant community is mainly blue grama, western wheatgrass, alkali sacaton, and galleta. As the range deteriorates, the proportion of the preferred forage plants decreases and the proportion of ring muhly, pricklypear, and broom snakeweed increases. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass and alkali sacaton.

This unit is suited to such range improvement practices as mechanical treatment and earthen ponds.

This unit is poorly suited to urban development. The main limitations are high shrink-swell potential, low strength, hazard of flooding, and high content of clay in the underlying layers.

VB—Vibo-Ribera association, undulating. This map unit is on fans. Slope is 1 to 9 percent. The vegetation in areas not cultivated is mainly grass and scattered pinyon and juniper. Elevation is 6,000 to 7,200 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 165 days.

This unit is 50 percent Vibo fine sandy loam and 30 percent Ribera fine sandy loam (fig. 11). The Vibo soil is on long fans, and the Ribera soil is on short fans.

Included in this unit are small areas of Bernal and Sombordoro soils on ridges, Manzano soils on fans, Quintana soils near the edge of mapped areas, and Teco soils in depressional areas. Included areas make up about 20 percent of the total acreage.

The Vibo soil is deep and well drained. It formed in alluvial and eolian material derived from mixed sources. Slope is 1 to 5 percent. Typically, the surface layer is brown fine sandy loam about 8 inches thick. The subsoil is reddish brown sandy clay loam about 16 inches thick. The substratum to a depth of 60 inches or more is light reddish brown and pink, calcareous sandy loam and loam.

Permeability of the Vibo soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Ribera soil is moderately deep and well drained. It formed in alluvial and eolian material derived dominantly from sandstone and shale. Slope is 5 to 9 percent. Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil is brown clay loam about 21 inches thick. The substratum to a depth of 31 inches is light brown, calcareous loam. Sandstone is at a depth of 31 inches.

Permeability of the Ribera soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

This unit is used for dryland crops, livestock grazing, woodland, and wildlife habitat.

If this unit is used for dryland crops, the main limitations are a high hazard of soil blowing, moderate slope, and a moderate hazard of water erosion. Crop residue left on or near the surface helps to conserve moisture, maintain tilth, and control erosion. Tillage should be kept to a minimum. Terracing and farming on the contour reduce runoff and the risk of erosion and help to conserve moisture. Stripcropping helps to control soil blowing. Generally, crops respond to nitrogen and phosphorus.

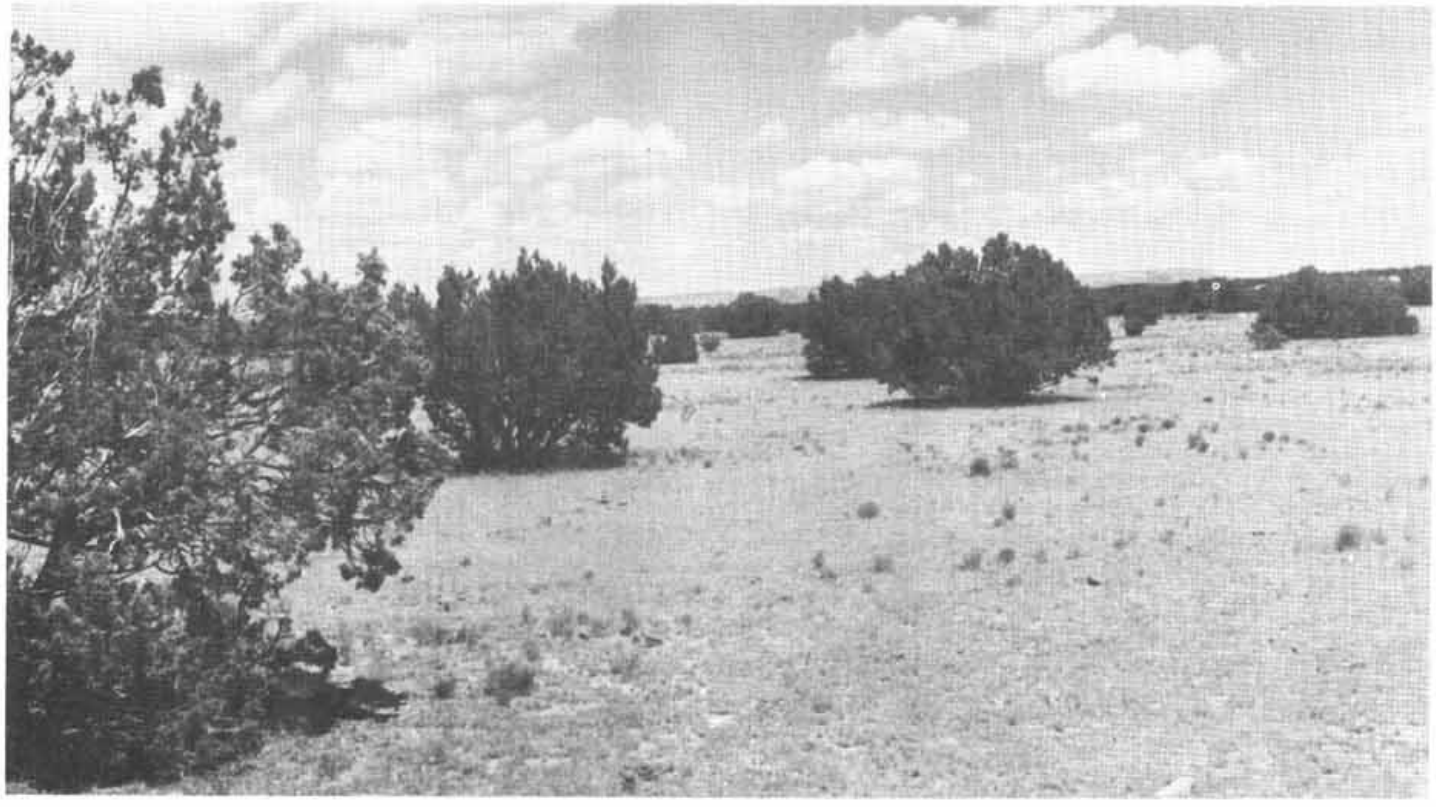


Figure 11.—Typical area of Vibo-Ribera association, undulating.

The potential plant community on the Vibo soil is mainly juniper, pinyon, blue grama, and Indian ricegrass. The potential plant community on the Ribera soil is mainly blue grama, western wheatgrass, pinyon ricegrass, and little bluestem. As the site deteriorates, the proportion of the preferred forage plants decreases and the proportion of pinyon, juniper, sand dropseed, threeawn, and broom snakeweed increases. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, pinyon ricegrass, and little bluestem.

This unit is suited to such range improvement practices as mechanical treatment. Range improvement practices such as earthen ponds are limited by the moderate depth of the Ribera soil.

The Vibo soil is suited to the production of pinyon and juniper, which are used for firewood and fenceposts. The Ribera soil is poorly suited to the production of pinyon and juniper. When the crown density of the overstory increases to more than 25 percent, understory forage production is reduced. To increase forage production, the crown density should be selectively reduced.

VC—Vibo-Rock outcrop complex, undulating. This map unit is on fans and ridges. Slope is 1 to 10 percent. The vegetation is mainly pinyon, juniper, and grass. Elevation is 5,300 to 7,200 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 50 degrees F, and the average frost-free period is 140 to 165 days.

This unit is 40 percent Vibo fine sandy loam, 20 percent Ribera fine sandy loam, and 15 percent Rock outcrop. The Vibo and Ribera soils are on fans, and Rock outcrop is on ridges.

Included in this unit are small areas of Sombordoro and Tuloso soils on ridges and benches, Manzano soils in drainageways, and Ustifluvents in gullies and on fans. Included areas make up about 25 percent of the total acreage.

The Vibo soil is deep and well drained. It formed in alluvial and eolian material derived from mixed sources. Slope is 1 to 5 percent. Typically, the surface layer is brown fine sandy loam about 8 inches thick. The subsoil is reddish brown sandy clay loam about 16 inches thick. The substratum to a depth of 60 inches or more is

reddish brown, calcareous sandy loam and loam.

Permeability of the Vibo soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

The Ribera soil is moderately deep and well drained. It formed in alluvial and eolian material derived dominantly from sandstone and shale. Slope is 5 to 9 percent. Typically, the surface layer is brown fine sandy loam about 5 inches thick. The subsoil is brown clay loam about 21 inches thick. The substratum to a depth of 31 inches is light brown, calcareous loam. Sandstone is at a depth of 31 inches.

Permeability of the Ribera soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is high.

Rock outcrop consists of areas of exposed sandstone. It occurs as ridges.

This unit is used for livestock grazing, woodland, and wildlife habitat.

The potential plant community on the Vibo soil is mainly juniper, pinyon, blue grama, and pinyon ricegrass. The potential plant community on the Ribera soil is mainly blue grama, western wheatgrass, pinyon ricegrass, and little bluestem. As the site deteriorates, the proportion of the desirable forage plants decreases and the proportion of threeawn, sand dropseed, and broom snakeweed increases. Grazing management should be designed to increase the productivity and reproduction of western wheatgrass, pinyon ricegrass, and blue grama.

Proper distribution of livestock grazing on this unit is limited by the areas of Rock outcrop and by slope. Practices that can be used to improve the distribution of livestock are fencing and properly locating salt and livestock watering facilities. Range improvement practices such as earthen ponds and fences are limited by moderate depth on the Ribera soil and by the areas of Rock outcrop. The Vibo and Ribera soils are suited to mechanical treatment.

The Vibo soil is suited to the production of pinyon and juniper, which are used for firewood and fenceposts. When the crown density of the overstory increases to more than 25 percent, the production of forage is reduced. To increase the production of forage, the crown density should be selectively reduced.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and data obtained on soil properties and performance are used as a basis for predicting soil behavior (*10*).

Information in this section is useful in planning use and management of soils for crops and pasture, rangeland, and woodland, as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities, and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

Paul Boden, conservation agronomist, Soil Conservation Service.

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; and the estimated yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the man-

agement practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

Although only a very small percentage of San Miguel County Area is in cultivation, cultivated crops are important to the economy. Most of the cropland is along the major rivers and tributaries in the western part of the county. Water for irrigation is taken from these rivers and tributaries. The soils used for irrigated crops are in the Brycan, Carnero, Colmor, La Brier, Manzano, Moreno, Partri, Swastika, and Vermejo series. Some dryfarming is practiced on the Vibo and Moreno soils.

The main irrigated crops are alfalfa, oats, wheat, and grain sorghum. Among the other locally important crops are dry beans, chili peppers, and orchards. Much of the oats planted is harvested for hay, and most of the wheat is used for grazing.

The main nonirrigated crops are grain sorghum and dry beans. Yields of nonirrigated crops generally are too low for this type of farming to be profitable.

Successful, long-term cultivation of any soil depends on managing the soil according to its capabilities and limitations for crops and on providing adequate water to supply crop needs. Management objectives that help to accomplish this in San Miguel County include conserving moisture and maintaining soil tilth and fertility. Basic to meeting these objectives is the use of a sound conservation cropping system tailored to the properties of each soil or group of soils. Some soils, such as Brycan and Manzano, can be used for a single crop for many years without damage to the physical condition of the soil. Other soils, such as Vermejo and La Brier, deteriorate rapidly when used for one crop, especially if that crop produces little residue. Use of a cropping system based on the properties of a soil helps to maintain tilth; reduces insect, disease, and weed infestations; and helps to control erosion and soil blowing. In most cases, such a cropping system also helps to conserve moisture and to maintain fertility.

Among the measures that help to maintain soil tilth and structure are stubble mulching, minimum tillage, use of crop residue, green manure crops, and use of grasses and legumes in the cropping system. These measures, plus application of barnyard manure and chemical fertilizer, also help to maintain fertility.

In the San Miguel County Area, irrigation generally is needed to produce cultivated crops. Both natural moisture and irrigation water can be conserved by reducing evaporation, limiting runoff, reducing deep percolation, and controlling weeds. Among the measures that can be used to accomplish this are minimum tillage, field windbreaks or barriers, land shaping or leveling, lining irrigation ditches, and timely tillage. Irrigation water can be conserved for crops by using a properly designed irrigation water delivery system and by applying irrigation water uniformly to meet crop needs without overirrigating. Applying water to a soil in amounts greater than the soil is capable of holding wastes water and leaches nutrients below the root zone.

Small areas in the county are too wet for cultivation during parts of some years. This is because of poor surface drainage or the height of the water table, or both. Reducing runoff from nearby higher lying slopes helps to prevent damaging overflow. Selecting crops suited to wet soils or saline-alkali conditions increases the amount of residue produced and eventually improves the soil. Improved drainage may be desirable or necessary to offset unfavorable soil characteristics such as wetness or saline-alkali conditions.

Tame pasture is a practical, economically feasible land use for most irrigated soils in San Miguel County Area. The primary objective of pasture management is to maintain vigorous stands of palatable, well adapted forage for livestock, to improve the soil, and to control water erosion and soil blowing. Management that provides for proper grazing, adequate fertility, clipping, and weed control helps to meet these objectives.

Proper grazing includes delaying grazing until vegetation has reached adequate height in spring, never grazing too closely, rotation grazing, grazing at the optimal time, and periodic rest from grazing. A good fertility management program involves adding fertilizer when needed and maintaining an adequate supply of all plant nutrients. Clipping some grasses helps to distribute grazing and stimulates growth. Where stands are thin, control of weeds by mowing or by spraying provides more available moisture and plant nutrients for desirable species.

Grasses planted on irrigated land require as much irrigation water as alfalfa. Those factors that improve irrigation efficiency on cropland are suitable for use on irrigated pastureland.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 4. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil or that a given crop is not commonly irrigated.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 4.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

Rangeland

Kenneth W. Williams, range conservationist, Soil Conservation Service

About 80 percent of San Miguel County Area consists of rangeland on which the native vegetation is predominantly grasses and forbs or shrubs suitable for grazing or browsing. In addition, about 14 percent of the land area is woodland consisting of pinyon, juniper, and ponderosa pine, which produce understory vegetation that is suitable for grazing.

The livestock produced on the grazing resource in the survey area provides the principal agricultural income. Yearlong cow and calf operations are dominant in the southern and eastern parts of the area. Much of the range in the northern and western parts is used seasonally, usually in summer, either by cows, calves, or yearlings. The average size of ranches is 4,550 acres.

The southern and eastern parts of the survey area are suitable for grazing any season of the year. The western and northern parts are better suited to grazing in spring, summer, and fall because the winters are occasionally severe. In winter, most ranches supplement the forage produced on the rangeland with hay and protein concentrates.

Proper grazing management improves the ground cover, promotes the accumulation of litter, and improves the vigor and reproduction of the more productive grasses and shrubs.

Continuous, yearlong grazing or grazing continually from April through October results in the deterioration of the plant community so that it has less value as forage for domestic livestock. Proper grazing use that includes a system of deferred grazing, which varies the seasons of grazing and rest in pastures during successive years, is needed to maintain a healthy, balanced plant community and provide higher quality forage throughout the year.

Periodic rest during different seasons of the year benefits different plants. Rest in winter benefits shrubs such as mountainmahogany, winterfat, and Gambel oak. Winter rest is also beneficial to black grama. Cattle show a definite preference for black grama late in winter and can easily overgraze this species. Rest during this period reduces the grazing pressure on black grama.

Rest in spring, from April to June, benefits early forbs and cool-season grasses such as western wheatgrass, New Mexico feathergrass, pinyon ricegrass, Arizona fescue, and bottlebrush squirreltail. Rest in summer from July to September, encourages the production and reproduction of warm-season grasses such as sideoats grama, little bluestem, mountain muhly, black grama, sand bluestem, and blue grama. Rest in summer allows the cool-season grasses to complete their growth cycle. Rest in fall allows the warm-season plants to mature and to complete the growth cycle.

Flexibility in the number of livestock permitted to graze and in the frequency and intensity of grazing is essential to the success of any grazing program. Effective livestock distribution is most frequently accomplished by the proper use of fences, wells, pipelines, tanks, and salt for livestock.

Each soil mapped has a distinctive potential plant community that differs from others in its potential to produce different kinds of native plants. The potential plant community is characterized by an association of species as listed in the description of the soils. Thus, to get full information about the potential plant community and its management, it is necessary to read both the descriptions of the map units and the use and management described in this section.

Where climate and topography are about the same, differences in the kind and amount of vegetation that rangeland can produce are related closely to the kind of soil. Effective management is based on the relationships among soils, vegetation, and water.

Table 5 shows, for each kind of soil, the name of the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the expected percentage of each species in the composition of the potential natural plant community. Soils not listed cannot support a natural plant community of predominately grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. The following are explanations of column headings in table 5.

A *range site* is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. Soils that produce a similar kind, amount, and proportion of range plants are grouped into range sites. For those areas where the relationship between soils and vegetation has been established, range sites can be interpreted

directly from the soil map. Properties that determine the capacity of the soil to supply moisture and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

Total production refers to the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the amount and distribution of precipitation and the temperatures are such that growing conditions are substantially better than average; in a normal year these conditions are about average for the area; in an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight refers to the total air-dry vegetation produced per acre each year by the potential natural plant community. Vegetation that is highly palatable to livestock and vegetation that is unpalatable are included. Some of the vegetation can also be grazed extensively by wildlife.

Characteristic vegetation of grasses, grasslike plants, forbs, and shrubs that make up most of the potential natural plant community on each soil are listed by common name (*4*). Under *Composition*, the expected proportion of each species is presented as the percentage, in air-dry weight, of the total annual production of herbaceous and woody plants. Because only major species are listed, percentages do not necessarily total 100. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. Generally all of the vegetation produced is not used.

Range management requires, in addition to knowledge of the kinds of soil and the potential natural plant community, an evaluation of the present condition of the range vegetation in relation to its potential. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the maximum production of vegetation, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

The major management concern on most rangeland is to control the time and the intensity of grazing so that the kinds and amounts of plants that make up the potential plant community are reestablished. Forage production is less than half of the potential because the natural vegetation in many parts of the county has been greatly depleted by continuous and excessive use. Brush, weeds, and cacti have increased or invaded on much of the rangeland, causing further depletion of the grass cover. Soil erosion generally occurs when the soils are not adequately covered.

In many areas where the landscape is broken by a mesa or is strongly sloping, or where pastures are large, the distribution of grazing by livestock generally is poor. Poor distribution of livestock grazing results in areas that are underused and large areas that are excessively used, which results in loss of cover, invasion of undesirable plants, and accelerated erosion. Improving distribution of grazing by providing additional watering facilities, stock trails, and fencing designed to help minimize excessive use is an important management concern. Manipulating or reducing undesirable brush species and minimizing soil erosion are other management concerns.

Woodland management and productivity

Gene Anderson, forester, Soil Conservation Service

About 400,000 acres, or 14 percent, of the survey area is forested. Two principal forest types are present, ponderosa pine (*9*) and pinyon and juniper (*5*). Table 6 contains information useful to landowners desiring to manage their forested land for wood products.

In table 6, the *ordination symbol* indicates the suitability of a soil for wood production. The first part of the symbol, a number, indicates the potential productivity of the soil for a particular species of tree. In this survey area, some soils produce mainly ponderosa pine and others produce mainly pinyon and juniper. For ponderosa pine, there are 7 ratings: 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; 5, moderately low; 6, low; and 7, very low. For pinyon and juniper there are 3 ratings: 1 indicates high productivity; 2, moderate; and 3, low.

The second part of the symbol, a letter, indicates the major soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *e*, clay in the upper part of the profile; *s*, sandy texture; *f*, high coarse fragment content in the soil; *r*, steep slopes. The letter *o* indicates insignificant restrictions or limitations.

In table 6 the soils are also rated for a number of factors to be considered in management. *Slight, moderate, and severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well-managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings when plant competition is not a limiting factor. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade or grow if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Important trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Woodland understory vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some types of forest, under proper management, can produce enough understory vegetation to support grazing of livestock or wildlife, or both.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees, the density of the canopy, and the depth and condition of the forest litter. The density of the forest canopy affects the amount of light that understory plants receive during the growing season.

Table 7 shows, for each soil suitable for woodland, the potential for producing understory vegetation. The table also lists the common names of the characteristic vegetation that grows on a specified soil and the percentage composition, by air-dry weight, of each kind of plant. The kind and percentage of understory plants listed in the table are those to be expected where canopy density is most nearly typical of forests that yield the highest production of wood crops.

The total production of understory vegetation is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the soil moisture is above average during the optimum part of the growing season; in a normal year soil moisture is average; and in an unfavorable year it is below average.

Recreation

The soils of the survey area are rated in table 8 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. Slight means that the soil properties are generally favorable and that the limitations are minor and easily overcome. Moderate means that the limitations can be overcome or alleviated by planning, design, or special maintenance. Severe means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 8 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 11, and interpretations for dwellings without basements and for local roads and streets, given in table 10.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Wildlife habitat

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populates an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either is scarce or does not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 9, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of good means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of fair means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of poor means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of very poor means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Examples are fescue, orchardgrass, bromegrass, clover, and alfalfa. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are bluestem, goldenrod, lambsquarter, fringed sagewort, buckwheat, beggarweed, wheatgrass, galleta, dropseeds, and grama. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Examples are ponderosa pine, pinyon, spruce, fir, kinnikinnick, barberry, and juniper. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Examples are mountainmahogany, skunkbush sumac, mesquite, winterfat, rose, prickly pear, and oak. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Examples of wetland plants are smartweed, wild millet, saltgrass, cattail, rushes, sedges, and reeds. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control devices in marshes or streams. Examples are marshes, waterfowl feeding areas, and ponds. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are associated with farmlands. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include quail, pheasant, mourning dove, meadowlark, blackbird, goldfinch, cottontail rabbit, skunk, pocket gopher, and deer mouse.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, shrubs, and wild herbaceous plants. Wildlife attracted to these areas include mule deer, wild turkey, nuthatch, jays, thrushes, woodpeckers, gray fox, and bear.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Rangeland habitat consists of areas of wild herbaceous plants and shrubs. Wildlife attracted to rangeland include antelope, mule deer, jackrabbit, prairie dog, scaled quail, meadowlark, and lark bunting.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale

of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 10 shows, for each kind of soil, the degree and kind of limitations for building site development; table 11, for sanitary facilities; and table 13, for water management. Table 12 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 10. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 10 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 10 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 11 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as slight, soils are generally favorable for the specified use and limitations are minor and overcome by normal design and planning; if moderate, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if severe, soil properties or site features are so unfavorable or difficult to overcome that major soil recla-

mation, special designs, or intensive maintenance is required.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

In the trench type of landfill, ease of excavation also affects the suitability of a soil for this, so the soil must be deep to bedrock and free of large stones and boulders. Where the seasonal water table is high, water seeps into trenches and causes problems in filling.

Unless otherwise stated, the limitations in table 11 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 12 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 14 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated good are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated fair have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated poor .

Sand and gravel are used in great quantities in many kinds of construction. The ratings in table 12 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated good or fair has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 14.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plant life is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated good have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated fair are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated poor are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of good is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 13 soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering index properties

Table 14 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area (*11*).

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 14 gives information for each of these contrasting horizons in a typical profile. Depth to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 14 in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes: eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The estimated classification, without group index numbers, is given in table 14. Also in table 14 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas

and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted in table 14.

Physical and chemical properties

Table 15 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Salinity is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of the nonirrigated soils. The salinity of individual irrigated fields is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of individual fields can differ greatly from the value given in table 15. Salinity affects the suitability of a soil for crop production, its stability when used as a construction material, and its potential to corrode metal and concrete.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Wind erodibility groups are made up of soils that have similar properties that affect their resistance to soil blowing if disturbed. The groups are used to predict the susceptibility of soil to blowing and the amount of soil lost as a result of blowing. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are extremely erodible, so vegetation is difficult to establish. They are generally not suitable for crops.

2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible, but crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible, but crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible, but crops can be grown if measures to control soil blowing are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and

sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible, but crops can be grown if measures to control soil blowing are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible, and crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible, and crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to soil blowing.

Soil and water features

Table 16 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Cemented pans are hard subsurface layers, within a depth of 5 or 6 feet, that are strongly compacted (indurated). Such pans cause difficulty in excavation. The hardness of pans is similar to that of bedrock. A rippable pan can be excavated, but a hard pan generally requires blasting.

Potential frost action refers to the likelihood of damage to pavements and other structures by frost heaving and low soil strength after thawing. Frost action results from the movement of soil moisture into the freezing temperature zone in the soil, which causes ice lenses to form. Soil texture, temperature, moisture content, porosity, permeability, and content of organic matter are the most important soil properties that affect frost action. It is assumed that the soil is not covered by insulating vegetation or snow and is not artificially drained. Silty and clayey soils that have a high water table in winter are most susceptible to frost action. Well drained very gravelly or sandy soils are the least susceptible.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an

installation that is entirely within one kind of soil or within one soil horizon.

Classification

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to the latest literature available (14).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 17, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in sol. An example is Mollisol.

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Argiustoll (Argi, meaning clayey horizons, plus ustoll, the suborder of Mollisols that have an ustic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups 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 Aridic identifies the subgroup that is thought to be dry more of the time than is typical of the great group. An example is Aridic Argiustolls.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, mesic, Aridic Argiustolls.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition. An example is the Carnero series.

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*12*). Unless otherwise noted, colors described are for dry soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or map units, of each soil series are described in the section "Soil maps for detailed planning."

Andok series

The soils in the Andok series are classified as Typic Ustochrepts, loamy-skeletal, mixed, mesic. These deep, well drained soils are on uplands. The soils formed in alluvial material derived from limestone and calcareous shale and sandstone. Slope is 5 to 15 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 52 degrees F.

Typical pedon of an Andok very gravelly loam in an area of Andok-Quintana complex, moderately sloping; 1.25 miles southeast of Quintana Spring on Forest Service Road 45, NE1/4NE1/4 of sec. 7, T. 12 N., R. 16 E.:

A11—0 to 2 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3) moist; weak very fine granular structure; soft, friable, nonsticky and non-

plastic; common very fine and fine roots; many very fine and fine interstitial pores; 30 percent gravel and 10 percent cobbles; moderately alkaline; calcareous; clear smooth boundary.

A12—2 to 5 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 4/3) moist; weak very fine granular structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine interstitial pores; 20 percent gravel and 15 percent cobbles; moderately alkaline; calcareous; clear smooth boundary.

B1—5 to 9 inches; light gray (10YR 7/2) very gravelly loam, brown (7.5YR 5/2) moist; weak very fine and fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots and few coarse roots; many very fine and fine tubular and interstitial pores; 25 percent gravel and 10 percent cobbles; moderately alkaline, calcareous; clear smooth boundary.

B2ca—9 to 20 inches; pink (7.5YR 8/4) very cobbly light clay loam, brown 7.5YR 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and nonplastic; few fine, medium, and coarse roots; common fine tubular pores; 30 percent gravel, 20 percent cobbles, and 10 percent stones; moderately alkaline; calcareous; gradual wavy boundary.

C1—20 to 37 inches; light brown (7.5YR 6/4) very gravelly sandy clay loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine and common medium roots; many very fine pores; 60 percent gravel; moderately alkaline; calcareous; gradual wavy boundary.

C2—37 to 60 inches; light reddish brown (5YR 6/4) very gravelly sandy loam, reddish brown (5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few pores; 60 percent gravel; moderately alkaline, calcareous; gradual wavy boundary.

The profile generally is more than 60 inches thick. The A horizon has hue of 5YR to 10YR. The B horizon has hue of 10YR to 5YR, value of 6 to 8, and chroma of 2 to 4. The C horizon has hue of 5YR or 7.5YR, value of 6 or 7, and chroma of 4 or 5.

Apache Series

The soils in the Apache series are classified as Lithic Haplustolls, loamy, mixed, mesic. These very shallow and shallow, well drained soils are on basalt-capped mesas and basalt flows. The soils formed in material weathered from basalt. Slope is 1 to 5 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of an Apache cobbly loam in an area of Apache-Ayon complex, rolling; about 10 miles southwest of Mosquero in the SW1/4 of sec. 24, T. 18 N., R. 26 E.:

A1—0 to 6 inches; brown (7.5YR 4/2) cobbly loam, dark brown (7.5YR 3/2) moist; strong fine granular structure; slightly hard, friable, slightly sticky; many fine roots; about 20 percent cobbles and stones; calcareous; mildly alkaline; clear smooth boundary.

B2—6 to 15 inches; brown (7.5YR 4/2) cobbly clay loam, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; many fine and medium roots; many fine tubular pores; few small soft lime coatings on peds; about 20 percent cobbles; calcareous; mildly alkaline; clear wavy boundary.

Cca—15 to 19 inches; pinkish gray (7.5YR 7/2) very cobbly loam, light brown (7.5YR 6/4) moist; massive; very hard, friable; few fine roots; many soft and hard lime masses; about 40 percent cobbles and stones; lime concentrations on cobbles and stones; strongly calcareous; mildly alkaline; abrupt wavy boundary.

R—19 inches; fractured basalt that has lime deposits in cracks and on surface.

Bedrock is at a depth of 4 to 20 inches. As much as 35 percent rock fragments is on the surface and throughout the profile. The B2 and C horizons are absent in some pedons where the profile is thinnest. Content of carbonates ranges from 5 to 25 percent. Horizons that are more than 15 percent calcium carbonate equivalent are less than 6 inches thick.

Ayon series

The soils in the Ayon series are classified as Aridic Calciustolls, loamy-skeletal, mixed, mesic. These deep, well drained soils are on fans, on the top of basalt-capped mesas, and around the edges of basalt flows. The soils formed in alluvial and colluvial material derived mainly from basalt, sandstone, and shale. Slope is 5 to 15 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of an Ayon stony loam in an area of Apache-Ayon complex, rolling; about 10 miles southwest of Mosquero in the NW1/4 of sec. 30, T. 18 N., R. 27 E.:

A1—0 to 11 inches; brown (7.5YR 4/2) stony loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, friable, slightly sticky; many fine roots; slightly calcareous; mildly alkaline; clear wavy boundary.

AC—11 to 22 inches; brown (7.5YR 5/4) stony clay loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; very hard, friable,

sticky, and plastic; common fine and medium roots; many fine tubular pores; 60 percent basalt cobbles and stones; calcareous; mildly alkaline; gradual wavy boundary.

C1ca—22 to 40 inches; pink (7.5YR 8/4) stony loam, pink (7.5YR 7/4) moist; massive; very hard, friable, slightly sticky; few fine and few medium roots; about 32 percent calcium carbonate; about 80 percent basalt cobbles and stones; strongly calcareous; mildly alkaline; gradual wavy boundary.

C2ca—40 to 60 inches; light reddish brown (5YR 6/4) stony clay loam, reddish brown (5YR 4/4) moist; massive; very hard, firm, slightly sticky and slightly plastic; few fine roots; about 24 percent calcium carbonate; about 80 percent basalt cobbles and stones; strongly calcareous; mildly alkaline.

Depth to the calcic horizon is 12 to 30 inches. Depth to basalt, sandstone, or shale is more than 60 inches. Rock fragments, mainly basalt cobbles and stones, make up 35 to 80 percent of the profile. The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 1 to 3. The C horizon has hue of 5YR to 10YR, value of 6 to 8 when dry and 5 to 7 when moist, and chroma of 2 to 4. It is cobbly, stony, or very stony loam or clay loam. The characteristics of the underlying sandstone and shale greatly affect the color of the lower part of the C horizon.

Bernal series

The soils in the Bernal series are classified as Lithic Argiustolls, loamy, mixed, mesic. These very shallow and shallow, well drained soils are on mesas and ridges. The soils formed in moderately fine textured residuum derived from sandstone. Slope is 1 to 8 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Bernal loam in an area of Bernal-Rock outcrop association, gently sloping; about 18 miles east of Las Vegas, NE1/4 of sec. 23, T. 16 N., R. 19 E. (projected):

A1—0 to 5 inches; brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; neutral; clear wavy boundary.

B1—5 to 7 inches; brown (7.5YR 4/2) sandy clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and plastic; many fine roots; common fine tubular pores; neutral; clear wavy boundary.

B21t—7 to 12 inches; reddish brown (5YR 4/3) sandy clay loam, dark reddish brown (5YR 3/3) moist; moderate fine prismatic structure; hard, friable, sticky and plastic; common fine roots; few fine tubular pores; common thin clay film on peds; mildly alkaline; abrupt wavy boundary.

R—12 inches, hard sandstone.

Thickness of the solum and depth to bedrock range from 8 to 20 inches. The solum is 0 to 15 percent rock fragments. Carbonates generally are absent, but in some pedons there is a thin accumulation of carbonates just above the lithic contact. The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. It is sandy loam or loam. The B2t horizon has hue of 5YR or 7.5YR, value of 4 to 6 when dry and 3 to 4 when moist, and chroma of 2 to 4. It is sandy clay loam or clay loam.

Brycan series

The soils in the Brycan series are classified as Cumulic Haploborolls, fine-loamy, mixed. These deep, well drained soils are on fans and valley fills. The soils formed in mixed alluvial deposits. Slope is 3 to 5 percent. Mean annual precipitation is about 20 inches, and mean annual air temperature is about 45 degrees F.

Typical pedon of a Brycan loam in an area of Moreno-Brycan association, sloping; about 8 miles north of Sapello in the NE1/4 of sec. 15, T. 19 N., R. 15 E. (projected):

A1—0 to 8 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, friable, slightly plastic; many fine and very fine roots; many fine interstitial pores; mildly alkaline; smooth clear boundary.

B21—8 to 29 inches; brown (10YR 5/3) loam, dark brown (10 YR 3/3) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; common fine and medium tubular pores; mildly alkaline; clear wavy boundary.

B22ca—29 to 50 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure; hard, very friable, sticky and slightly plastic; common fine and medium roots; common fine tubular pores; common fine soft filaments of lime; calcareous; mildly alkaline; clear wavy boundary.

C—50 t0 60 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic, few fine roots; few fine tubular pores; calcareous; mildly alkaline.

The profile is more than 60 inches thick. The mollic epipedon is 20 to 36 inches thick. The solum is 30 to 50 inches thick. The A horizon in some pedons is weakly calcareous because of lime recharge from irrigation water. Depth to the zone of lime accumulation is 30 to 50 inches. The A horizon has value of 3 or 4 when dry and 2 or 3 when moist. The B2 horizon has hue of

7.5YR or 10YR. It is loam or clay loam. The C horizon has hue of 5YR, 7.5YR, or 10YR; value of 4 or 5 when dry and 3 or 4 when moist; and chroma of 3 or 4. It is loam or clay loam.

Canez series

The soils in the Canez series are classified as Ustollic Haplargids, fine-loamy, mixed, thermic. These deep, well drained soils are on fans and terraces and in valleys. The soils formed in alluvial and eolian deposits of mixed materials. Slope is 0 to 8 percent. Mean annual precipitation is about 15 inches, and mean annual air temperature is about 60 degrees F.

Typical pedon of a Canez fine sandy loam in an area of Canez-Ima association, undulating; about 22 miles east of Conchas State Park in the SWI/4 of sec. 17, T. 12 N., R. 30 E. (projected):

A11—0 to 5 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable; many fine and very fine roots; many fine interstitial pores; slightly calcareous; moderately alkaline; abrupt wavy boundary.

A12—5 to 10 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable; many fine and very fine roots; many fine tubular pores; moderately alkaline; clear wavy boundary.

B21t—10 to 32 inches; reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky; common fine roots; common fine tubular pores; many thin clay films on peds and in pores; moderately alkaline; abrupt wavy boundary.

IIB22t—32 to 60 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate coarse prismatic structure; hard, friable, plastic; few fine roots; common fine tubular pores; many thin clay films on peds and in pores; common fine filaments of lime on peds; calcareous; moderately alkaline.

Thickness of the solum and depth to the buried horizon range from 30 inches to more than 50 inches. The A horizon has hue of 10YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 4 or 5. The B2t horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 3 or 4. It is sandy loam or sandy clay loam and is 18 to 25 percent clay. Buried horizons have texture of sandy clay loam, loam, or clay loam. Some pedons have a C horizon.

Carnero series

The soils in the Carnero series are classified as Aridic Argiustolls, fine, mixed, mesic. These moderately deep, well drained soils are on uplands. The soils formed in mixed, moderately fine textured and fine textured alluvium and residuum derived from sandstone. Slope is 1 to 5 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Carnero loam in an area of Carnero-Partri association, undulating; about 30 miles east of Las Vegas; 1,000 feet west and 700 feet north of the southeast corner of sec. 8, T. 15 N., R. 22 E.:

A1—0 to 4 inches; brown (7.5YR 5/2) loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; common fine tubular pores; neutral; clear smooth boundary.

B21t—4 to 12 inches; reddish brown (5YR 4/3) silty clay, dark reddish brown (5YR 3/3) moist; moderate coarse prismatic structure parting to moderate fine subangular blocky; very hard, firm, slightly sticky and plastic; many fine roots; common fine tubular pores; common moderately thick clay films on peds; neutral; clear wavy boundary.

B22t—12 to 19 inches; dark reddish brown (5YR 3/4) clay, dark reddish brown (5YR 3/4) moist; moderate coarse prismatic structure; very hard, firm, slightly sticky and very plastic; common fine roots; common fine tubular pores; many moderately thick clay films on peds; neutral; clear wavy boundary.

C1—19 to 27 inches; reddish yellow (7.5YR 6/6) clay, dark brown (7.5YR 4/4) moist, massive, some rock structure visible; hard, firm, plastic; very few fine roots; less than 15 percent gravel; mildly alkaline; abrupt wavy boundary.

R—27 inches; hard red sandstone.

The solum is 18 to 36 inches thick. Hard sandstone bedrock is at a depth of 20 to 40 inches. The A horizon has hue of 5YR to 10YR, value of 4 or 5 when dry, and chroma of 2 or 3. The B2t horizon has hue of 5YR or 7.5YR, value of 3 to 5 when dry and 3 or 4 when moist, and chroma of 3 to 5. Texture is heavy clay loam, silty clay, or clay. The C horizon has hue of 5YR or 7.5YR, value of 5 to 8 when dry, and chroma of 3 to 6. In some pedons there is a thin horizon of calcium carbonate accumulation about 1 inch to 2 inches thick on top of the sandstone.

Colmor series

The soils in the Colmor series are classified as Torriorthentic Haplustolls, fine-silty, mixed, mesic. These deep, well drained soils are on uplands. The soils formed in moderately fine textured material derived from shale.

Slope is 1 to 5 percent. Mean annual precipitation is about 15 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of Colmor silt loam, undulating, about 5 miles northeast of Las Vegas on the Las Vegas Airport; in the SW1/4 of sec. 32, T. 17 N., R. 17 E. (projected):

A11—0 to 4 inches; brown (10YR 4/3) silt loam, dark brown (10YR 3/3) moist; moderate medium granular structure; hard, friable, slightly plastic; many fine and very fine roots; many very fine and fine pores; calcareous; moderately alkaline; clear smooth boundary.

A12—4 to 12 inches; brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many fine and very fine tubular pores; calcareous; mildly alkaline; clear smooth boundary.

B2—12 to 24 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common fine tubular pores; calcareous; moderately alkaline; clear wavy boundary.

B3ca—24 to 32 inches; light yellowish brown (10YR 6/4) silty clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; few fine and very fine roots; common fine tubular pores; few fine filaments of lime; calcareous; moderately alkaline; clear wavy boundary.

C1ca—32 to 53 inches; light yellowish brown (10YR 6/4) heavy loam, yellowish brown (10YR 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; very few very fine roots; few fine pebbles with light calcium carbonate coating; calcareous; moderately alkaline; clear smooth boundary.

C2ca—53 to 60 inches; very pale brown (10YR 7/4) loam, light yellowish brown (10YR 6/4) moist; massive; soft, friable, sticky and plastic; calcareous; moderately alkaline.

The solum is 30 to 44 inches thick. The A horizon has value of 4 or 5 when dry and 2 or 3 when moist, and it has chroma of 2 or 3. It is silt loam, silty clay loam, or loam. The B2 horizon has value of 5 or 6 when dry and chroma of 3 to 5. It is silt loam or silty clay loam. The B3ca horizon has value of 6 or 7 when dry and 4 to 6 when moist, and it has chroma of 3 or 4. It is silty clay loam or silt loam. The Cca horizon has value of 5 to 7 when dry and 5 or 6 when moist, and it has chroma of 3 or 4. It is silt loam or loam.

Conchas series

The soils in the Conchas series are classified as Ustollic Calciorthids, fine-silty, mixed, thermic. These moderately deep, well drained soils are on undulating uplands. The soils formed in mixed material derived from sandstone and shale. Slope is 1 to 5 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 60 degrees F.

Typical pedon of a Conchas loam in an area of Conchas-Latom association, undulating; about 50 miles east of Las Vegas in the NE1/4 of sec. 14, T. 13 N., R. 23 E.:

A1—0 to 2 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/2) moist; weak thin and medium platy structure; soft, friable, slightly plastic; many fine and very fine roots; few fine tubular pores; slightly calcareous; mildly alkaline; abrupt smooth boundary.

B1—2 to 5 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; common fine tubular pores; moderately calcareous; moderately alkaline; clear smooth boundary.

B21—5 to 15 inches, reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure that parts to medium subangular blocky; slightly hard, friable, slightly plastic; common fine roots; common fine tubular pores; few medium soft lime masses; calcareous; moderately alkaline; gradual smooth boundary.

B22ca—15 to 30 inches; reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure that parts to weak coarse subangular blocky; hard, firm, slightly sticky and plastic; few fine roots; few fine tubular pores; common fine soft lime masses; about 20 percent calcium carbonate; strongly calcareous; strongly alkaline; abrupt wavy boundary.

R—30 inches; hard red sandstone.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The depth to the calcic horizon ranges from 12 to 24 inches. The A horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 4 or 5 when moist, and chroma of 4 to 6 when dry. The B horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 4 or 5 when moist, and chroma of 3 or 4. It is loam, silt loam, clay loam, or silty clay loam. The calcic horizon is more than 20 percent calcium carbonate.

Crews series

The soils in the Crews series are classified as Petrocalcic Paleustolls, clayey, mixed, mesic. These shallow and very shallow, well drained soils are on undulating

uplands. The soils formed in mixed material of local origin. Slope is 0 to 5 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Crews loam in an area of Crews-Tricon association, undulating; about 25 miles east of Las Vegas in the SW1/4 of sec. 3, T. 17 N., R. 20 E. (projected):

A1—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; common fine tubular pores; neutral; clear smooth boundary.

B21t—5 to 10 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; moderate coarse prismatic structure parting to medium subangular blocky; very hard, firm, sticky and plastic; many fine and very fine roots; common medium and fine tubular pores; common thin clay films on peds; neutral; clear smooth boundary.

B22t—10 to 16 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure; very hard, firm, sticky and very plastic; common fine and very fine roots; many very fine tubular pores; few thin clay films on peds and in pores; mildly alkaline; abrupt wavy boundary.

Ccam—16 inches; white indurated caliche that is laminated and fractured in the upper few inches.

The thickness of the solum and depth to hard caliche range from 8 to 20 inches. The solum is less than 10 percent caliche gravel or rock fragments of sandstone. The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The B2t horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5 when dry and 2 to 4 when moist, and chroma of 2 to 4. It is clay loam or clay.

Dargol series

The soils in the Dargol series are classified as Typic Eutroboralfs, fine, mixed. These moderately deep, well drained soils are on mountainsides. The soils formed in fine textured residuum derived from sandstone and shale. Slope is 5 to 45 percent. Mean annual precipitation is about 20 inches, and mean annual air temperature is about 43 degrees F.

Typical pedon of a Dargol stony loam in an area of Rocio-Dargol-Stout association, hilly; about 25 miles north of Las Vegas in the SW1/4 of sec. 21, T. 19 N., R. 15 E. (projected):

01 and 02—1 inch to 0; decomposing forest litter.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) stony loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable; many fine and medium roots; many fine interstitial pores; 20 percent sandstone cobbles and stones; medium acid; abrupt smooth boundary.

A2—3 to 9 inches; pale brown (10YR 6/3) loam, yellowish brown (10YR 5/4) moist; weak fine subangular blocky structure; slightly hard, friable, plastic; many fine and medium roots; many fine interstitial pores and few fine tubular pores; about 10 percent gravel; medium acid; abrupt smooth boundary.

B21t—9 to 22 inches; light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/4) moist; strong medium subangular blocky structure; very hard, firm, very plastic; common fine and medium roots; common fine tubular pores; many moderately thick clay films on peds and in pores; 10 percent cobbles and stones; medium acid; clear wavy boundary.

B22t—22 to 30 inches; 60 percent pale brown (10YR 6/3) and 40 percent brown (7.5YR 5/2) clay, yellowish brown (10YR 5/4) and dark brown (7.5YR 4/2) moist; weak medium subangular blocky structure; very hard, firm, very plastic; few fine and medium roots; common fine tubular pores; many moderately thick clay films on peds and in pores; 10 percent cobbles and stones; medium acid; gradual wavy boundary.

C—30 to 37 inches; 70 percent brown (7.5YR 5/2) and 30 percent light brownish gray (10YR 6/2) clay, dark brown (7.5YR 4/2) and grayish brown (10YR 5/2) moist; massive; very hard, firm, very plastic; few fine and medium roots; common very fine tubular pores; many pressure faces; medium acid; abrupt wavy boundary.

R—37 inches; sandstone.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. The solum is 5 to 20 percent angular sandstone gravel, cobbles, and stones. The O horizon is 1 to 3 inches thick. The A1 horizon has value of 4 or 5 when dry and 2 or 3 when moist. The A2 horizon has value of 5 or 6 when dry and 3 to 5 when moist, and it has chroma of 3 or 4. It is loam or sandy loam. The B2t horizon has hue of 7.5YR or 10YR and value of 4 to 6 when dry and 3 or 4 when moist; colors are generally variegated. It is heavy clay loam or clay. The C horizon is discontinuous.

Dean series

The soils in the Dean series are classified as Ustollic Calciorthids, fine-loamy, carbonatic, mesic. These deep, well drained soils are on mesas and ridges. The soils formed in material derived mainly from limestone. Slope is 1 to 9 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Dean loam in an area of Tapia-Dean association, undulating; about 6 miles north of Clines Corners in the NW1/4 of sec. 16, T. 10 N., R. 12 E.:

A1—0 to 5 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; soft, friable, slightly plastic; many fine and very fine roots; few very fine tubular pores; about 5 percent gravel-sized caliche fragments; calcareous; moderately alkaline; clear smooth boundary.

AC—5 to 13 inches; light grayish brown (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly plastic; many fine and very fine roots, common medium roots; few fine and very fine tubular pores; about 10 percent fine gravel-sized caliche fragments; calcareous; moderately alkaline; clear smooth boundary.

C1ca—13 to 21 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly plastic; common fine and very fine roots; few fine tubular pores; strongly calcareous; about 30 percent soft caliche fragments; moderately alkaline; clear wavy boundary.

C2ca—21 to 60 inches; very pale brown (10YR 8/3) gravelly loam; massive; weakly cemented indurated caliche fragments with loam or soft caliche cementation.

Depth to caliche is 6 to 23 inches. The profile has hue of 7.5YR or 10YR. The A and AC horizons have value of 5 or 6 when dry and 4 or 5 when moist, and they have chroma of 2 or 3. The C horizon is less than 35 percent weakly cemented to strongly cemented caliche fragments.

Dioxice series

The soils in the Dioxice series are classified as Aridic Calciustolls, fine-loamy, mixed, mesic. These deep, well drained soils are on fans. The soils formed in calcareous alluvial and eolian sediment. Slope is 0 to 5 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Dioxice loam in an area of Dioxice-Dean association, undulating; about 2 miles southeast of Mosquero in the SW1/4 of sec. 27, T. 18 N., R. 28 E. (projected):

A1—0 to 4 inches; brown (7.5YR 5/2) loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, friable; slightly sticky and slightly plastic; many fine roots; calcareous; moderately alkaline; clear wavy boundary.

B21—4 to 9 inches; brown (7.5YR 5/2) heavy loam, dark brown (7.5YR 3/2) moist; weak coarse subangular blocky structure; slightly hard, friable, sticky and plastic; many fine and few medium roots; few fine tubular pores; calcareous; moderately alkaline; clear wavy boundary.

B22—9 to 24 inches; pinkish gray (7.5YR 6/2) clay loam, brown (7.5YR 4/2) moist; weak coarse prismatic structure; hard, friable, slightly sticky and plastic; common fine and few medium roots; common fine tubular and few medium tubular pores; calcareous; moderately alkaline; abrupt wavy boundary.

C1ca—24 to 34 inches; pinkish white (7.5YR 8/2) loam, pink (5YR 8/3) moist; massive; hard, friable, sticky and slightly plastic; few fine roots; strongly calcareous; moderately alkaline; clear wavy boundary.

C2ca—34 to 60 inches; pink (5YR 8/4) loam, light reddish brown (5YR 6/4) moist; massive; very hard, friable, sticky and slightly plastic; strongly calcareous; moderately alkaline.

The solum is 24 to 40 inches thick. The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The A horizon in places is noncalcareous. The B2 horizon has hue of 7.5YR or 10YR. It has value of 4 or 5 when dry and 2 or 3 when moist in the upper part and value of 5 or 6 when dry or 3 or 4 when moist in the lower part. It is loam or clay loam. The C horizon is loam, clay loam, or gravelly loam. It is estimated at 30 percent to more than 50 percent calcium carbonate equivalent.

Dumas series

The soils in the Dumas series are classified as Aridic Paleustolls, fine-loamy, mixed, mesic. These deep, well drained soils are on uplands. The soils formed in mixed alluvial deposits. Slope is 0 to 5 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Dumas loam in an area of Dumas-La Brier association, undulating; about one-half mile south of Mosquero in the SW1/4 of sec. 22, T. 18 N., R. 28 E. (projected):

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; common fine interstitial pores; neutral; clear wavy boundary.

B21t—4 to 10 inches; brown (7.5YR 5/2) clay loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots; common fine tubular pores; mildly alkaline; clear wavy boundary.

B22t—10 to 17 inches; brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; moderate coarse prismatic structure that parts to strong medium subangular blocky; very hard, firm, sticky and plastic, common fine roots; common fine tubular pores; few thin clay films on peds; weakly calcareous; mildly alkaline; clear wavy boundary.

B23t—17 to 28 inches; strong brown (7.5YR 5/6) clay loam, dark brown (7.5YR 4/4) moist; moderate coarse prismatic structure that parts to strong medium subangular blocky; very hard, firm, slightly sticky and plastic; common fine roots; common fine tubular pores; common thin clay films on peds; calcareous; moderately alkaline; clear wavy boundary.

B24t—28 to 40 inches; strong brown (7.5YR 5/6) clay loam, dark brown (7.5YR 4/4) moist; weak coarse prismatic structure that parts to weak medium subangular blocky; very hard, firm, slightly sticky and plastic; few fine roots; common thin clay films on peds; strongly calcareous; moderately alkaline; clear wavy boundary.

B25tca—40 to 60 inches; light reddish brown (5YR 6/4) clay loam, reddish brown (5YR 5/4) moist; weak coarse prismatic structure; hard, friable, slightly sticky and slightly plastic; strongly calcareous; moderately alkaline.

Depth to secondary lime is 17 to 24 inches. The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry, and chroma of 2 or 3. The upper part of the B2t horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry, and chroma of 2 or 3 when moist or dry. Below a depth of 10 to 20 inches, it has hue of 5YR or 7.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 4 to 6. The B2t horizon is sandy clay loam or clay loam.

Escabosa series

The soils in the Escabosa series are classified as Aridic Calciustolls, fine-loamy, mixed, mesic. These moderately deep, well drained soils are on hillsides and fans. The soils formed in alluvial and colluvial deposits derived from limestone and sandstone. Slope is 3 to 25 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of an Escabosa cobbly channery loam in an area of Laporte-Escabosa association, hilly; about 8 miles west of Las Vegas in the NW1/4 of sec. 28, T. 16 N., R. 15 E. (projected):

A1—0 to 3 inches; brown (7.5YR 4/2) channery loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; weakly calcareous; few limestone cobbles; mildly alkaline; clear smooth boundary.

B2—3 to 11 inches; dark grayish brown (10YR 4/2) cobbly clay loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many fine and common medium roots; about 15 percent limestone cobbles; calcareous; mildly alkaline; clear wavy boundary.

B22ca—11 to 20 inches; dark grayish brown (10YR 4/2) cobbly clay loam, very dark grayish brown (10YR 3/2) moist; weak subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many fine and medium and few coarse roots; about 30 percent limestone channery fragments and cobbles; strongly calcareous; moderately alkaline; clear wavy boundary.

Cca—20 to 28 inches; light gray (10YR 7/2) cobbly loam, light brownish gray (10YR 6/2) moist; massive; soft, friable, slightly plastic; few fine and few medium roots; about 30 percent limestone channery fragments and cobbles; strongly calcareous; moderately alkaline; abrupt wavy boundary.

R—28 inches; fractured limestone; lime coatings on rock surface and in fractures.

Depth to bedrock ranges from 20 to 40 inches. Depth to the calcic horizon ranges from 17 to 25 inches. The A horizon has hue of 10YR or 7.5YR, value of 4 or 5 when dry and to 4 when moist, and chroma of 2 or 3. It is channery or stony loam. The B2 horizon has hue of 10YR or 7.5YR, value of 4 or 5 when dry and 2 to 4 when moist, and chroma of 2 to 4. It is loam, clay loam, or silty clay loam. Limestone fragments and calcium carbonate coated pebbles make up from less than 5 percent to about 25 percent of the horizon. The Cca horizon has hue of 10YR or 7.5YR, value of 7 to 8 when dry and 6 or 7 when moist, and chroma of 2 or 3. It is loam or light clay loam and is 15 to 35 percent gravel and cobbles.

Gallegos series

The soils in the Gallegos series are classified as Ustollic Camborthids, loamy-skeletal, mixed, thermic. These deep, well drained soils are on old terraces. The soils formed in coarse-textured alluvial deposits of mixed origin. Slope is 5 to 35 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 60 degrees F.

Typical pedon of Gallegos very gravelly fine sandy loam, hilly; about 12 miles east of Conchas State Park in the SW1/4 of sec. 21, T. 13 N., R. 28 E. (projected):

A1—0 to 3 inches; brown (7.5YR 5/4) very gravelly fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium granular structure; soft, very friable; many fine and very fine roots; many fine pores; about 35

percent gravel; moderately alkaline; clear smooth boundary.

B2—3 to 13 inches; reddish brown (5YR 4/4) very gravelly loam, dark reddish brown (5YR 3/4) moist; moderate fine subangular blocky structure; soft, friable; many fine and very fine roots; few fine tubular pores; about 40 percent gravel and 10 percent cobbles; moderately alkaline; clear smooth boundary.

C1ca—13 to 20 inches; light reddish brown (5YR 6/4) very gravelly loam, reddish brown (5YR 4/4) moist; massive; soft, friable; many fine and very fine roots; about 45 percent gravel and about 15 percent cobbles; undersides of rock fragments are coated with lime; strongly calcareous; moderately alkaline; gradual wavy boundary.

C2ca—20 to 27 inches; light reddish brown (5YR 6/4) very gravelly loam, reddish brown (5YR 4/4) moist; massive; soft, very friable; common fine and very fine roots; about 45 percent gravel and about 15 percent cobbles; undersides of rock fragments are lime coated; strongly calcareous; moderately alkaline; gradual wavy boundary.

IIC3ca—27 to 60 inches; light reddish brown (5YR 6/4) very gravelly sandy loam, reddish brown (5YR 4/4) moist; single grain; loose, very friable; about 50 percent gravel and about 25 percent cobbles; undersides of pebbles are coated with lime; strongly calcareous; moderately alkaline.

The solum is 13 to 20 inches thick. Rock fragments consisting of rounded gravel and cobbles average more than 35 percent of the solum and C horizon. The A horizon has hue of 7.5YR or 5YR, value of 4 or 5 when dry, and chroma of 3 or 4. The B horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 4 to 6. It is very gravelly loam, gravelly clay loam, or very gravelly sandy clay loam. The C horizon has hue of 7.5YR or 5YR. In the lower part it is 15 percent or more calcium carbonate. It is gravelly or very gravelly loam or sandy loam.

Ima series

The soils in the Ima series are classsified as Ustochreptic Camborthids, coarse-loamy, mixed, thermic. These deep, well drained soils are on fans and uplands. The soils formed in moderately coarse textured eolian deposits. Slope is 1 to 5 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 60 degrees F.

Typical pedon of an Ima loamy fine sand in an area of Canez-Ima association, undulating; about 4 miles east of Conchas State Park in the NE1/4 of sec. 16, T. 13 N., R. 27 E. (projected):

A11—0 to 7 inches; reddish brown (5YR 5/4) loamy fine sand, reddish brown (5YR 4/4) moist; single grain; loose, many fine roots; weakly calcareous; moderately alkaline; gradual wavy boundary.

A12—7 to 15 inches; reddish brown (5YR 5/4) sandy loam, reddish brown (5YR 4/3) moist; weak medium subangular structure; soft, very friable; many fine roots; weakly calcareous; moderately alkaline; gradual wavy boundary.

B21—15 to 31 inches; reddish brown (5YR 5/4) sandy loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure; soft, very friable; many fine medium and coarse roots; few fine tubular pores; weakly calcareous; moderately alkaline; gradual wavy boundary.

B22a—31 to 46 inches; reddish brown (5YR 5/4) sandy loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure; soft, very friable; many fine and common medium and coarse roots; few fine irregular soft masses and threads of calcium carbonate; calcareous; moderately alkaline; abrupt to wavy boundary.

Bt—46 to 60 inches; reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; hard, firm, very plastic; common fine and medium roots; common fine tubular pores; common thin clay films on ped faces; many fine soft threads of lime; calcareous; moderately alkaline.

The solum is 20 to 45 inches thick. The profile is noncalcareous to calcareous. Most pedons have buried horizons at a depth of 40 to 60 inches. The A horizon has hue of 5YR or 7.5YR, value 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 or 4. The B horizon has hue of 2.5YR or 5YR, and it has value of 5 to 7 when dry and 4 to 6 when moist. It is sandy loam or loam. The C horizon is strongly calcareous in some pedons.

Karde series

The soils in the Karde series are classified as Ustic Torriorthents, fine-silty, carbonatic, mesic. These deep, well drained soils are on hills and low ridges on the leeward side of dry and intermittent lakes. The soils formed in silty eolian deposits. Slope is 1 to 5 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Karde loam in an area of Karde-Vermejo association, gently sloping; about 30 miles east of Las Vegas in the NE1/4 of sec. 8, T. 16 N., R. 21 E.:

A1—0 to 6 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and plastic; many fine and medium roots; calcareous; moderately alkaline; clear smooth boundary.

AC—6 to 17 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate fine su-

bangular blocky structure; hard, friable, sticky and plastic; many fine roots; about 15 percent calcium carbonate equivalent; strongly calcareous; moderately alkaline; clear smooth boundary.

C1—17 to 27 inches; white (10YR 8/2) loam, grayish brown (10YR 5/2) moist; weak medium prismatic structure; hard, friable, slightly sticky and plastic; few fine roots; strongly calcareous, about 25 percent calcium carbonate equivalent; moderately alkaline; clear smooth boundary.

C2—27 to 60 inches; light gray (10YR 7/2) loam, brown (10YR 5/3) moist; massive; hard, firm, slightly sticky and plastic; strongly calcareous; strongly alkaline.

The profile is strongly calcareous throughout; calcium carbonate equivalent ranges from 15 percent to more than 40 percent. The A horizon has value of 5 or 6 when dry and 2 or 3 when moist, and it has chroma of 2 or 3. The C horizon has value of 6 to 8 when dry and 4 to 6 when moist, and it has chroma of 2 or 3. It is loam, silt loam, or clay loam.

Kiln series

The soils in the Kiln series are classified as Lithic Argiborolls, loamy, mixed. These shallow, well drained soils are on hills. The soils formed in material derived from limestone and shale. Slope is 10 to 35 percent. Mean annual precipitation is about 20 inches, and mean annual air temperature is about 45 degrees F.

Typical pedon of a Kiln stony loam in an area of Kiln-Rock outcrop complex, hilly; about 12 miles northwest of Las Vegas, in the SW1/4SE1/4 of sec. 34, T. 18 N., R. 15 E. (projected):

O1—1 to 0 inches; decomposed and decomposing oak and pine litter.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) stony loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; many fine tubular pores; 15 percent stones and 15 percent angular gravel; neutral; abrupt wavy boundary.

B2t—4 to 14 inches; reddish brown (5YR 4/3) stony clay loam, dark reddish brown (5YR 3/3) moist; moderate fine subangular blocky structure; hard, friable, slightly sticky and plastic; common fine and medium and few coarse roots; common fine tubular pores; thin continuous clay films on peds; 15 percent stones and 15 percent angular gravel; neutral; abrupt wavy boundary.

R—14 inches; hard limestone.

Bedrock is at a depth of 10 to 20 inches. The profile is 10 to 35 percent rock fragments. The A1 horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The Bt horizon has value of 4 or 5 when dry. It is stony silty clay loam or stony clay loam. In some pedons the rock fragments near the lithic contact have thin deposits of calcium carbonate on the underside.

La Brier series

The soils in the La Brier series are classified as Torrertic Argiustolls, fine, mixed, mesic. These deep, well drained soils are in swales. The soils formed in alluvium derived from mixed material. Slope is 0 to 3 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of La Brier silty clay loam, 0 to 3 percent slopes; about 16 miles northeast of Las Vegas in the NE1/4NE1/4 of sec. 33, T. 18 N., R. 18 E. (projected):

A1—0 to 4 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; hard, firm, slightly sticky and plastic; many fine roots; many fine interstitial pores; calcareous; moderately alkaline; clear smooth boundary.

B21t—4 to 9 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; strong medium subangular blocky structure; very hard, friable, sticky and plastic; many fine roots; many coarse and fine tubular pores; few thin clay films on peds; calcareous; moderately alkaline; clear smooth boundary.

B22t—9 to 17 inches; grayish brown (10YR 5/2) clay, very dark brown (10YR 2/2) moist; moderate medium prismatic structure that parts to fine subangular blocky; hard, firm, sticky and very plastic; many fine and medium roots; many medium tubular pores; common thin clay films on peds; calcareous; moderately alkaline; clear smooth boundary.

B23t—17 to 24 inches; grayish brown (10YR 5/2) clay, very dark grayish brown (10YR 3/2) moist; moderate fine prismatic structure that parts to fine subangular blocky; very hard, firm, sticky and very plastic; many coarse and fine roots; many fine pores; common moderately thick clay films on peds; moderately alkaline; clear smooth boundary.

B24t—24 to 30 inches; brown (10YR 5/3) clay, dark brown (10YR 3/3) moist; weak medium prismatic structure that parts to fine angular blocky; very hard, firm, sticky and very plastic; few coarse and many fine and medium roots; few large and many fine and medium tubular pores; continuous thin clay films on peds; calcareous; moderately alkaline; clear wavy boundary.

B3ca—30 to 40 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; weak fine prismatic structure that parts to fine angular

blocky; hard, firm, sticky and very plastic; few coarse, many fine and medium roots; many fine tubular pores; few thin clay films on peds; common fine and medium soft lime masses; calcareous; moderately alkaline; clear wavy boundary.

Cca—40 to 60 inches; grayish brown (10YR 5/2) clay loam, dark brown (10YR 3/3) moist; moderate fine prismatic structure; hard, firm, sticky and plastic; few fine roots; many fine filaments of lime; strongly calcareous; moderately alkaline.

The solum is 26 to 40 inches thick. When these soils are dry, cracks 1/2 inch or more in width extend to a depth of 20 inches or more. The A horizon has hue of 7.5YR or 10YR and value of 3 to 5 when dry. It is silt loam or silty clay loam. The B2t horizon to a depth of 20 inches has hue of 7.5YR or 10YR, value of 4 or 5 when dry, and chroma of 2. Below a depth of 20 inches it has chroma of 2 to 4. The C horizon, where present, has hue of 5YR, 7.5YR, or 10YR.

Lacita series

The soils in the Lacita series are classified as Ustic Torriorthents, fine-silty, mixed (calcareous), mesic. These deep, well drained soils are on flood plains, terraces, and alluvial fans. The soils formed in medium textured and moderately fine textured, calcareous alluvial deposits. Slope is 0 to 3 percent. Mean annual precipitation is about 14 inches, and mean annual air temperature is about 60 degrees F.

Typical pedon of a Lacita silty clay loam in an area of Lacita-San Jose association, gently sloping; about 5 miles east of Conchas Dam in the SW1/4 of sec. 28, T. 13 N., R. 27 E (projected):

A1—0 to 4 inches; reddish brown (2.5YR 5/4) silty clay loam, reddish brown (2.5YR 4/4) moist; weak coarse platy structure; hard, friable, plastic; many fine roots; few fine tubular pores; calcareous; moderately alkaline; clear, smooth boundary.

AC—4 to 13 inches; reddish brown (2.5YR 5/4) silty clay loam, reddish brown (2.5YR 4/4) moist; weak medium subangular blocky structure; hard, friable, plastic; many fine and very fine roots; common fine tubular pores; calcareous; moderately alkaline; abrupt smooth boundary.

C1—13 to 42 inches; reddish brown (2.5YR 5/4) silty clay loam, reddish brown (2.5YR 4/4) moist; weak coarse prismatic structure; hard, friable, slightly sticky and slightly plastic; common fine roots; few fine tubular pores; calcareous; moderately alkaline; clear smooth boundary.

C2—42 to 60 inches; reddish brown (2.5YR 5/4) silty clay loam, reddish brown (2.5YR 4/4) moist; weak medium subangular blocky structure; very hard, firm, plastic; few fine roots; common fine tubular pores; lime segregated into fine soft masses; calcareous; moderately alkaline.

The A and C horizons have hue of 2.5YR, 5YR, or 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 to 6. Thin strata are present in some pedons. The profile is silt loam, silty clay loam, or clay loam. Silt content in the 10- to 40-inch control section averages about 60 percent.

La Lande series

The soils in the La Lande series are classified as Ustollic Camborthids, fine-loamy, mixed, thermic. These deep, well drained soils are on fans. The soils formed in medium textured and moderately fine textured alluvium derived from sandstone and shale. Slope is 3 to 8 percent. Mean annual precipitation is about 14 inches, and mean annual air temperature is about 60 degrees F.

Typical pedon of a La Lande sandy loam in an area of La Lande-Redona association, undulating; about 2 1/2 miles east of the Trementina School, in the NE1/4 of sec. 12, T. 14, N., R. 23, E.:

A1—0 to 3 inches; reddish brown (5YR 5/4) sandy loam, dark reddish brown (5YR 3/4) moist; weak fine granular structure; soft, very friable; many fine and very fine roots; many fine interstitial pores; calcareous; moderately alkaline; abrupt smooth boundary.

B21—3 to 8 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure; slightly hard, very friable, slightly plastic; common fine and very fine roots; common fine tubular pores; calcareous; moderately alkaline; clear smooth boundary.

B22—8 to 31 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure; slightly hard, friable, plastic; few fine and medium roots; common fine and medium pores; common fine filaments of calcium carbonate; calcareous; moderately alkaline; clear smooth boundary.

C1—31 to 54 inches; reddish brown (5YR 5/4) sandy clay loam,reddish brown (5YR 4/4) moist; massive; hard, friable, plastic; very few fine roots; common fine tubular pores; about 5 percent very fine gravel; few fine filaments and soft masses of lime; calcareous; moderately alkalne; gradual wavy boundary.

C2—54 to 63 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; massive; hard, friable, slightly plastic; very few fine roots; common fine tubular pores; very few fine filaments of lime; calcareous; moderately alkaline.

The solum is 20 to 40 inches thick. The A horizon has hue of 5YR or 7.5YR and value of 5 or 6 when dry and 3 or 4 when moist. The B horizon has hue of 2.5YR, 5YR, or

7.5YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 4 to 6. It is less than 15 percent calcium carbonate equivalent. It is loam, sandy clay loam, or clay loam. The C horizon has hue of 2.5YR, 5YR, or 7.5YR. It is less than 15 percent calcium carbonate equivalent. It is loam, sandy clay loam, or clay loam and is 0 to 15 percent gravel.

Laporte series

The soils in the Laporte series are classified as Lithic Haplustolls, loamy, mixed, mesic. These shallow, well drained soils are on hillsides and ridges. The soils formed in material derived from limestone. Slope is 3 to 30 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Laporte stony loam in an area of Laporte-Rock outcrop complex, steep; about 4 miles north of Clines Corners, 1,500 feet south and 2,000 feet west of the northeast corner of sec. 3, T. 10 N., R. 12 E.:

A1—0 to 5 inches; dark grayish brown, (10YR 4/2) stony loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, friable, slightly sticky; many fine and few medium roots; few fine tubular pores; calcareous; moderately alkaline; clear smooth boundary.

Cca—5 to 13 inches; brown (10YR 4/3) channery loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly plastic; many fine roots; few fine tubular pores; few fine irregular soft lime masses; calcareous; moderately alkaline; abrupt wavy boundary.

R—13 inches; fractured limestone that has a thin caliche coating on surface.

Bedrock is at a depth of 10 to 20 inches. The control section is 18 to 30 percent clay. Limestone fragments make up 5 to 35 percent of the profile. The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. It is stony loam or channery loam. The C horizon has hue of 7.5YR or 10YR, value 5 to 7 when dry and 3 to 5 when moist, and chroma of 2 or 3. It is channery loam, stony loam, channery clay loam, or stony clay loam.

Latom series

The soils in the Latom series are classified as Lithic Ustic Torriorthents, loamy, mixed (calcareous), thermic. These shallow and very shallow, well drained soils are on low ridges. The soils formed in material derived from calcareous sandstone. Slope is 2 to 15 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 60 degrees F.

Typical pedon of a Latom fine sandy loam in an area of Conchas-Latom association, undulating; about 5 miles south of Variadero, in the SW1/4 of sec. 34, T. 33 N., R. 23 E.:

A1—0 to 10 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; structureless; soft, very friable; common fine roots; few fine hard lime concretions in lower part; calcareous; moderately alkaline; abrupt wavy boundary.

R—10 inches; hard sandstone that has a thin layer of caliche on the surface and in the cracks.

About 0 to 30 percent of the surface is covered with stones and cobbles. Sandstone is at a depth of 8 to 20 inches. Sandstone gravel makes up 0 to 15 percent of the profile. The profile has hue of 5YR or 7.5YR, and it has value of 4 or 5 when dry and 3 or 4 when moist. It is less than 15 percent clay.

Litle series

The soils in the Litle series are classified as Ustollic Camborthids, fine, mixed, mesic. These moderately deep, well drained soils are on uplands and fans. The soils formed in material derived from shale and limestone. Slope is 1 to 9 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Litle clay in an area of Penrose-Litle-Mion association, undulating; about 20 miles east of Las Vegas in the NE1/4 of sec. 24, T. 16 N., R. 19 E. (projected):

A1—0 to 5 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; hard, firm, very plastic; many fine and very fine roots; many fine interstitial pores; calcareous; moderately alkaline; clear smooth boundary.

B2—5 to 11 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; very hard, firm, very plastic; many fine and very fine roots; common fine tubular pores; common pressure faces; calcareous; moderately alkaline; clear smooth boundary.

B3—11 to 23 inches; light brownish gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; very hard, firm, very plastic; common fine and very fine roots; common fine tubular pores; 10 percent shale chips; calcareous; moderately alkaline; abrupt wavy boundary.

Cr—23 inches; gray shale that has calcium carbonate deposits between the plates.

The solum is 20 to 30 inches thick. Shale is at a depth of 20 to 40 inches. The A horizon has hue of 10YR or

2.5Y, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. It is clay or clay loam. The B horizon has hue of 10YR or 2.5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. It is clay or clay loam.

Manter series

The soils in the Manter series are classified as Aridic Argiustolls, coarse-loamy, mixed, mesic. These deep, well drained soils are on rolling uplands. The soils formed in eolian deposits derived from mixed material. Slope is 1 to 9 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of Manter loamy fine sand, undulating; about 16 miles east of Las Vegas in the SE1/4 of sec. 33, T. 16 N., R. 19 E. (Projected in the Las Vegas Land Grant):

A1—0 to 5 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) moist; weak thin platy structure at the surface, massive below a depth of 2 inches; loose, very friable; many fine and medium roots; mildly alkaline; abrupt smooth boundary.

B1—5 to 11 inches; brown (7.5YR 5/2) fine sandy loam, dark brown (7.5YR 3/2) moist; weak fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky; many fine and medium roots; mildly alkaline; clear smooth boundary.

B21t—11 to 17 inches; brown (7.5YR 5/2) fine sandy loam, dark brown (7.5YR 3/2) moist; weak fine and very fine subangular blocky structure; slightly hard, friable, slightly sticky; few fine and medium roots; common fine and very fine tubular pores; common thin clay films on faces of peds and in pores; mildly alkaline; abrupt smooth boundary.

B22t—17 to 33 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium prismatic structure; hard, friable, slightly sticky; few fine roots; few fine and very fine tubular pores; common thin clay films on peds; mildly alkaline; abrupt smooth boundary.

Cca—33 to 60 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 4/4) moist; massive; hard, friable; very few very fine roots; common very fine tubular pores; weakly calcareous in lower part; moderately alkaline.

The mollic epipedon is 10 to 20 inches thick. The profile is noncalcareous to a depth of 30 to 40 inches. The A horizon has hue of 7YR or 10YR, value of 4 or 5 when dry and 3 when moist, and chroma of 2 or 3. The B horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 to 4. It is fine sandy loam, sandy loam, or loam and is less than 18 percent clay. The C horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 or 4. It is sandy loam or loamy fine sand.

Manzano series

The soils in the Manzano series are classified as Cumulic Haplustolls, fine-loamy, mixed, mesic. These deep, well drained soils are on fans, flood plains, and valley sides and in swales. The soils formed in mixed alluvial deposits. Slope is 1 to 5 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of Manzano fine sandy loam, 1 to 3 percent slopes; about 12 miles north of Las Vegas in the SE1/4 of sec. 34, T. 18 N., R. 16 E. (projected):

A1—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; soft, very friable; many fine and very fine roots; few very fine tubular pores; mildly alkaline; clear smooth boundary.

A3—6 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; slightly hard, friable; many fine and very fine roots; common fine and very fine tubular pores; moderately alkaline; clear smooth boundary.

B21—10 to 16 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure that parts to weak medium subangular blocky; slightly hard, friable; common fine and very fine roots; common very fine tubular pores; moderately alkaline; clear smooth boundary.

B22—16 to 37 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure that breaks to weak medium subangular blocky; slightly hard, friable; few fine and very fine roots; few very fine tubular pores; moderately alkaline; clear smooth boundary.

B3ca—37 to 60 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure; slightly hard, friable, slightly plastic; common fine tubular pores; common fine irregular soft filaments of lime; weakly calcareous; moderately alkaline.

The profile to a depth of 40 inches ranges from noncalcareous to calcareous. The dark-colored layers are more than 20 inches thick. The A horizon has hue of 7.5YR or 10YR and value of 4 or 5 when dry. It is fine sandy loam, loam, or clay loam. The B2 horizon to a depth of 20 inches or more has hue of 7.5YR or 10YR and value of 4 or 5; below a depth of 20 inches the value ranges from 4 to 6. The B2 horizon to a depth of 20 inches has chroma of 2 or 3; below a depth of 20

inches the chroma ranges from 2 to 4. It is loam or clay loam.

Mion series

The soils in the Mion series are classified as Ustic Torriorthents, clayey, mixed (calcareous), mesic. These shallow, well drained soils are on uplands and side slopes of drainageways. The soils formed in material derived from shale. Slope is 1 to 25 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Mion silty clay loam in an area of Mion-Penrose association, hilly; about 7 miles north of Las Vegas in the SE1/4 of sec. 8, T. 17 N., R. 17 E. (projected):

A—0 to 4 inches; dark grayish brown (2.5Y 4/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate fine granular structure; hard, firm, plastic; many fine and very fine roots; many fine interstitial pores; calcareous; moderately alkaline; clear smooth boundary.

AC—4 to 12 inches; dark grayish brown (2.5Y 4/2) clay, very dark grayish brown (2.5Y 3/2) moist; massive; very hard, firm, plastic; common fine and very fine roots; common fine tubular pores; about 5 percent fine shale fragments; calcareous; moderately alkaline; abrupt wavy boundary.

Cr—12 inches; dark grayish brown (2.5Y 4/2) shale; some lime deposits between shale plates.

Shale is at a depth of 10 to 20 inches. The A horizon has hue of 10YR or 2.5Y, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. It is clay loam or silty clay loam. The AC horizon has hue of 10YR or 2.5Y, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. It is silty clay or clay.

Montoya series

The soils in the Montoya series are classified as Mollic Torrerts, fine, mixed, thermic. These deep, well drained soils are on broad flood plains and in depressional areas. The soils formed in fine textured, calcareous sediment derived from red beds. Slope is 0 to 3 percent. Mean annual precipitation is about 14 inches, and mean annual air temperature is about 59 degrees F.

Typical pedon of Montoya clay loam in an area of Montoya-Tucumcari association, gently sloping; about 1 1/2 miles west of Conchas State Park Headquarters, in the SW1/4 of sec. 29, T. 13 N., R. 26 E. (projected):

A1—0 to 4 inches; reddish brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/4) moist; moderate fine granular structure; slightly hard, friable, sticky and plastic; many fine and very fine roots; many fine pores; calcareous; moderately alkaline; abrupt smooth boundary.

B21—4 to 13 inches; reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; weak coarse angular blocky structure; very hard, firm, sticky and plastic; many fine roots; common fine tubular pores; few cracks 1/2 to 1 inch wide; few pressure faces; calcareous; moderately alkaline; clear smooth boundary.

B22—13 to 24 inches; light reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; moderate coarse subangular blocky structure; very hard, firm, sticky and very plastic; common fine roots; common fine tubular pores; few cracks 1/2 inch wide; few weakly expressed slickensides; few filaments of gypsum crystals; calcareous; moderately alkaline; clear smooth boundary.

C1ca—24 to 43 inches; reddish brown (5YR 5/3) clay, reddish brown (5YR 4/3) moist; massive; very hard, very firm, sticky and very plastic; few fine roots in the upper part; few slickensides and pressure faces; few gypsum crystals; calcareous; moderately alkaline; clear smooth boundary.

C2—43 to 60 inches; reddish brown (5YR 5/3) clay, reddish brown (5YR 4/3) moist; massive; very hard, very firm, sticky and very plastic; few slickensides; common pressure faces; slightly calcareous; moderately alkaline.

The solum is 13 to 34 inches thick. Cracks 1/2 to 1 inch wide extend to a depth of 20 inches or more. The A and B horizons have hue of 5YR or 2.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 3 to 6. The B horizon is clay or clay loam and is 35 to 60 percent clay. In the lower part it has few if any accumulations of carbonate and gypsum. The C horizon has hue of 5YR or 2.5YR. It is clay or heavy clay loam It is less than 15 percent calcium carbonate equivalent. The C horizon has few if any accumulations of gypsum or soluble salts.

Moreno series

The soils in the Moreno series are classified as Typic Argiborolls, fine, mixed. These deep, well drained soils are on fans and valley sides. The soils formed in fine textured alluvium derived from sandstone and shale. Slope is 3 to 9 percent. Mean annual precipitation is about 20 inches, and mean annual air temperature is about 45 degrees F.

Typical pedon of a Moreno loam in an area of Moreno-Brycan association, sloping; about 10 miles northwest of Sapello, in the SE1/4 of sec. 16, T. 19 N., R. 15 E. (projected):

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate

fine granular structure; slightly hard, friable, slightly plastic; many fine and very fine roots; many very fine interstitial pores; neutral; clear smooth boundary.

B1—4 to 12 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard, friable, plastic; many fine and very fine roots; many fine tubular pores; neutral; clear smooth boundary.

B21t—12 to 21 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium prismatic structure that parts easily to fine subangular blocky; very hard, firm, plastic; many fine and very fine roots; common fine tubular pores; many thin clay films on peds and in pores; neutral; clear wavy boundary.

B22t—21 to 32 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; moderate coarse prismatic structure that parts to medium subangular blocky; very hard, firm, very plastic; common fine and very fine roots; many fine tubular pores; many thin clay films on peds and in pores; neutral; clear wavy boundary.

B23t—32 to 53 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4.4) moist; moderate coarse prismatic structure; very hard, firm, very plastic; few fine roots; many fine tubular pores; common thin clay films on peds and in pores; about 5 percent gravel; neutral; clear wavy boundary.

C—53 to 60 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; massive; very hard, firm, very plastic; common fine tubular pores; about 10 percent gravel; neutral.

The solum is 36 to 55 inches thick. The A horizon has value of 4 or 5 when dry and chroma of 2 or 3. The B1 horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry, and chroma of 2 or 3. It is loam or clay loam. The B2t horizon has value of 4 or 5 when dry and 3 or 4 when moist, and it has chroma of 2 to 4. It ranges from a trace to 15 percent gravel. The B2t horizon is clay or clay loam and is 35 to 45 percent clay. It is 10 to 20 percent gravel. In some pedons the C horizon has a slight accumulation of carbonates.

Newkirk series

The soils in the Newkirk series are classified as Lithic Ustollic Haplargids, loamy, mixed, thermic. These very shallow and shallow, well drained soils are on ridges and uplands. The soils formed in material derived from sandstone. Slope is 1 to 10 percent. Mean annual precipitation is about 14 inches, and mean annual air temperature is about 60 degrees F.

Typical pedon of a Newkirk sandy loam in an area of Newkirk-Walkon-Conchas association, undulating; about 1 1/2 miles east of the Trementina School, in the NW1/4 of sec. 11, T. 14 N., R. 23 E.:

A1—0 to 4 inches; reddish brown (5YR 5/4) sandy loam, reddish brown (5YR 4/4) moist; moderate fine granular structure; soft, very friable; many fine and very fine roots; many fine interstitial pores; neutral; abrupt smooth boundary.

B2t—4 to 13 inches; reddish brown (5YR 4/4) sandy clay loam, dark reddish brown (5YR 3/4) moist; weak coarse prismatic structure that parts to medium subangular blocky; slightly hard, friable, slightly plastic; many fine and very fine roots; common fine tubular pores; few thin clay films on peds and in pores; about 5 percent gravel; moderately alkaline; abrupt wavy boundary.

R—13 inches; calcareous sandstone that is fractured in the upper 5 inches; thin carbonate accumulation on upper surfaces and in fractures.

The thickness of the solum and the depth to sandstone range from 8 to 20 inches. The solum is 0 to 15 percent coarse fragments. Most pedons are leached, but some pedons are calcareous in the lower part of the B2t horizon. The A horizon has hue of 5YR or 7.5YR, value of 3 to 5 when dry and 3 or 4 when moist, and chroma of 2 to 4. It is sandy loam or fine sandy loam. The B2t horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 3 or 4. It is sandy clay loam or clay loam.

Partri series

The soils in the Partri series are classified as Aridic Argiustolls, fine, mixed, mesic. These deep, well drained soils are on level to undulating uplands. The soils formed in mixed alluvium derived from limestone and sandstone and in wind-worked calcareous sediment. Slope is 0 to 5 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of Partri loam, undulating; about 24 miles east of Las Vegas on Maes Road, 2,400 feet north and 50 feet west of the southeast corner of sec. 17, T. 16 N., R. 20 E. (projected):

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse granular structure; slightly hard, friable, slightly sticky; many fine and very fine roots, many fine tubular pores; neutral; abrupt smooth boundary.

B21t—4 to 17 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 3/2) moist; strong medium angular blocky structure; very hard, firm, slightly sticky and very plastic; common very fine roots; common fine tubular pores; continuous thick clay films on peds; mildly alkaline; abrupt smooth boundary.

B22t—17 to 25 inches; brown (7.5YR 5/4) silty clay loam, dark brown (7.5YR 4/4) moist; moderate medium prismatic structure; very hard, firm, slightly sticky and plastic; common very fine roots; common

fine and very fine tubular pores; moderately thick clay films on peds; common fine irregular filaments of lime; calcareous; moderately alkaline; clear smooth boundary.

B3—25 to 29 inches; brown (7.5YR 5/4) silty clay loam, dark brown (7.5YR 4/4) moist; weak medium prismatic structure; very hard, firm, slightly sticky and plastic; few fine roots; common fine and very fine tubular pores; few thin clay films on peds; calcareous; common fine filaments of lime; moderately alkaline; abrupt smooth boundary.

C1ca—29 to 48 inches; pink (7.5YR 7/4) silty clay loam, light brown (7.5YR 6/4)moist; massive; very hard, firm, sticky and plastic; few very fine tubular pores; about 42 percent calcium carbonate equivalent; lime is segregated into many small soft masses and filaments; calcareous; moderately alkaline; abrupt smooth boundary.

C2ca—48 to 60 inches; pinkish white (7.5YR 8/2) silty clay loam, pinkish white (7.5YR 8/2) moist; massive; very hard, firm, sticky and plastic; about 48 percent calcium carbonate; lime is disseminated; calcareous; moderately alkaline.

The thickness of the solum and the depth to the calcic horizon range from 21 to 34 inches. The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. It is silt loam or loam. The B2t horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 to 4. It is silty clay loam, silty clay, or clay. The Cca horizon has hue of 5YR or 7.5YR, and it has value of 6 to 8 when dry and 4 to 8 when moist. The Cca horizon is more than 15 percent calcium carbonate equivalent.

Penrose series

The soils in the Penrose series are classified as Lithic Ustic Torriorthents, loamy, mixed (calcareous), mesic. These shallow, well drained soils are on hills, ridges, and mesas. The soils formed in calcareous, medium textured material derived from limestone. Slope is 0 to 8 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Penrose channery silt loam in an area of Penrose-Litle-Mion association, undulating; about 10 miles north of Las Vegas, in the northeast corner of sec. 13, T. 17 N., R. 17 E. (projected):

A1—0 to 4 inches; grayish brown (2.5Y 5/2) channery silt loam, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; soft, friable, sticky and plastic; many fine and very fine roots; many fine interstitial pores; weakly calcareous; moderately alkaline; clear smooth boundary.

C—4 to 14 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine subangular blocky stucture; slightly hard, firm, slightly sticky and plastic; many fine and very fine roots; common fine tubular pores; 10 to 15 percent fine limestone fragments; weakly calcareous; moderately alkaline; abrupt smooth boundary.

R—14 inches; hard limestone that is fractured; calcium carbonate coatings are on the bottom of fragments.

Depth to limestone is 10 to 20 inches. The profile is weakly calcareous to strongly calcareous. The A and C horizons have hue of 2.5Y or 10YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 or 3. The A horizon is channery silt loam or channery loam and is 15 to 20 percent channery limestone fragments. The C horizon is clay loam or loam and is 10 to 25 percent channery limestone fragments.

Quay series

The soils in the Quay series are classified as Ustochreptic Calciorthids, fine-silty, mixed, thermic. These deep, well drained soils are on fans and uplands. The soils formed in medium textured and fine textured alluvium. Slope is 0 to 5 percent. Mean annual precipitation is about 14 inches, and mean annual air temperature is about 60 degrees F.

Typical pedon of a Quay loam in an area of Redona-Quay association, undulating; about 10 miles east of the junction of U. S. Highway 84 and the south boundary of San Miguel County, in the SE1/4 of sec. 17, T. 12 N., R. 21 E. (projected):

A1—0 to 2 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak medium platy structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; few fine tubular pores; calcareous; moderately alkaline; clear smooth boundary.

A3—2 to 6 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; few coarse tubular pores; calcareous; moderately alkaline; clear smooth boundary.

B21—6 to 11 inches; reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; many fine tubular pores; calcareous; moderately alkaline; clear smooth boundary.

B22—11 to 16 inches; pink (5YR 7/3) clay loam, light reddish brown (5YR 6/3) moist; weak coarse prismatic structure; hard, firm, slightly sticky and slightly plastic; few fine roots; very few very fine tubular pores; lime segregated into large irregular soft masses; calcareous; moderately alkaline; abrupt smooth boundary.

B3ca—16 to 26 inches; pinkish white (7.5YR 8/2) silty clay loam, pinkish gray (7.5YR 6/2) moist; weak medium subangular blocky structure; hard, friable, firm, slightly sticky and slightly plastic; few fine roots; few fine tubular pores; about 50 percent calcium carbonate equivalent; calcareous; moderately alkaline; clear wavy boundary.

C1ca—26 to 40 inches; pink (7.5YR 8/4) silty clay loam, brown (7.5YR 5/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few fine and very fine roots; few very fine pores; lime segregated into large hard masses; about 30 percent calcium carbonate equivalent; calcareous; moderately alkaline; clear and wavy boundary.

C2ca—40 to 60 inches; light brown (7.5YR 6/4) clay loam, brown (7.5YR 4/4) moist; massive; very hard, very firm, slightly sticky and slightly plastic; very few fine roots; calcareous; moderately alkaline.

The solum is 21 to 30 inches thick. The calcic horizon is at a depth of 16 to 30 inches. Some pedons have sandstone at a depth of 40 to 60 inches. The A horizon has hue of 5YR or 7.5YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 3 or 4. The B horizon has hue of 2.5YR or 5YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 3 or 4. Some pedons have dry value of 8 in the lower part of the B horizon. The calcic horizon is 15 to 30 percent calcium carbonate equivalent.

Quintana series

The soils in the Quintana series are classified as Typic Ustochrepts, fine-loamy, mixed, mesic. These deep, well drained soils are on uplands. The soils formed in material derived from limestone, calcareous sandstone, and shale. Slope is 0 to 15 percent. Mean annual precipitation is about 18 inches, and mean annual air temperature is about 52 degrees F.

Typical pedon of Quintana gravelly loam, moderately sloping; 1.25 miles southeast of Quintana Spring on Forest Service Road 45, in the NE1/4 of sec. 7, T. 12 N., R. 16 E.:

A11—0 to 2 inches; brown (10YR 5/3) very gravelly loam, dark brown (10YR 4/3) moist; weak fine platy structure parting to weak fine granular; soft, friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; 50 percent gravel; mildly alkaline; abrupt smooth boundary.

A12—2 to 6 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular pores; mildly alkaline; clear smooth boundary.

B2—6 to 13 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; common very fine and fine roots, few medium roots; common very fine tubular pores; calcareous; mildly alkaline; clear smooth boundary.

B3ca—13 to 19 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure, slightly hard, firm, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular pores; 5 percent gravel; calcareous; moderately alkaline; clear wavy boundary.

C1ca—19 to 33 inches; very pale brown (10YR 7/3) sandy clay loam, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; many very fine tubular pores; 10 percent gravel; calcareous; moderately alkaline; gradual wavy boundary.

C2—33 to 41 inches; very pale brown (10YR 7/4) sandy loam, light yellowish brown (10YR 6/4) moist; moderate medium subangular blocky structure; soft, very friable; few very fine and fine roots; common very fine and fine interstitial pores; 10 percent gravel; calcareous; moderately alkaline; gradual wavy boundary.

C3—41 to 60 inches; yellow (10YR 8/6) very gravelly sandy loam; very pale brown (10YR 8/4) moist; moderate medium subangular blocky structure; soft, very friable; common very fine and fine interstitial pores; 50 percent gravel; calcareous; moderately alkaline.

In some pedons the A horizon is calcareous. Depth to the calcic horizon ranges from 19 to 40 inches. The A horizon has hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 2 to 4. It is loam or gravelly loam. The B horizon has hue of 10YR to 5YR, value of 4 to 8, and chroma of 2 to 4. The C horizon has value of 7 or 8 and chroma of 2 to 4. It is sandy clay loam or sandy loam.

Redona series

The soils in the Redona series are classified as Ustollic Haplargids, fine-loamy, mixed, thermic. These deep, well drained soils are on fans and upland plains. The soils formed in medium textured to moderately fine textured material derived from sandstone and shale. Slope is 0 to 5 percent. Mean annual precipitation is about 14 inches, and mean annual air temperature is about 60 degrees F.

Typical pedon of a Redona loam in an area of Redona-Quay association, undulating; about 25 miles southwest of Mosquero, in the SW1/4 of sec. 19, T. 16 N., R. 24 E.:

A1—0 to 5 inches; reddish brown (5YR 5/4) loam, dark reddish brown (5YR 3/4) moist; moderate fine granular structure; soft, friable, slightly plastic; many fine and very fine roots; many fine pores; neutral; clear smooth boundary.

B21t—5 to 10 inches; reddish brown (5YR 4/4) light clay loam, dark reddish brown (5YR 3/4) moist; weak coarse prismatic structure that parts to moderate fine subangular blocky; hard, friable, slightly sticky and plastic; many fine and very fine roots; common fine and very fine tubular pores; few thin clay film on peds and in pores; mildly alkaline; clear smooth boundary.

B22t—10 to 21 inches; reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; moderate coarse prismatic structure that parts to medium subangular blocky; hard, friable, slightly sticky and plastic; common fine and very fine roots; common fine tubular pores; common thin clay films on peds and in pores; calcareous; moderately alkaline; clear smooth boundary.

B23t—21 to 31 inches; reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; moderate coarse prismatic structure that parts to medium subangular blocky; hard, friable, slightly sticky and plastic; few fine and very fine roots; common fine tubular pores; common thin clay film on peds and in pores; lime segregated into few fine filaments; calcareous; moderately alkaline; clear wavy boundary.

B3ca—31 to 37 inches; light reddish brown (5YR 6/4) clay loam, reddish brown (5YR 5/4) moist; weak coarse prismatic structure; hard, friable, slightly sticky and slightly plastic; very few very fine roots; common fine and very fine tubular pores; about 20 percent calcium carbonate equivalent; lime segregated into common medium hard concretions; calcareous; moderately alkaline; clear wavy boundary.

C1ca—37 to 60 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and plastic; few fine tubular pores; lime segregated into many very fine soft masses; calcareous; moderately alkaline.

The solum is 36 to 60 inches thick. The calcic horizon is at a depth of 23 to 38 inches. Some pedons are calcareous to the surface. The A1 horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 3 or 4. Layers that have value of 5 when dry and 3 when moist and chroma of 3 are too thin or too low in organic matter to meet the requirements of a mollic epipedon. The B2t horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 4 or 5. It is clay loam or silty clay loam. The lower part of the Bt horizon is 15 to 30 percent calcium carbonate equivalent.

Ribera series

The soils in the Ribera series are classified as Typic Haplustalfs, fine-loamy, mixed, mesic. These deep, well drained soils are on uplands and fans. The soils formed in eolian and alluvial deposits derived from sandstone and shale. Slope is 3 to 9 percent. Mean annual precipitation is about 18 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Ribera fine sandy loam in an area of Vibo-Ribera association, undulating; about 30 miles southwest of Las Vegas, in the SW1/4 of sec. 33, T. 15 N., R. 13 E.:

A1—0 to 5 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; loose, very friable; many fine and very fine roots; neutral; clear smooth boundary.

B1—5 to 9 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; many fine roots; many fine tubular pores; neutral; clear smooth boundary.

B21t—9 to 17 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate coarse prismatic structure; very hard, firm, sticky and plastic; common fine and medium roots; many fine and common medium pores; few thin clay films on peds and in pores; mildly alkaline; clear wavy boundary.

B22t—17 to 26 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate coarse prismatic structure; very hard, firm, slightly sticky and plastic; few fine and common medium roots; many fine and common medium tubular pores; few thin clay films on peds and in pores; carbonates segregated into fine discontinuous filaments; calcareous; moderately alkaline; clear wavy boundary.

Cca—26 to 31 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, slightly plastic; very few fine roots; strongly calcareous; carbonates segregated into common fine filaments; moderately alkaline; abrupt wavy boundary.

R—31 inches; sandstone; lime deposits on surface and in cracks.

The solum is 21 to 31 inches thick. Bedrock is at a depth of 20 to 40 inches. The A horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 4 or 5 when dry and 3 to 5 when moist, and chroma of 3 to 5. It is fine sandy loam or loam. The B2t horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 4 to 6. It is clay loam or sandy clay loam. The lower part of the B2t horizon is noncalcareous to calcareous. The Cca horizon has hue of 2.5YR, 5YR, or 7.5YR; value of 5 to 7 when dry and 4 to 6 when moist; and chroma of 4 to 6. It is sandy loam or loam.

Rocio series

The soils in the Rocio series are classified as Mollic Eutroboralfs, fine, mixed. These deep, well drained soils are on mountainsides. The soils formed in alluvial and colluvial deposits derived from sandstone and shale. Slope is 9 to 65 percent. Mean annual precipitation is about 25 inches, and mean annual air temperature is about 45 degrees F.

Typical pedon of a Rocio gravelly loam in an area of Stout-Rocio-Dargol association, very steep; about 1.5 miles southwest of the village of Rociada, 600 feet south and 880 feet east of the northwest corner of sec. 6, T. 18 N., R. 15 E. (projected):

01 and 02—1 inch to 0; decomposed and decomposing forest litter.

A1—0 to to 5 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, friable, slightly plastic; many fine and very fine roots; many fine interstitial pores; 20 percent fine gravel and 5 percent cobbles; slightly acid; clear smooth boundary.

A2—5 to 18 inches; pale brown (10YR 6/3) gravelly fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable; common fine, medium, and coarse roots; common fine tubular pores; 30 percent fine gravel; slightly acid; abrupt wavy boundary.

B21t—18 to 39 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; strong medium angular blocky structure; very hard, very firm, sticky and very plastic; many medium roots; few fine tubular pores; continuous thick clay film on peds and in pores; 5 percent gravel and cobbles; slightly acid; gradual wavy boundary.

B22t—39 to 63 inches; light brown (7.5YR 6/4) clay, brown (7.5YR 4/4) moist; strong coarse angular blocky structure that parts to fine and medium angular blocky; very hard, very firm, sticky and very plastic; few fine and medium roots; few fine tubular pores; continuous thick clay films on surface of peds and rock fragments; many pressure faces on secondary peds; 10 percent rock fragments; neutral.

Rock fragments of sandstone range from gravel to stones in size. Some pedons do not have an O horizon. The A1 horizon has hue of 7.5YR or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. It is gravelly loam or stony loam. The A2 horizon has hue of 7.5YR or 10YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 3 or 4. Texture is gravelly or stony loam, fine sandy loam, or sandy loam. The B2t horizon has hue of 5YR, 7.5YR, or 10YR; value of 4 to 6 when dry and 3 or 4 when moist; and chroma of 3 to 6. It is clay or sandy clay. In some pedons there is a C horizon.

San Jose series

The soils in the San Jose series are classified as Ustic Torrifluvents, coarse-loamy, mixed (calcareous), thermic. These deep, well drained soils are on terraces, benches, and flood plains. The soils formed in moderately coarse textured, calcareous alluvial deposits derived from mixed sources. Slope is 0 to 3 percent. Mean annual precipitation is about 15 inches, and mean annual air temperature is about 60 degrees F.

Typical pedon of San Jose fine sandy loam, 0 to 3 percent slopes, in an area of Lacita-San Jose association, gently sloping; about 10 miles north of Tucumcari, in the SE1/4 of sec. 19, T. 13 N., R. 20 E. (projected):

A11—0 to 4 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium granular structure; loose, very friable; few fine roots; weakly calcareous; moderately alkaline; gradual smooth boundary.

A12—4 to 12 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; soft, very friable; few fine roots; weakly calcareous; moderately alkaliine; clear smooth boundary.

C1—12 to 41 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; massive; soft, very friable; few fine roots; weakly calcareous; moderately alkaline; clear smooth boundary.

C2—41 to 63 inches; brown (7.5YR 5/4) stratified fine sandy loam and silt loam, dark brown (7.5YR 4/4) moist; massive; soft, very friable; few fine roots; weakly calcareous; moderately alkaline.

The profile is weakly calcareous throughout. Depth to stratified layers is 30 to 50 inches. The A horizon has hue of 5YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 4 or 5. The C horizon has hue of 5YR or 7.5YR and value of 4 or 5 when dry or moist. It is stratified fine sandy loam, sandy loam, or sandy clay loam and has layers of silt loam.

Sombordoro series

The soils in the Sombordoro series are classified as Lithic Haplustalfs, clayey-skeletal, mixed, mesic. These very shallow, well drained soils are on uplands. The soils formed in material derived from sandstone. Slope is 0 to 40 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Sombordoro very stony fine sandy loam in an area of Ribera-Sombordoro-Vibo association,

moderately sloping; about 4 miles south of Bernal, in the NE1/4 of sec. 25, T. 13 N., R. 15 E.:

A11—0 to 3 inches; light brown (7.5YR 6/4) very stony fine sandy loam, brown (7.5YR 5/4) moist; weak fine granular structure; soft, friable; many very fine and fine roots; many very fine and fine interstitial pores; 40 percent stones; mildly alkaline; clear smooth boundary.

A12—3 to 7 inches; yellowish red (5YR 5/6) very stony sandy loam, yellowish red (5YR 4/6) moist; weak fine subangular blocky structure; soft, friable; many very fine and fine and few coarse roots; many very fine and fine interstitial pores; 10 percent gravel, 20 percent cobbles, and 25 percent stones; mildly alkaline; clear smooth boundary.

B2t—7 to 16 inches; yellowish red (5YR 4/6) extremely stony clay, yellowish red (5YR 4/6) moist; strong medium subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; common fine tubular pores; many moderately thick clay film on peds; 10 percent gravel, 15 percent cobbles, and 40 percent stones; moderately alkaline; abrupt wavy boundary.

R—16 inches; hard red sandstone.

Thickness of the solum and depth to bedrock are 8 to 20 inches. Sandstone rock fragments more than 2 feet in diameter are common throughout the pedon. The A horizon has hue of 5YR to 10YR, value of 4 to 6 when dry and 3 to 4 when moist, and chroma of 2 to 6. It is very stony sandy loam or very stony loam. The B horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 6. It is clay or sandy clay and is 35 to 80 percent rock fragments. Carbonates are present above the lithic contact in some pedons.

Stout series

The soils in the Stout series are classified as Lithic Ustorthents, loamy, mixed, nonacid, frigid. These very shallow and shallow, well drained soils are on hills and mountains. The soils formed in mixed material derived from sandstone. Slope is 5 to 30 percent. Mean annual precipitation is about 20 inches, and mean annual air temperature is about 40 degrees F.

Typical pedon of Stout cobbly sandy loam in an area of Rocio-Dargol-Stout association, hilly; about 17 miles northwest of Las Vegas, in the NW1/4 of sec. 17, T. 18 N., R. 15 E. (projected):

A1—0 to 4 inches; grayish brown (10YR 5/2) cobbly sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable; common fine and medium roots; many fine interstitial pores; 15 percent very fine gravel and cobbles; slightly acid; clear smooth boundary.

C—4 to 10 inches; pale brown (10YR 6/3) cobbly sandy loam, yellowish brown (10YR 5/4) moist; moderate fine granular structure; soft, friable; many fine and common medium roots; many fine interstitial pores; 15 percent fine gravel; slightly acid; abrupt wavy boundary.

R—10 inches; decomposing, coarse grained sandstone.

Bedrock is at a depth of 6 to 20 inches. The profile is 10 to 30 percent rock fragments that are gravel to cobbles in size. The A horizon has value of 5 or 6 when dry and 3 or 4 when moist, and it has chroma of 2 or 3. It is cobbly sandy loam or cobbly fine sandy loam. The C horizon has hue of 7.5YR or 10YR, value of 5 to 7 when dry and 5 or 6 when moist, and chroma of 3 to 5. Some pedons have an O horizon of decomposing forest litter 1 inch to 2 inches thick.

Swastika series

The soils in the Swastika series are classified as Aridic Argiustolls, fine, mixed, mesic. These deep, well drained soils are on uplands. The soils formed in fine textured residuum derived from shale. Slope is 0 to 5 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of Swastika silt loam, undulating; about 5 miles northeast of Las Vegas, in the NW1/4 of sec. 32, T. 17 N., R. 17 E. (projected):

A1—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; soft, friable, slightly plastic; many fine and very fine roots; many fine tubular pores; mildly alkaline; abrupt smooth boundary.

B1—2 to 7 inches; brown (10YR 4/3) silt loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard; friable, slightly plastic; many fine and very fine roots; common fine tubular pores; mildly alkaline; clear smooth boundary.

B21t—7 to 15 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure; very hard, friable, plastic; common fine and very fine roots; common fine tubular pores; common thin clay films on peds and in pores; moderately alkaline; clear smooth boundary.

B22t—15 to 21 inches; brown (10YR 5/3) clay, brown (10YR 4/3) moist; weak coarse prismatic structure that parts to moderate medium subangular blocky; very hard, firm, plastic and slightly sticky; common fine and very fine roots; common fine tubular pores; common thin clay film on peds and in pores; weakly calcareous; moderately alkaline; clear smooth boundary.

B23tca—21 to 30 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; moder-

ate medium subangular structure; very hard, firm, plastic; few very fine roots; common fine tubular pores; few thin clay films on peds and in pores; moderately alkaline; clear smooth boundary.

C1ca—30 to 52 inches; light yellowish brown (10YR 6/4) silty clay loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; very hard, friable, plastic; very few very fine roots; common fine tubular pores; common irregular soft lime masses; calcareous; moderately alkaline; clear smooth boundary.

C2ca—52 to 60 inches; very pale brown (10YR 8/4) silty clay loam, light yellowish brown (10YR 6/4) moist; massive; very hard, friable, plastic; many small and medium irregular soft lime masses; strongly calcareous; moderately alkaline.

The solum is 24 to 40 inches thick. Secondary lime is generally at a depth of 18 to 30 inches, but some pedons are calcareous to the surface. The A horizon has value of 4 or 5 when dry and chroma of 2 or 3 when moist. It is silt loam or clay loam. The B2t horizon has hue of 7.5YR or 10YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 3 or 4. It is clay, clay loam, or silty clay loam that is 35 to 50 percent clay. The C horizon has hue of 7.5YR or 10YR, value of 6 to 8 when dry and 4 to 6 when moist, and chroma of 3 or 4. It is clay loam or silty clay loam.

Tapia series

The soils in the Tapia series are classified as Ustollic Haplargids, fine-loamy, mixed, mesic. These deep, well drained soils are on mesas and fans. The soils formed in calcareous, medium textured and fine textured material of mixed origin. Slope is 1 to 5 percent. The mean annual precipitation is about 16 inches, and the mean annual air temperature is about 50 degrees F.

Typical pedon of a Tapia loam in an area of Tapia-Dean association, undulating; about 35 miles south of Las Vegas, in the southwest corner of sec. 7, T. 10 N., R 15 E.:

A1—0 to 5 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak very fine granular structure; soft, very friable; many fine roots; mildly alkaline; clear smooth boundary.

B1—5 to 11 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak coarse prismatic structure; slightly hard, very friable, slightly plastic; many fine roots; many fine tubular pores; mildly alkaline; clear wavy boundary.

B2t—11 to 17 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky; many fine roots; many fine tubular pores; calcareous in the lower part; mildly alkaline; clear wavy boundary.

B3ca—17 to 22 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; weak coarse subangular blocky structure; hard, friable, slightly plastic; common fine roots; many fine tubular pores; few gravel- and cobble-sized petrocalcic fragments; strongly calcareous; moderately alkaline; clear wavy boundary.

Cca—22 to 60 inches; pink (7.5YR 8/4) very gravelly loam, pink (7.5YR 7/4) moist; massive; hard, friable; about 40 percent petrocalcic gravel and cobble fragments; strongly calcareous; moderately alkaline.

Thickness of the solum and depth to calcic gravel layers range from 16 to 35 inches. The solum is less than 10 percent rock fragments. The A and B2t horizons generally are leached, but some pedons downslope from calcareous soils are calcareous throughout the solum. The A horizon has hue of 7.5YR or 10YR, value of 4 or 5 when moist, and chroma of 3 or 4. The B1 horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 or 5. It is loam or clay loam. The B2t horizon has hue of 7.5YR or 10YR and value of 5 or 6 when dry. It is sandy clay loam or clay loam. The Cca horizon has hue of 7.5YR or 10YR, value of 6 to 8, and chroma of 2 to 4. It is 25 to 45 percent caliche fragments. It is more than 15 percent calcium carbonate. The Cca horizon is gravelly loam or very gravelly loam. The soil material between the caliche fragments in this horizon is slightly cemented to strongly cemented.

Teco series

The soils in the Teco series are classified as Aridic Haplustalfs, fine, mixed, mesic. These deep, well drained soils are on uplands. The soils formed in alluvium derived from sandstone and shale. Slope is 0 to 15 percent. Mean annual precipitation is about 16 inches, and mean annual air temperature is about 52 degrees F.

Typical pedon of Teco loam, moderately sloping; about 6 miles south of Bernal, in the NW1/4 of sec. 8, T. 12 N., R. 16 E.:

A11—0 to 2 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak fine platy structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine interstitial pores; neutral; clear smooth boundary.

A12—2 to 6 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate medium granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and fine roots; many fine interstitial pores; neutral; clear smooth boundary.

B21t—6 to 22 inches; yellowish red (5YR 4/6) clay loam, dark reddish brown (5YR 3/4) moist; strong fine subangular blocky structure; hard, firm, sticky and

plastic; common very fine and fine roots; many very fine tubular pores; common moderately thick clay films on peds; mildly alkaline; clear smooth boundary.

B3ca—22 to 28 inches; yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6) moist; weak subangular blocky structure; slightly hard, firm, sticky and plastic; few very fine and fine roots; common fine tubular pores; calcareous; moderately alkaline; gradual wavy boundary.

C1ca—28 to 36 inches; pink (5YR 7/4) clay loam, light reddish brown (5YR 6/4) moist; massive; slightly hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; common fine interstitial pores; calcareous; moderately alkaline; gradual wavy boundary.

C2—36 to 60 inches; light red (2.5YR 6/8) gravelly fine sandy loam, red (2.5YR 5/8) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; calcareous; moderately alkaline.

The thickness of the solum and the depth to the calcic horizon range from 20 to 40 inches. The A horizon has hue of 5YR to 10YR, value of 5 to 7 when dry and 3 or 4 when moist, and chroma of 3 or 4. The B horizon has hue of 2.5YR or 5YR, value of 4 to 7 when dry, and chroma of 4 to 6. It is clay loam, silty clay loam, or clay and is less than 10 percent coarse fragments. The C horizon has hue of 2.5YR or 5YR, value of 6 or 7 when dry, and chroma of 4 to 8. It is fine sandy loam or clay loam and is 5 to 35 percent gravel.

Tinaja series

The soils in the Tinaja series are classified as Aridic Ustochrepts, loamy-skeletal, mixed, mesic. These deep, well drained soils are on old terraces. The soils formed in alluvial deposits. Slope is 3 to 25 percent. Mean annual precipitation is about 14 to 16 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of Tinaja gravelly loam, hilly; about 20 miles southwest of Las Vegas; about one-half mile south of Ribera in the approximate center of sec. 10, T. 13 N., R. 14 E.:

A1—0 to 7 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 4/4) moist; moderate coarse granular structure; soft, friable; many fine roots; about 20 percent gravel; calcareous; mildly alkaline; clear smooth boundary.

B2ca—7 to 14 inches; light brown (7.5YR 6/4) gravelly loam, brown (7.5YR 4/4) moist; moderate to medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many fine and very fine roots; many fine tubular pores; 25 percent gravel and 10 percent cobbles; strongly calcareous; mildly alkaline; clear smooth boundary.

C1ca—14 to 42 inches; light brown (7.5YR 6/4) very gravelly sandy loam, brown (7/5YR 5/4) moist; massive; slightly hard, loose; strongly calcareous, weakly cemented layer on the surface of this horizon; about 75 percent gravel; mildly alkaline; clear wavy boundary.

C2—42 to 60 inches; brown (7.5YR 5/4) very gravelly loamy coarse sand, brown (7.5YR 4/4) moist; single grain; loose both dry and moist; 70 percent gravel and cobbles; strongly calcareous; moderately alkaline.

The solum is 14 to 29 inches thick. Rock fragments, mainly gravel and cobbles, are of mixed origin. The A horizon is 15 to 35 percent rock fragments. The B2ca and C1ca horizons are 35 to 75 percent rock fragments.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. The B2ca horizon has hue of 7.5YR or 10YR, value of 6 or 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. It is gravelly sandy clay loam, gravelly clay loam, or gravelly loam. The C1ca horizon has hue of 7.5YR or 10YR, value of 6 to 8 when dry and 4 to 6 when moist, and chroma of 2 to 4. It is sandy loam, sandy clay loam, or loam and is 35 to 75 percent coarse fragments. The IIC horizon, where present, has hue of 7.5YR, 10YR, or 2.5YR, value of 5 to 8 when dry and 4 to 7 when moist, and chroma of 3 to 8. It is sand, loamy sand, or sandy loam and is 65 to 85 percent coarse fragments.

Tricon series

The soils in the Tricon series are classified as Petrocalcic Paleustolls, fine, mixed, mesic. These moderately deep, well drained soils are on nearly level to gently undulating upland plains. The soils formed in mixed alluvial and eolian material and are underlain by petrocalcic layers. Slope is 0 to 5 percent. Mean annual precipitation is about 15 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Tricon silt loam in an area of Crews-Tricon association, undulating; about 21 miles east of Las Vegas, in the NW1/4 of sec. 8, T. 16 N., R. 20 E. (projected):

A1—0 to 7 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky; many very fine and common fine roots; neutral; clear smooth boundary.

B21t—7 to 13 inches; dark brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; weak fine prismatic structure that parts to fine subangular blocky; hard, firm, sticky and plastic; many very fine roots; few

very fine and fine tubular pores; few thin clay films on peds; mildly alkaline; clear smooth boundary.

B22t—13 to 23 inches, brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; weak fine prismatic structure that parts to fine subangular blocky; very hard, firm, slightly sticky; many very fine roots; very few fine and very fine pores; thin patchy clay films on peds; few fine rounded soft lime masses; few small caliche fragments; calcareous; moderately alkaline; gradual smooth boundary.

B3ca—23 to 33 inches, light brown (7.5YR 6/4) clay loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; very hard, firm, slightly sticky; few very fine and fine pores; common medium irregular lime filaments or threads; calcareous; moderately alkaline; abrupt wavy boundary.

Ccam—33 inches, pinkish white (7.5YR 8/2) caliche that is continuous across pedon; 25 percent is indurated and has laminations on the surface; remainder can be chipped with a spade.

The solum is 21 to 34 inches thick. Indurated caliche is at a depth of 20 to 40 inches. The profile is noncalcareous in the upper 8 to 20 inches.

The A horizon has hue of 10YR to 7.5YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 to 4. It is heavy clay loam or light clay.

Tucumcari series

The soils in the Tucumcari series are classified as Ustollic Haplargids, fine, mixed, thermic. These deep, well drained soils are on fans and valley sides. The soils formed in fine textured material derived from sandstone and shale. Slope is 0 to 3 percent. The mean annual precipitation is about 14 inches, and the mean annual air temperature is about 59 degrees F.

Typical pedon of a Tucumcari loam in an area of Montoya-Tucumcari association, gently sloping; about 4 miles east of Conchas State Park, in the SE1/4 of sec. 18, T. 13 N., R. 27 E. (projected):

A1—0 to 4 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak coarse platy structure; soft, friable, slightly plastic; many fine roots; calcareous; moderately alkaline; abrupt smooth boundary.

B21t—4 to 16 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; moderate to medium subangular blocky structure; hard, friable, slightly sticky and plastic; common fine roots; few fine tubular pores; few thin clay films on peds; calcareous; moderately alkaline; clear smooth boundary.

B22tca—16 to 18 inches; reddish brown (5YR 5/4) silty clay, reddish brown (5YR 4/4) moist; weak coarse prismatic structure that parts to medium subangular blocky; very hard, firm, sticky and plastic; few fine roots; common fine tubular pores; few thin clay films on peds and in pores; few irregular soft lime masses; calcareous; moderately alkaline; clear smooth boundary.

B3ca—18 to 51 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; weak coarse subangular blocky structure; very hard, firm, plastic; very few fine roots; common fine tubular pores; few fine irregular soft lime masses; calcareous; moderately alkaline; gradual smooth boundary.

C—51 to 60 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; massive; very hard, firm, plastic; few fine irregular soft lime masses; calcareous; moderately alkaline.

The solum is 30 to 55 inches thick. The A1 horizon has hue of 5YR or 7.5YR and value of 4 or 5 when dry or moist. The Bt horizon has hue of 2.5YR or 5YR and value of 4 or 5 when dry or moist. It is heavy silty clay loam, clay loam, silty clay, or clay. The C horizon has hue of 2.5YR or 5YR. It is silty clay loam, clay loam, silty clay, or clay.

Tuloso series

The soils in the Tuloso series are classified as Lithic Ustochrepts, loamy-skeletal, mixed, mesic. These shallow, well drained soils are on uplands, ridges, and small benches on canyon walls. The soils formed in material derived from sandstone. Slope is 1 to 35 percent. Mean annual precipitation is about 17 inches, and mean annual air temperature is about 52 degrees F.

Typical pedon of a Tuloso stony sandy loam in an area of Tuloso-Rock outcrop-Sombordoro complex, moderately sloping; about 40 miles northeast of Las Vegas, in the SW1/4 of sec. 27, T. 17 N., R. 22 E.:

A1—0 to 3 inches; light brown (7.5YR 6/4) stony sandy loam, brown (7.5YR 4/4) moist; weak thin platy structure; loose, very friable; many fine and very fine roots; few very fine tubular pores; 15 percent gravel and stones; neutral; clear smooth boundary.

B2—3 to 11 inches; yellowish red (5YR 5/6) very stony loam, reddish brown (5YR 4/4) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly plastic; common very fine and many fine roots, common medium and coarse roots; few fine tubular pores; 60 percent gravel, cobbles, and stones; neutral; abrupt wavy boundary.

R—11 inches; hard sandstone.

The thickness of the solum and the depth to bedrock range from 10 to 20 inches. Sandstone rock fragments

average more than 35 percent of the profile. The A horizon has hue of 7.5YR or 10YR, value of 4 to 6 when dry and 3 or 4 when moist, and chroma of 3 or 4. The B horizon has hue of 7.5YR or 5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 4 to 6. It is stony fine sandy loam, stony loam, very stony fine sandy loam, or very stony loam. Some pedons have a thin accumulation of clay on the surface of the sandstone bedrock.

Vermejo series

The soils in the Vermejo series are classified as Ustic Torriorthents, fine, mixed (calcareous), mesic. These deep, moderately well drained soils are on fans and broad, nearly level valley floors and lakebeds. The soils formed in fine textured alluvium derived from shale. Slope is 0 to 3 percent. Mean annual precipitation is about 14 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of Vermejo silty clay loam, 0 to 3 percent slopes; about 15 miles north of Las Vegas, in the NW1/4 of sec. 24, T. 17 N., R. 17 E. (projected):

A1—0 to 2 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate fine granular structure; hard, firm, sticky and very plastic; many fine and very fine roots; few fine interstitial pores; calcareous; moderately alkaline; abrupt smooth boundary.

AC—2 to 10 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure that parts to weak medium subangular blocky; very hard, very firm, sticky and very plastic; many fine roots; few fine interstitial pores; calcareous; moderately alkaline; abrupt smooth boundary.

C1—10 to 24 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure that parts to medium subangular blocky; very hard, very firm, sticky and very plastic; common fine roots; few fine tubular pores; few pressure faces; few fine mycellia and crystals of salt; calcareous; moderately alkaline; clear wavy boundary.

C2—24 to 60 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, sticky and very plastic; few fine roots; few fine mycellia and crystals of salt; strongly calcareous; moderately alkaline.

Depth to visible salt crystals is 0 to 24 inches. The A horizon has hue of 10YR or 2.5Y, value of 4 or 5 when dry, 3 or 4 when moist, and chroma of 2 or 3. The C horizon has hue of 10YR or 2.5Y, value of 4 to 5 when dry, and chroma of 2 or 3. It is silty clay or clay. Some pedons have few to common, large and medium, soft lime masses.

Vibo series

The soils in the Vibo series are classified as Typic Haplustalfs, fine-loamy, mixed, mesic. These deep, well drained soils are on uplands, fans, and valley sides. The soils formed in eolian sediment and local alluvium. Slope is 1 to 5 percent. Mean annual precipitation is about 18 inches, and mean annual air temperature is about 50 degrees F.

Typical pedon of a Vibo fine sandy loam in an area of Vibo-Ribera association, undulating; about 30 miles southwest of Las Vegas, in the southeast corner of sec. 21 T. 12 N., R. 14 E.:

A1—0 to 8 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak very fine granular structure; soft, friable; many fine and very fine roots; many very fine interstitial pores; neutral; clear smooth boundary.

B21t—8 to 13 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate to medium subangular blocky structure; hard, friable, slightly plastic; many fine and common medium roots; many fine and few medium tubular pores; few thin clay films on peds and in pores; mildly alkaline; clear smooth boundary.

B22t—13 to 24 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate coarse prismatic structure that easily parts to medium subangular blocky; very hard, firm, slightly plastic; common fine and medium and few coarse roots; common fine and medium tubular pores; few thin clay films on peds and in pores; mildly alkaline; clear wavy boundary.

C1—24 to 34 inches; light reddish brown (5YR 6/4) sandy loam, reddish brown (5YR 5/4) moist; massive; very hard, friable; common fine and few medium and coarse roots; few very fine tubular pores; carbonates segregated into few fine filaments; calcareous; mildly alkaline; clear wavy boundary.

C2ca—34 to 60 inches; pink (5YR 7/4) loam, light reddish brown (5YR 6/4) moist; massive; very hard, firm; very few fine roots; few very fine tubular pores; carbonates segregated into common fine filaments; strongly calcareous; moderately alkaline.

Some pedons are calcareous in the lower part of the solum. The A horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4. It is fine sandy loam or sandy loam. The B2t horizon has hue of 5YR or 7.5YR and value of 4 to 6 when dry or moist. It is loam, sandy clay loam, clay loam, or silty clay loam and is 18 to 30 percent clay. The C1 horizon has hue of 5YR or 7.5YR and value of 5 or 6 when dry or moist. It is loam or sandy loam. The Cca horizon has hue of 5YR or 7.5YR and value of 6 or 7 when moist or dry. It is less than 15

percent calcium carbonate equivalent. It is sandy loam, loam, or fine sandy loam.

Walkon series

The soils in the Walkon series are classified as Ustollic Haplargids, fine-loamy, mixed, thermic. These moderately deep, well drained soils are on uplands. The soils formed in sediment eroded from sandstone and shale. Slope is 1 to 7 percent. Mean annual precipitation is about 14 inches, and mean annual air temperature is about 60 degrees F.

Typical pedon of a Walkon fine sandy loam in an area of Newkirk-Walkon-Conchas association, undulating; about 1.5 miles east of the Trementina School, in the NW1/4 of sec. 11, T. 14 N., R. 23 E.:

A1—0 to 4 inches; reddish brown (5YR 5/4) fine sandy loam, dark reddish brown (5YR 3/4) moist; moderate fine granular structure; soft, very friable; many fine and very fine roots; many fine interstitial pores; neutral; abrupt smooth boundary.

B21t—4 to 10 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and plastic; many fine roots; common fine tubular pores; common thin clay films on peds and in pores; neutral; abrupt wavy boundary.

B22t—10 to 24 inches; reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; moderate coarse prismatic structure that parts to medium subangular blocky; very hard, firm, slightly sticky and plastic; few fine roots; many very fine and common fine tubular pores; many thin clay films on peds and in pores; mildly alkaline; abrupt wavy boundary.

Cca—24 to 31 inches; light reddish brown (5YR 6/4) silt loam, reddish brown (5YR 5/4) moist; massive; very hard, friable, slightly sticky and slightly plastic; few fine roots; many fine tubular pores; carbonates disseminated; strongly calcareous; moderately alkaline; abrupt smooth boundary.

R—31 inches; red sandstone.

Bedrock is at a depth of 20 to 40 inches. The profile is 0 to 10 percent rock fragments.

The A horizon has hue of 5YR or 7.5YR, and it has value of 4 to 6 when dry and 3 or 4 when moist. The B horizon has hue of 2.5YR or 5YR, and it has value of 4 to 6 when dry and 3 or 4 when moist. It is clay loam, silty clay loam, or sandy clay loam. The C horizon where present, has hue of 2.5YR, 5YR, or 7.5YR, and it has value of 5 to 7 when dry and 3 to 5 when moist.

Factors of soil formation

Soil is the collection of natural bodies on the surface of landscapes that is capable of supporting plants when air, water, and light are present in the kind and amount needed to promote plant growth. At any point on the landscape the soil has characteristics that are the result of the five factors of soil formation: (1) parent material modified by (2) climate and (3) plant and animal life as they are affected by (4) topography and (5) time. These five factors are so closely interrelated that generalizations regarding the effect of any one are difficult to make. In the San Miguel County Area, all of these factors vary greatly.

This section discusses the major factors of soil formation as they are interrelated in the San Miguel County Area (*6*). Each factor is discussed separately so that some of the variability in soils and landscapes can be explained.

Parent material

Parent material of most of the soils in the San Miguel County Area is material that formed by weathering of rock. Rock becomes soil through the action of the other four factors of soil formation on it. The various kinds of rock become soil at different rates, and at any time the soil may have different characteristics. The kinds of rock, or parent material, in the San Miguel County Area can be related to geologic periods (*3*). The oldest rock in the area belongs to the Pennsylvanian Period. The rock of this period is around the edge of the Sangre de Cristo Mountains and is mostly gray limestone and brown shale. The principal soils derived from this rock are in the Dargol, Kiln, Rocio, and Stout series.

The southwestern part of the area is dominated by younger rock of the Permian Period. It consists mostly of sandstone and shale with some thin layers of gypsum and limestone. The soils derived from these rocks include those in the Andok, Ribera, Tapia, and Vibo series.

A large part of the erosional valleys of the Conchas and Canadian Rivers is exposed red sandstone and shale of the Triassic Period and of the younger Jurassic Period. Similar material was deposited during these two periods, and it is difficult to determine which is the parent material of most of the soils in the area. Soils derived from the rocks of these two periods include those of the Conchas, Latom, Newkirk, and Walkon series. Most of the deep soils in the eastern part of the area are deposits eroded from these formations. Among these soils are those of the Montoya, Quay, Redona, and Tucumcari series.

The soils on the high plateau in the central part of the survey area are underlain by sandstone, shale, and limestone of the Cretaceous Period. These rocks are younger than the Jurassic red beds of the Conchas and Canadian River Valleys. Red Dakota sandstone under-

lies most of the area. Examples of soils derived from this rock are those of the Bernal, Partri, and Carnero series. Near the foot of the Sangre de Cristo Mountains, near Las Vegas and in small isolated areas throughout the central part of the survey area, are areas of Graneros shale, another rock of the Cretaceous Period. Some of the soils derived from this material are those of the Colmor, Litle, Swastika, and Vermejo series.

In the northeast corner of the survey area is a remnant of the Ogallala Formation of the more recent Tertiary Period. This formation furnished the parent material for the Dean, Dioxice, and Dumas soils.

The present, or Quaternary Period, is represented throughout the area by soils that are the result of recent geologic activity. Along the county line in the north, near the Canadian River, is part of a basalt flow from which the Apache and Ayon soils formed. Soils such as those in the La Brier, Lacita, Manzano, and San Jose series formed in alluvial deposits during the Quaternary Period.

Climate

Climate has an effect on the formation of soils from the time the parent rock is first exposed. Freezing, thawing, wetting, and drying, and the intensity of these actions, largely determine the rate at which rock weathers. Climate also determines the kind and amount of plant and animal life that exists.

In the San Miguel County Area, three general climatic zones can be recognized (*8*). The part of the area below about 5,300 feet elevation has hot summers and mild winters. Most of the precipitation is received during the growing season. The soils are seldom wet except in the upper few inches and are not well leached; examples are the soils in the Conchas and Quay series. The soils may also have strong lime zones; examples are the soils in the Canez and Redona series.

The part of the area between elevations of 5,300 and 7,200 feet has warm summers and cold, dry winters. Precipitation falls mostly during the growing season. Temperatures are such that plants can make good use of the available moisture. This has resulted in relatively dense plant communities and in the formation of a subsoil that is high in content of clay. The soils in the Partri and Tricon series are examples of these soils in this area.

The mountainous areas above 7,200 feet elevation have cool summers and cold winters. Precipitation increases with altitude. The dominant vegetation in these areas is coniferous forest. The soils in these areas are well leached. The soils in the Dargol and Rocio series are examples.

Plants and animals

The kind and amount of plants and animals in the survey area are closely related to climate. Plants convert some of the products of weathered rock material to organic matter. Both plants and animals mix the surface and subsurface layers to some extent. Their residue promotes weathering of minerals and enhances the soil forming processes.

Topography

Topography is one of the more visible factors in soil formation. The degree and length of slope determine the rate of runoff and the hazard of erosion. The aspect, or direction of slope, often modifies the climate of an area of soil. North-facing slopes are cooler than south-facing slopes. Very steep north-facing slopes receive much less sunlight than do more gently sloping south-facing slopes. Landscapes that have varied topography have a greater variety of soils than do landscapes that have smooth topography.

Time

The processes of soil formation are slow. Soils that have been in place a long time show greater development of definite soil horizons than do other soils that were derived from the same parent material and were subject to the same soil-forming factors but that have been in place for only a short time.

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils 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 is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	3.5
Low	3.5-5.0
Moderate	5.0-7.5
High	7.5-10
Very high	10

Badland. Steep or very steep, commonly nonstony barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

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 coat, clay skin.

Coarse fragments. Mineral or rock particles as much as 3 inches (2 millimeters to 7.5 centimeters) (10 inches) in diameter.

Coarse textured (light textured) soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A map unit of two or more kinds of soil occurring in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the sur-

rounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

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.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock. Bedrock is too near the surface for the specified use.

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 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. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, 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. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

B horizon.—A mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (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) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

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 horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II 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.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

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.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. Inadequate strength for supporting loads.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

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.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant, essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit 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.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, differences in slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure 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 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

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called groundwater 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. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

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.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can

damage roads, dams, building foundations, and other structures. It can also damage plant roots.

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.

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.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

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 pericds of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil 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 plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or 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. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or 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, silt loam, 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."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil, as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams.

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.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in 1936-65 at Bell Ranch, San Miguel County, N. Mex.; elevation, 4,500 feet]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with--		Average	One year in 10 will have--		Average number of days with precipitation	
			Maximum temperature equal to or higher than--	Minimum temperature equal to or lower than--		Less than--	More than--	0.10 inch or more	0.25 inch or more
	°F	°F	°F	°F	In	In	In	In	In
January----	53	19	69	6	0.3	1 [1]	0.8	1	1 [2]
February---	58	23	72	10	0.3	1 [1]	0.8	1	1 [2]
March------	65	29	77	15	0.6	1 [1]	1.1	2	1
April------	74	39	86	28	1.0	0.1	1.9	2	1
May--------	82	49	93	38	1.8	0.5	3.4	4	2
June-------	91	59	100	49	1.6	0.3	3.1	3	2
July-------	93	63	100	57	2.8	1.0	5.3	6	4
August-----	91	63	99	57	2.6	0.9	3.9	5	3
September--	85	55	95	43	1.8	0.2	3.9	3	2
October----	76	42	86	31	1.0	1 [1]	2.9	2	1
November---	63	29	75	16	0.4	1 [1]	1.0	1	1
December---	56	21	70	9	0.5	1 [1]	1.1	1	1
Year---	74	41	102 [3]	-3 [4]	14.7	8.8	21.7	31	18

[1]Less than 0.05 inch.

[2]Less than one-half day.

[3]Average annual maximum.

[4]Average annual minimum.

TABLE 1A.--TEMPERATURE AND PRECIPITATION

[Recorded in 1949-68 at Las Vegas Airport, San Miguel County, N. Mex.; elevation, 6,857 feet]

Month	Temperature				Precipitation				
						One year in 10 will have--			
	Average daily maximum	Average daily minimum	Average monthly maximum	Average monthly minimum	Average	Less than--	More than--	Days with snow cover 1.0 in or more	Average depth of snow on days with snow cover
	°F	°F	°F	°F	In	In	In		In
January----	45	18	61	-3	0.3	1 [1]	0.5	10	2
February---	48	20	65	2	0.3	0.1	0.5	6	3
March------	53	24	70	5	0.4	1 [1]	0.7	3	4
April------	62	32	77	17	0.5	0.1	1.1	1	4
May--------	71	41	84	28	1.4	0.4	2.9	1 [2]	5
June-------	80	50	91	40	1.6	0.6	2.9	0	0
July-------	83	54	87	48	3.1	1.4	4.5	0	0
August-----	80	52	88	46	3.8	1.6	5.8	0	0
September--	75	46	85	36	1.3	1 [1]	2.5	0	0
October----	67	36	79	24	1.0	0.1	3.4	1 [2]	3
November---	55	25	70	7	0.4	1 [1]	0.7	3	3
December---	47	19	64	1	0.4	0.1	0.9	9	4
Year---	64	35	92 [3]	-9 [4]	14.5	10.5	19.3	32	3

[1]Less than 0.05 inch.

[2]Less than one-half day.

[3]Average annual maximum.

[4]Average annual minimum.

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in 1936-65 at Bell Ranch, San Miguel County, New Mex.; elevation, 4,500 feet]

Probability	Minimum temperature						
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower	36° F or lower	40° F or lower
Spring:							
1 year in 10 later than--	March 28	April 6	April 16	April 23	May 10	May 17	May 27
2 years in 10 later than--	March 22	April 1	April 11	April 19	May 5	May 11	May 22
5 years in 10 later than--	March 8	March 20	March 31	April 9	April 23	May 1	May 12
Fall:							
1 year in 10 earlier than--	November 6	October 30	October 26	October 20	October 8	September 30	September 25
2 years in 10 earlier than--	November 12	November 4	October 31	October 24	October 12	October 3	September 27
5 years in 10 earlier than--	November 23	November 13	November 8	October 31	October 20	October 12	October 5

TABLE 2A.--FREEZE DATES IN SPRING AND FALL

[Recorded in 1921-50 at Las Vegas Airport, San Miguel County, N. Mex.; elevation, 6,857 feet]

Probability	Minimum temperature						
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower	36° F or lower	40° F or lower
Spring:							
1 year in 10 later than--	April 17	April 26	May 2	May 13	May 21	June 2	June 16
2 years in 10 later than--	April 13	April 21	April 27	May 9	May 18	May 29	June 12
5 years in 10 later than--	March 31	April 9	April 18	April 29	May 10	May 21	June 5
Fall:							
1 year in 10 earlier than--	October 25	October 21	October 17	October 4	September 21	September 16	September 4
2 years in 10 earlier than--	October 31	October 25	October 21	October 8	September 26	September 21	September 6
5 years in 10 earlier than--	November 11	November 3	October 29	October 17	October 6	September 28	September 16

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AQ	Andok-Quintana complex, moderately sloping	1,715	0.1
AY	Apache-Ayon complex, rolling	3,405	0.1
BA	Badland	34,315	1.3
Be	Bernal loam, 3 to 5 percent slopes	2,072	0.1
BR	Bernal-Rock outcrop association, gently sloping	26,218	1.0
CA	Canez-Ima association, undulating	26,087	1.0
Cb	Carnero loam, 1 to 3 percent slopes	1,289	*
Cc	Carnero loam, 3 to 5 percent slopes	461	*
CD	Carnero-Partri association, undulating	94,734	3.5
Cf	Colmor loam, 1 to 3 percent slopes	1,576	0.1
Cg	Colmor silt loam, 3 to 5 percent slopes	1,646	0.1
CH	Colmor silt loam, undulating	16,439	0.6
CK	Conchas-Latom association, undulating	277,229	10.1
CT	Crews-Tricon association, undulating	79,524	2.9
DA	Dioxice-Dean association, undulating	1,106	*
DB	Dumas-La Brier association, undulating	2,003	0.1
GA	Gallegos very gravelly fine sandy loam, hilly	11,807	0.4
GB	Gullied land-Manzano complex, gently sloping	1,646	0.1
GC	Gullied land-Montoya complex, gently sloping	1,855	0.1
KA	Karde-Vermejo association, gently sloping	8,411	0.3
KR	Kiln-Rock outcrop complex, hilly	7,958	0.3
La	La Brier silty clay loam, 0 to 3 percent slopes	10,649	0.4
LB	Lacita-San Jose association, gently sloping	24,058	0.9
LC	La Lande-Redona association, undulating	223,871	8.2
LE	Laporte-Escabosa association, hilly	12,861	0.5
LF	Laporte-Rock outcrop complex, steep	43,806	1.6
LN	Latom-Newkirk-Rock outcrop association, rolling	199,168	7.3
Lo	Litle clay loam, 1 to 3 percent slopes	1,472	0.1
Lp	Litle clay loam, 3 to 5 percent slopes	775	*
MA	Manter loamy fine sand, undulating	1,202	*
Mb	Manzano fine sandy loam, 1 to 3 percent slopes	618	*
MC	Manzano loam, gently sloping	13,897	0.5
Md	Manzano clay loam, 1 to 3 percent slopes	2,612	0.1
ME	Mion-Penrose association, hilly	14,802	0.5
MF	Montoya-Tucumcari association, gently sloping	51,835	1.9
MG	Moreno-Brycan association, sloping	15,046	0.6
NW	Newkirk-Walkon-Conchas association, undulating	234,119	8.6
Pa	Partri loam, 1 to 3 percent slopes	2,612	0.1
Pb	Partri loam, 3 to 5 percent slopes	496	*
PC	Partri loam, undulating	76,973	2.8
PD	Partri-Tricon association, undulating	54,638	2.0
PM	Penrose-Litle-Mion association, undulating	28,116	1.0
QU	Quintana gravelly loam, moderately sloping	3,788	0.1
RE	Redona-Quay association, undulating	124,320	4.5
RF	Ribera-Sombordoro-Vibo association, moderately sloping	35,099	1.3
RG	Rocio-Dargol-Stout association, hilly	36,910	1.4
RH	Rock outcrop-Haploborolls complex, very steep	11,416	0.4
RT	Rock outcrop-Torriorthents complex, very steep	97,546	3.6
SR	Stout-Rocio-Dargol association, very steep	11,676	0.4
SW	Swastika silt loam, undulating	7,140	0.3
Sx	Swastika clay loam, 1 to 3 percent slopes	4,223	0.2
Sy	Swastika clay loam, 3 to 5 percent slopes	1,167	*
TD	Tapia-Dean association, undulating	46,445	1.7
TE	Teco loam, moderately sloping	5,712	0.2
TG	Tinaja gravelly loam, hilly	2,839	0.1
TR	Tuloso-Rock outcrop-Sombordoro association, steep	164,147	6.0
TS	Tuloso-Sombordoro-Rock outcrop complex, moderately sloping	195,868	7.2
UF	Ustifluvents, frequently flooded	3,161	0.1
UR	Ustorthents-Rock outcrop complex, very steep	142,457	5.2
Va	Vermejo silty clay loam, 0 to 3 percent slopes	22,883	0.8
VB	Vibo-Ribera association, undulating	150,721	5.5
VC	Vibo-Rock outcrop complex, undulating	38,817	1.4
	Lakes and rivers	12,443	0.3
	Total	2,733,900	100.0

* Less than 0.1 percent.

TABLE 4.--YIELDS PER ACRE OF IRRIGATED CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Alfalfa hay	Barley	Wheat	Pasture
	Ton	Bu	Bu	AUM*
CA**:				
Canez	4.5	---	---	8
Ima	4.5	---	---	8
Cb---------- Carnero	3.0	---	---	6
Cc---------- Carnero	2.5	---	---	5
CD**:				
Carnero	2.5	---	---	5
Partri	4	40	---	---
Cf---------- Colmor	5	55	45	10
Cg, CH---------- Colmor	4.5	45	40	9
DA**:				
Dioxice	5	---	---	10
Dean	---	---	---	---
DB**:				
Dumas	---	---	50	---
La Brier	---	---	---	---
KA**:				
Karde	---	---	---	---
Vermejo	3.5	40	40	7
Lo---------- Litle	3.5	40	---	7
MA---------- Manter	4.0	55	45	---
Mb***---------- Manzano	4	---	---	---
Md***---------- Manzano	4	---	---	---
MF**:				
Montoya	---	---	---	---
Tucumcari	5.5	---	50	10
Lacita	5	---	45	9

See footnote at end of table.

TABLE 4.--YIELDS PER ACRE OF IRRIGATED CROPS AND PASTURE--Continued

Soil name and map symbol	Alfalfa hay	Barley	Wheat	Pasture
	Ton	Bu	Bu	AUM*
MG**:				
Moreno	---	---	---	---
Brycan	3.5	---	---	9
Pa Partri	4	40	---	---
Pb, PC Partri	3.5	35	---	---
PD**:				
Partri	4	40	---	---
Tricon	---	---	---	---
RE**:				
Redona	6	---	50	11
Quay	5.5	---	45	9
SW Swastika	4.0	40	40	8
Sx Swastika	4.5	45	45	9
Sy Swastika	4.0	40	40	8
Va Vermejo	3.5	40	40	7

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.
** See description of the map unit for composition and behavior characteristics of the map unit.
*** Yields are for areas protected from flooding.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Only the soils that support rangeland vegetation suitable for grazing are listed]

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
AQ*:					
Andok	Gravelly Cp-3	Favorable	1,000	Blue grama	20
		Normal	600	Sideoats grama	15
		Unfavorable	350	Black grama	10
				Bottlebrush squirreltail	7
				Sand dropseed	5
				Wolftail	5
				New Mexico feathergrass	5
				Rough tridens	5
				Little bluestem	5
				Bigelow sagebrush	5
Quintana	Loamy-Cp-3	Favorable	1,100	Blue grama	25
		Normal	650	Western wheatgrass	15
		Unfavorable	350	Sideoats grama	10
				Pinyon ricegrass	10
				Sand dropseed	5
				Black grama	5
				Bottlebrush squirreltail	5
				Pinyon	5
				Oneseed juniper	5
AY*:					
Apache	Malpais Cp-1	Favorable	1,200	Sideoats grama	25
		Normal	800	Little bluestem	20
		Unfavorable	500	Western wheatgrass	20
				Blue grama	10
				Galleta	10
				Indiangrass	5
				Hairy grama	5
Ayon	Malpais Cp-1	Favorable	1,500	Western wheatgrass	20
		Normal	1,000	Bottlebrush squirreltail	10
		Unfavorable	700	Muttongrass	10
				Mountainmahogany	10
				Indian ricegrass	10
Be	Shallow Cp-1	Favorable	1,100	Sideoats grama	20
Bernal		Normal	700	Blue grama	20
		Unfavorable	400	Little bluestem	15
				Indian ricegrass	5
				Western wheatgrass	5
				Galleta	5
				Threeawn	5
				New Mexico feathergrass	5
BR*:					
Bernal	Shallow Cp-1	Favorable	1,100	Sideoats grama	20
		Normal	700	Blue grama	20
		Unfavorable	400	Little bluestem	15
				Indian ricegrass	5
				Western wheatgrass	5
				Galleta	5
				Threeawn	5
				New Mexico feathergrass	5
Rock outcrop.					

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
CA*:					
Canez	Sandy Loam, Cp-2	Favorable	1,700	Blue grama	30
		Normal	950	Little bluestem	15
		Unfavorable	500	Black grama	15
				Sideoats grama	10
				Yucca	5
				New Mexico feathergrass	5
Ima	Sandy Plains Cp-2	Favorable	1,300	Little bluestem	20
		Normal	900	Blue grama	10
		Unfavorable	500	Hairy grama	10
				Sand dropseed	10
				Mesa dropseed	10
				Spike dropseed	10
				Sand bluestem	10
				Sideoats grama	5
				New Mexico feathergrass	5
				Black grama	5
				Plains bristlegrass	5
Cb, Cc Carnero	Loamy Cp-1	Favorable	1,300	Blue grama	40
		Normal	900	Western wheatgrass	15
		Unfavorable	600	Buffalograss	10
				Galleta	10
				Vine-mesquite	5
				Sideoats grama	5
				Ring muhly	5
				Sand dropseed	5
				Threeawn	5
CD*:					
Carnero	Loamy Cp-1	Favorable	1,300	Blue grama	40
		Normal	900	Western wheatgrass	15
		Unfavorable	600	Buffalograss	10
				Galleta	10
				Vine-mesquite	5
				Sideoats grama	5
				Ring muhly	5
				Sand dropseed	5
				Threeawn	5
Partri	Loamy Cp-1	Favorable	1,500	Blue grama	30
		Normal	950	Western wheatgrass	20
		Unfavorable	450	Sideoats grama	10
				Galleta	10
				Winterfat	5
				Bottlebrush squirreltail	5
				Ring muhly	5
				Wolftail	5
Cf, Cg, CH Colmor	Loamy Cp-1	Favorable	1,400	Blue grama	35
		Normal	1,200	Western wheatgrass	10
		Unfavorable	800	Wolftail	10
				Sideoats grama	10
				Buffalograss	5
				Galleta	5
				Fringed sagewort	5
CK*:					
Conchas	Loamy Cp-2	Favorable	1,200	Blue grama	35
		Normal	750	Black grama	15
		Unfavorable	300	Galleta	10
				Sideoats grama	10
				Sand dropseed	5
				Silver bluestem	5
				Threeawn	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
CK*:					
Latom	Shallow Sandstone Cp-2	Favorable	1,000	Sideoats grama	30
		Normal	750	Blue grama	10
		Unfavorable	500	Black grama	10
				Little bluestem	5
				Buffalograss	5
				Sand bluestem	5
				Arizona cottontop	5
				Hairy grama	5
				Silver bluestem	5
CT*:					
Crews	Shallow Cp-1	Favorable	1,000	Sideoats grama	25
		Normal	650	Blue grama	15
		Unfavorable	300	Little bluestem	15
				Hairy grama	10
				New Mexico feathergrass	5
				Silver bluestem	5
				Wolftail	5
Tricon	Loamy Cp-1	Favorable	1,300	Blue grama	40
		Normal	900	Western wheatgrass	15
		Unfavorable	600	Sideoats grama	10
				Buffalograss	10
				Galleta	10
				Vine-mesquite	5
DA*:					
Dioxice	Loamy Hp-1	Favorable	1,300	Blue grama	40
		Normal	900	Western wheatgrass	15
		Unfavorable	600	Sideoats grama	10
				Buffalograss	10
				Galleta	10
				Vine-mesquite	5
				Sand dropseed	5
				Threeawn	5
Dean	Gravelly Hp-1	Favorable	1,000	Black grama	15
		Normal	600	Blue grama	15
		Unfavorable	300	Sideoats grama	10
				Needleandthread	10
				Hairy grama	10
				Little bluestem	5
				New Mexico feathergrass	5
				Winterfat	5
				Spike dropseed	5
				Galleta	5
DB*:					
Dumas	Loamy Hp-1	Favorable	1,800	Blue grama	35
		Normal	1,200	Buffalograss	20
		Unfavorable	900	Vine-mesquite	10
				Sideoats grama	5
				Silver bluestem	5
				Western wheatgrass	5
				Hairy grama	5
La Brier	Swale Hp-1	Favorable	3,000	Western wheatgrass	20
		Normal	2,500	Blue grama	20
		Unfavorable	1,500	Vine-mesquite	15
				Galleta	15
				Alkali sacaton	15
				Buffalograss	5
				Mat muhly	5
				Fourwing saltbush	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
GA---------- Gallegos	Gravelly Cp-2----------	Favorable	1,100	Black grama----------	20
		Normal	850	Blue grama----------	16
		Unfavorable	450	Galleta----------	16
				Sideoats grama----------	10
				Threeawn----------	6
				Little bluestem----------	6
				Rough tridens----------	5
KA*:					
Karde----------	Limy Cp-1----------	Favorable	---	Blue grama----------	30
		Normal	---	Western wheatgrass----------	15
		Unfavorable	---	Bottlebrush squirreltail------	10
				Winterfat----------	5
				Ring muhly----------	5
				Sand dropseed----------	5
				Sideoats grama----------	5
Vermejo----------	Clayey Cp-1----------	Favorable	1,500	Blue grama----------	30
		Normal	1,200	Western wheatgrass----------	20
		Unfavorable	600	Alkali sacaton----------	15
				Galleta----------	10
				Sideoats grama----------	10
				Fourwing saltbush----------	5
La---------- La Brier	Swale Cp-1----------	Favorable	3,000	Western wheatgrass----------	20
		Normal	2,500	Blue grama----------	20
		Unfavorable	1,500	Vine-mesquite----------	15
				Galleta----------	15
				Alkali sacaton----------	15
				Buffalograss----------	5
				Mat muhly----------	5
				Fourwing saltbush----------	5
LB*:					
Lacita----------	Bottomland Cp-2----------	Favorable	3,500	Giant sacaton----------	25
		Normal	2,100	Alkali sacaton----------	10
		Unfavorable	1,100	Vine-mesquite----------	10
				Sideoats grama----------	10
				Blue grama----------	10
				Sand dropseed----------	5
				Galleta----------	5
				Fourwing saltbush----------	5
				Western wheatgrass----------	5
San Jose----------	Bottomland Cp-2----------	Favorable	3,900	Giant sacaton----------	30
		Normal	2,300	Alkali sacaton----------	10
		Unfavorable	1,200	Vine-mesquite----------	10
				Sideoats grama----------	10
				Blue grama----------	10
				Sand dropseed----------	5
				Galleta----------	5
				Western wheatgrass----------	5
LC*:					
La Lande----------	Sandy Loam Cp-2----------	Favorable	1,600	Blue grama----------	20
		Normal	850	Little bluestem----------	20
		Unfavorable	400	Black grama----------	15
				Sideoats grama----------	10
				Sand dropseed----------	10
				Fringed sagewort----------	5
				Yucca----------	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
LC*:					
Redona	Loamy Cp-2	Favorable	1,500	Blue grama	40
		Normal	850	Yucca	10
		Unfavorable	400	Galleta	10
				Sideoats grama	5
				Sand dropseed	5
				Threeawn	5
				Black grama	5
				Vine-mesquite	5
LN*:					
Latom	Shallow Sandstone Cp-2	Favorable	1,000	Sideoats grama	30
		Normal	750	Blue grama	10
		Unfavorable	500	Black grama	10
				Little bluestem	5
				Buffalograss	5
				Sand bluestem	5
				Arizona cottontop	5
				Hairy grama	5
				Silver bluestem	5
Newkirk	Shallow Sandstone Cp-2	Favorable	1,000	Blue grama	15
		Normal	700	New Mexico feathergrass	15
		Unfavorable	400	Black grama	10
				Little bluestem	10
				Sideoats grama	10
				Silver bluestem	5
Rock outcrop.					
Lo, Lp	Clayey Cp-1	Favorable	1,200	Blue grama	20
Litle		Normal	700	Western wheatgrass	15
		Unfavorable	400	Sideoats grama	10
				Galleta	10
				Alkali sacaton	10
				Vine-mesquite	5
				Buffalograss	5
				Mat muhly	5
				Threeawn	5
				Fourwing saltbush	5
				Winterfat	5
MA	Sandy Plains Cp-1	Favorable	1,800	Indian ricegrass	15
Manter		Normal	1,400	Blue grama	15
		Unfavorable	950	Needlegrass	10
				Sand dropseed	10
				Bottlebrush squirreltail	7
				Western wheatgrass	7
				Little bluestem	5
				Sand sagebrush	5
Mb	Loamy Cp-1	Favorable	1,450	Blue grama	45
Manzano		Normal	800	Western wheatgrass	25
		Unfavorable	350	Galleta	10
				Buffalograss	5
				Mat muhly	5
MC	Swale Cp-1	Favorable	3,500	Western wheatgrass	20
Manzano		Normal	2,200	Blue grama	15
		Unfavorable	1,000	Alkali sacaton	15
				Vine-mesquite	12
				Galleta	10
				Buffalograss	5
				Sideoats grama	5
				Switchgrass	5
				Inland saltgrass	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
Md---------- Manzano	Loamy Cp-1----------	Favorable Normal Unfavorable	1,450 800 350	Blue grama---------- Western wheatgrass---------- Galleta---------- Buffalograss---------- Mat muhly----------	45 25 10 5 5
ME*: Mion----------	Shale Breaks Cp-1----------	Favorable Normal Unfavorable	1,200 900 600	Sideoats grama---------- Little bluestem---------- Blue grama---------- Needleandthread---------- New Mexico feathergrass---------- Wolftail---------- Red threeawn----------	20 20 20 15 10 5 5
Penrose----------	Shale Breaks Cp-1----------	Favorable Normal Unfavorable	1,000 700 400	Blue grama---------- Sideoats grama---------- Needlegrass---------- Juniper---------- Little bluestem---------- Indian ricegrass----------	30 15 10 10 5 5
Litle----------	Clayey Cp-1----------	Favorable Normal Unfavorable	1,200 700 400	Blue grama---------- Western wheatgrass---------- Sideoats grama---------- Galleta---------- Alkali sacaton---------- Vine-mesquite---------- Buffalograss---------- Mat muhly---------- Threeawn---------- Fourwing saltbush---------- Winterfat----------	20 15 10 10 10 5 5 5 5 5 5
MF*: Montoya----------	Bottomland Cp-2----------	Favorable Normal Unfavorable	3,000 1,200 600	Alkali sacaton---------- Tobosa---------- Blue grama---------- Vine-mesquite---------- Inland saltgrass---------- Western wheatgrass---------- Fourwing saltbush----------	40 15 10 10 5 5 5
Tucumcari---------	Clayey Cp-2----------	Favorable Normal Unfavorable	1,500 850 400	Blue grama---------- Alkali sacaton---------- Galleta---------- Sideoats grama---------- Buffalograss----------	35 15 15 10 5
Lacita----------	Bottomland Cp-2----------	Favorable Normal Unfavorable	3,500 2,100 1,100	Giant sacaton---------- Alkali sacaton---------- Vine-mesquite---------- Sideoats grama---------- Blue grama---------- Galleta---------- Fourwing saltbush---------- Sand dropseed----------	25 10 10 10 10 10 5 5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
MG*:					
Moreno	Mountain Loam Rm-1	Favorable	1,100	Little bluestem	15
		Normal	700	Western wheatgrass	15
		Unfavorable	400	Mountain muhly	10
				Blue grama	10
				Sideoats grama	10
				Arizona fescue	5
				Big bluestem	5
				True mountainmahogany	5
				Muttongrass	5
				Gambel oak	5
				Pine dropseed	5
Brycan	Mountain Valley Rm-1	Favorable	1,500	Little bluestem	15
		Normal	1,000	Blue grama	15
		Unfavorable	700	Prairie junegrass	10
				Mountain brome	10
				Mountain muhly	10
				Sideoats grama	10
				Western wheatgrass	10
				Muttongrass	5
				Pine dropseed	5
				Pinyon	5
NW*:					
Newkirk	Shallow Sandstone Cp-2	Favorable	1,000	Blue grama	15
		Normal	700	New Mexico feathergrass	15
		Unfavorable	400	Black grama	10
				Little bluestem	10
				Sideoats grama	10
				Silver bluestem	5
				Hairy grama	5
				Rough tridens	5
				Galleta	5
Walkon	Loamy Cp-2	Favorable	1,200	Blue grama	20
		Normal	650	Black grama	15
		Unfavorable	350	Galleta	10
				Sand dropseed	10
				Sideoats grama	10
				Juniper	5
Conchas	Loamy Cp-2	Favorable	1,200	Blue grama	35
		Normal	750	Black grama	15
		Unfavorable	300	Galleta	10
				Sideoats grama	10
				Sand dropseed	5
Pa, Pb, PC	Loamy Cp-1	Favorable	1,500	Blue grama	30
Partri		Normal	950	Western wheatgrass	20
		Unfavorable	450	Sideoats grama	10
				Galleta	10
				Winterfat	5
				Bottlebrush squirreltail	5
				Ring muhly	5
				Wolftail	5
PD*:					
Partri	Loamy Cp-1	Favorable	1,500	Blue grama	30
		Normal	950	Western wheatgrass	20
		Unfavorable	450	Sideoats grama	10
				Galleta	10
				Winterfat	5
				Bottlebrush squirreltail	5
				Ring muhly	5
				Wolftail	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
PD*:					
Tricon	Loamy Cp-1	Favorable	1,300	Blue grama	40
		Normal	900	Western wheatgrass	15
				Buffalograss	10
				Vine-mesquite	5
PM*:					
Penrose	Shallow Cp-1	Favorable	1,000	Blue grama	30
		Normal	700	Sideoats grama	15
		Unfavorable	400	Needlegrass	10
				Juniper	10
				Little bluestem	5
				Indian ricegrass	5
PM*:					
Litle	Clayey Cp-1	Favorable	1,200	Blue grama	20
		Normal	700	Western wheatgrass	15
		Unfavorable	400	Sideoats grama	10
				Galleta	10
				Alkali sacaton	10
				Vine-mesquite	5
				Buffalograss	5
				Mat muhly	5
				Threeawn	5
				Fourwing saltbush	5
				Winterfat	5
Mion	Shallow Cp-1	Favorable	1,200	Sideoats grama	20
		Normal	900	Little bluestem	20
		Unfavorable	600	Blue grama	20
				Needleandthread	15
				New Mexico feathergrass	10
				Wolftail	5
				Red threeawn	5
QU	Loamy-Cp-3	Favorable	1,100	Blue grama	25
Quintana		Normal	650	Western wheatgrass	15
		Unfavorable	350	Sideoats grama	10
				Pinyon ricegrass	10
				Sand dropseed	5
				Black grama	5
				Bottlebrush squirreltail	5
				Pinyon	5
				Oneseed juniper	5
RE*:					
Redona	Loamy Cp-2	Favorable	1,500	Blue grama	40
		Normal	850	Galleta	10
		Unfavorable	400	Black grama	10
				Sideoats grama	5
				Sand dropseed	5
				Threeawn	5
				Vine-mesquite	5
Quay	Loamy Cp-2	Favorable	1,200	Blue grama	40
		Normal	750	Galleta	10
		Unfavorable	350	Black grama	10
				Western wheatgrass	5
				Sideoats grama	5
				Sand dropseed	5
				Threeawn	5
				Broom snakeweed	5
SW, Sx, Sy	Loamy Cp-1	Favorable	1,500	Blue grama	40
Swastika		Normal	1,200	Western wheatgrass	15
		Unfavorable	600	Wolftail	10
				Buffalograss	5
				Galleta	5
				Sideoats grama	5
				Fringed sagewort	5

See footnote at end of table.

TABLE 5.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
TD*:					
Tapia	Shallow Cp-3	Favorable	1,000	Blue grama	25
		Normal	600	Western wheatgrass	20
		Unfavorable	300	Galleta	15
				Pinyon ricegrass	10
				Sideoats grama	10
				Sand dropseed	5
Dean.					
TE	Loamy Cp-3	Favorable	1,400	Blue grama	25
Teco		Normal	850	Sideoats grama	12
		Unfavorable	400	Galleta	8
				Pinyon ricegrass	8
				Western wheatgrass	8
				Threeawn	5
				Little bluestem	5
				Needlegrass	5
TG	Gravelly Cp-3	Favorable	1,100	Sideoats grama	25
Tinaja		Normal	900	Blue grama	20
		Unfavorable	200	Little bluestem	20
				New Mexico feathergrass	10
				Big bluestem	5
				Needleandthread	5
				Wolftail	5
				Red threeawn	5
Va	Clayey Cp-1	Favorable	1,500	Blue grama	30
Vermejo		Normal	1,200	Western wheatgrass	20
		Unfavorable	600	Alkali sacaton	15
				Galleta	10
				Sideoats grama	10
				Fourwing saltbush	5
VB*:					
Vibo.**					
Ribera	Loamy Cp-3	Favorable	1,400	Blue grama	20
		Normal	950	Western wheatgrass	10
		Unfavorable	650	Pinyon ricegrass	10
				Little bluestem	10
				Sideoats grama	10
				Green needlegrass	5
				Bottlebrush squirreltail	5
				Galleta	5
				Sand dropseed	5
VC*:					
Vibo.**					
Rock outcrop.					
Ribera	Loamy Cp-3	Favorable	1,400	Blue grama	20
		Normal	950	Western wheatgrass	10
		Unfavorable	650	Pinyon ricegrass	10
				Little bluestem	10
				Sideoats grama	10
				Green needlegrass	5
				Bottlebrush squirreltail	5
				Galleta	5
				Sand dropseed	5

* See description of the map unit for composition and behavior characteristics of the map unit.
**For the characteristic vegetation on Vibo soils, see table 7.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordination symbol	Management concerns					Potential productivity	
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index
KR*----- Kiln	6d	Severe	Severe	Severe	Moderate	Severe	Ponderosa pine------	53
LE*: Laporte---------- Escabosa----------	2d 3o	Slight Slight	Moderate Slight	Severe Slight	Moderate Slight	Slight Slight	Pinyon-Juniper------ Pinyon-Juniper------	86 69
LF*: Laporte---------- Rock outcrop. Escabosa----------	2d 3o	Slight Slight	Moderate Slight	Severe Slight	Moderate Slight	Slight Slight	Pinyon-Juniper------ Pinyon-Juniper------	86 69
RF*: Ribera. Sombordoro--------	3x	Moderate	Moderate	Severe	Slight	Moderate	Juniper-Pinyon------	64
RG*: Rocio---------- Dargol---------- Stout----------	5o 6o 6d	Moderate Moderate Moderate	Moderate Moderate Slight	Moderate Moderate Severe	Slight Moderate Moderate	Moderate Moderate Moderate	Ponderosa pine------ Ponderosa pine------ Douglas-fir--------- Ponderosa pine------	57 49 --- 51
SR*: Stout---------- Rocio---------- Dargol----------	6d 5r 6o	Moderate Severe Moderate	Slight Severe Moderate	Severe Moderate Moderate	Moderate Slight Moderate	Moderate Moderate Moderate	Ponderosa pine------ Ponderosa pine------ Ponderosa pine------ Douglas-fir---------	51 57 49 ---
TD*: Tapia.								
TR*: Tuloso---------- Rock outcrop.	2d	Moderate	Moderate	Moderate	Slight	Moderate	Pinyon-Juniper------	64
TR*: Sombordoro--------	3x	Moderate	Moderate	Severe	Slight	Moderate	Juniper-Pinyon------	64
TS*: Tuloso---------- Sombordoro-------- Rock outcrop.	2d 3x	Moderate Moderate	Moderate Moderate	Moderate Severe	Slight Slight	Moderate Moderate	Pinyon-Juniper------ Juniper-Pinyon------	64 64

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION

[Only the soils suitable for production of commercial trees are listed]

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
KR*----------	Favorable	800	Arizona fescue----------	15
Kiln	Normal	600	Mountain muhly----------	15
	Unfavorable	400	Blue grama----------	10
			Muttongrass----------	10
			Sideoats grama----------	10
			Little bluestem----------	10
			Gambel oak----------	5
			Carex----------	5
LE*:				
Laporte----------	Favorable	900	Blue grama----------	20
	Normal	500	Little bluestem----------	15
	Unfavorable	350	Sideoats grama----------	15
			Needlegrass----------	10
			True mountainmahogany----------	5
			Wheatgrass----------	5
Escabosa----------	Favorable	1,200	Blue grama----------	20
	Normal	850	Pinyon ricegrass----------	15
	Unfavorable	400	Sideoats grama----------	10
			Little bluestem----------	10
			Western wheatgrass----------	5
			Carex----------	5
			Hairy grama----------	5
			Threeawn----------	5
			Wolftail----------	5
LF*:				
Laporte----------	Favorable	900	Blue grama----------	20
	Normal	500	Little bluestem----------	15
	Unfavorable	350	Sideoats grama----------	15
			Needlegrass----------	10
			True mountainmahogany----------	5
			Wheatgrass----------	5
Rock outcrop.				
Escabosa----------	Favorable	1,200	Blue grama----------	20
	Normal	850	Pinyon ricegrass----------	15
	Unfavorable	400	Sideoats grama----------	10
			Little bluestem----------	10
			Western wheatgrass----------	5
			Carex----------	5
			Hairy grama----------	5
			Threeawn----------	5
			Wolftail----------	5
RF*:				
Ribera.				
Sombordoro--------	Favorable	750	Blue grama----------	18
	Normal	450	Pinyon ricegrass----------	10
	Unfavorable	200	Sideoats grama----------	10
			Green needlegrass----------	8
			Plains lovegrass----------	8
			Oneseed juniper----------	6
			Little bluestem----------	5
			Pinyon----------	5
			Wavyleaf oak----------	5
			Wolftail----------	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
RF*:				
Vibo	Favorable	475	Oneseed juniper	25
	Normal	250	Pinyon	15
	Unfavorable	125	Blue grama	15
			Indian ricegrass	10
			Sand dropseed	5
			Needleandthread	5
			Threeawn	5
			Plains pricklypear	5
			Galleta	5
RG*:				
Rocio	Favorable	1,000	Bluegrass	25
	Normal	800	Arizona fescue	20
	Unfavorable	500	Pine dropseed	15
			Mountain muhly	10
			Mountain brome	5
			Western wheatgrass	5
			Gambel oak	5
			True mountainmahogany	5
Dargol	Favorable	900	Arizona fescue	20
	Normal	750	Muttongrass	20
	Unfavorable	400	Mountain muhly	15
			Gambel oak	10
			Pinyon	6
			Pine dropseed	5
			Prairie junegrass	5
			Sideoats grama	5
			Kinnikinnick	5
Stout	Favorable	900	Sideoats grama	15
	Normal	700	Arizona fescue	15
	Unfavorable	500	Mountain muhly	15
			Blue grama	15
			Muttongrass	10
			Little bluestem	10
			Pine dropseed	5
			Prairie junegrass	5
SR*:				
Stout	Favorable	900	Sideoats grama	15
	Normal	700	Arizona fescue	15
	Unfavorable	500	Mountain muhly	15
			Blue grama	15
			Muttongrass	10
			Little bluestem	10
			Pine dropseed	5
			Prairie junegrass	5
Rocio	Favorable	1,000	Bluegrass	25
	Normal	800	Arizona fescue	20
	Unfavorable	500	Pine dropseed	15
			Mountain muhly	10
			Mountain brome	5
			Western wheatgrass	5
			Gambel oak	5
			True mountainmahogany	5
Dargol	Favorable	900	Arizona fescue	20
	Normal	750	Muttongrass	20
	Unfavorable	400	Mountain muhly	15
			Gambel oak	10
			Pinyon	6
			Pine dropseed	5
			Prairie junegrass	5
			Sideoats grama	5
			Kinnikinnick	5

See footnote at end of table.

TABLE 7.--WOODLAND UNDERSTORY VEGETATION--Continued

Soil name and map symbol	Total production		Characteristic vegetation	Composition
	Kind of year	Dry weight		
		Lb/acre		Pct
'D*: Tapia.				
Dean	Favorable	300	Oneseed juniper	20
	Normal	200	Blue grama	20
	Unfavorable	100	Sideoats grama	15
			Pinyon	10
			Little bluestem	5
			Pinyon ricegrass	5
			Needleandthread	5
			Winterfat	5
			Hairy grama	5
			Spike dropseed	5
[R*, TS*:				
Tuloso	Favorable	700	Hairy grama	15
	Normal	600	Little bluestem	10
	Unfavorable	500	Sideoats grama	10
			Blue grama	8
			Gambel oak	8
			Pinyon	8
			Pinyon ricegrass	8
			Galleta	5
			Oneseed juniper	5
			Wolftail	5
Sombordoro	Favorable	750	Blue grama	18
	Normal	450	Pinyon ricegrass	10
	Unfavorable	200	Sideoats grama	10
			Green needlegrass	8
			Plains lovegrass	8
			Oneseed juniper	6
			Little bluestem	5
			Pinyon	5
			Wavyleaf oak	5
			Wolftail	5
Rock outcrop.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
AQ*:				
Andok	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.
Quintana	Slight	Slight	Moderate: slope.	Slight.
AY*:				
Apache	Moderate: small stones.	Moderate: small stones.	Severe: depth to rock.	Moderate: small stones.
Ayon	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
BA*.				
Badland				
Be	Slight	Slight	Severe: depth to rock.	Slight.
Bernal				
BR*:				
Bernal	Slight	Slight	Severe: depth to rock.	Slight.
Rock outcrop.				
CA*:				
Canez	Slight	Slight	Moderate: slope.	Slight.
Ima	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
Cb, Cc	Moderate: percs slowly.	Slight	Moderate: depth to rock, percs slowly, slope.	Slight.
Carnero				
CD*:				
Carnero	Moderate: percs slowly.	Slight	Moderate: depth to rock, percs slowly, slope.	Slight.
Partri	Moderate: percs slowly, too clayey.	Moderate: too clayey.	Moderate: slope, percs slowly, too clayey.	Moderate: too clayey.
Cf, Cg, CH	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
Colmor				
CK*:				
Conchas	Moderate: dusty, percs slowly.	Moderate: dusty.	Moderate: slope, depth to rock, percs slowly.	Moderate: dusty.
Latom	Slight	Slight	Severe: depth to rock.	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
CT*:				
Crews	Slight	Slight	Severe: cemented pan.	Slight.
Tricon	Slight	Slight	Moderate: slope.	Slight.
DA*:				
Dioxice	Slight	Slight	Moderate: slope.	Slight.
Dean	Slight	Slight	Moderate: slope.	Slight.
DB*:				
Dumas	Slight	Slight	Moderate: slope.	Slight.
La Brier	Severe: floods.	Moderate: percs slowly, dusty.	Moderate: percs slowly, dusty.	Moderate: dusty.
GA Gallegos	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope, small stones.
GB*:				
Gullied land.				
Manzano	Severe: floods.	Moderate: too clayey.	Moderate: slope, too clayey.	Moderate: too clayey.
GC*:				
Gullied land.				
Montoya	Severe: floods.	Slight	Moderate: percs slowly.	Slight.
KA*:				
Karde	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope.	Moderate: dusty.
Vermejo	Severe: floods.	Moderate: too clayey, percs slowly.	Moderate: too clayey, percs slowly.	Moderate: too clayey.
KR* Kiln	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope.
Rock outcrop.				
La La Brier	Severe: floods.	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Slight.
LB*:				
Lacita	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
San Jose	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
LC*:				
La Lande	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
LC*:				
Redona	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Moderate: dusty.
LE*:				
Laporte	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: depth to rock, slope.	Moderate: small stones.
Escabosa	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: small stones.
LF*:				
Laporte	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Moderate: slope, small stones.
Rock outcrop.				
Escabosa	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
LN*:				
Latom	Moderate: slope.	Moderate: slope.	Severe: slope, depth to rock.	Slight.
Newkirk	Slight	Slight	Severe: depth to rock.	Slight.
Rock outcrop.				
Lo, Lp Litle	Slight	Slight	Moderate: slope.	Slight.
MA Manter	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.
Mb Manzano	Slight	Slight	Moderate: percs slowly.	Slight.
MC Manzano	Severe: floods.	Moderate: dusty.	Moderate: dusty, floods.	Moderate: dusty.
Md Manzano	Slight	Slight	Moderate: percs slowly.	Slight.
ME*:				
Mion	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope.
Penrose	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: depth to rock, slope.	Moderate: small stones, dusty.
Litle	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
MF*:				
Montoya	Severe: floods.	Slight	Moderate: percs slowly.	Slight.
Tucumcari	Slight	Moderate: too clayey.	Moderate: too clayey.	Slight.
Lacita	Severe: floods.	Moderate: dusty.	Moderate: dusty, slope.	Moderate: dusty.
MG*:				
Moreno	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight.
Brycan	Slight	Slight	Moderate: slope.	Slight.
NW*:				
Newkirk	Slight	Slight	Severe: depth to rock.	Slight.
Walkon	Slight	Slight	Moderate: depth to rock, slope.	Slight.
Conchas	Moderate: dusty, percs slowly.	Moderate: dusty, percs slowly.	Moderate: slope, depth to rock, percs slowly.	Moderate: dusty.
Pa, Pb, PC---------- Partri	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: slope, percs slowly, too clayey.	Moderate: too clayey.
PD*:				
Partri	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: slope, percs slowly, too clayey.	Moderate: too clayey.
Tricon	Slight	Slight	Moderate: slope.	Slight.
PM*:				
Penrose	Moderate: small stones, dusty.	Moderate: small stones, dusty.	Severe: depth to rock.	Moderate: small stones, dusty.
Litle	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
Mion	Moderate: percs slowly.	Moderate: percs slowly.	Severe: depth to rock.	Slight.
QU---------- Quintana	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
RE*:				
Redona	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
Quay	Moderate: dusty.	Moderate: dusty.	Moderate: dusty, slope.	Moderate: dusty.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
RF*:				
Ribera	Slight	Slight	Severe: slope.	Slight.
Sombordoro	Severe: large stones.	Severe: large stones.	Severe: large stones, depth to rock, slope.	Severe: large stones.
Vibo	Slight	Slight	Moderate: slope.	Slight.
RG*:				
Rocio	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Dargol	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Slight.
Stout	Severe: large stones.	Moderate: large stones.	Severe: slope, depth to rock, large stones.	Moderate: large stones.
RH*:				
Rock outcrop.				
Haploborolls.				
RT*:				
Rock outcrop.				
Torriorthents.				
SR*:				
Stout	Severe: slope, large stones.	Severe: slope.	Severe: slope, depth to rock, large stones.	Severe: slope.
Rocio	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Dargol	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope.
SW	Moderate:	Moderate:	Moderate:	Moderate:
Swastika	dusty.	dusty.	slope, dusty.	dusty.
Sx, Sy	Moderate:	Moderate:	Moderate:	Moderate:
Swastika	dusty.	dusty.	dusty, slope.	dusty.
TD*:				
Tapia	Slight	Slight	Moderate: slope.	Slight.
Dean	Slight	Slight	Moderate: slope.	Slight.
TE	Moderate:	Moderate:	Severe:	Moderate:
Teco	dusty.	dusty.	slope.	dusty.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
TG---------- Tinaja	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
TR*: Tuloso----------	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones.	Severe: large stones, slope.
Rock outcrop.				
Sombordoro----------	Severe: large stones.	Severe: large stones.	Severe: large stones, depth to rock, slope.	Severe: large stones.
TS*: Tuloso----------	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.
Sombordoro----------	Severe: large stones.	Severe: large stones.	Severe: large stones, depth to rock, slope.	Severe: large stones.
Rock outcrop.				
UF*. Ustifluvents				
UR*: Ustorthents.				
Rock outcrop.				
Va---------- Vermejo	Severe: floods.	Moderate: too clayey, percs slowly.	Moderate: too clayey, percs slowly.	Moderate: too clayey.
VB*: Vibo----------	Slight----------	Slight----------	Moderate: slope.	Slight.
Ribera----------	Slight----------	Slight----------	Severe: slope.	Slight.
VC*: Vibo----------	Slight----------	Slight----------	Moderate: slope.	Slight.
Rock outcrop.				
Ribera----------	Slight----------	Slight----------	Severe: slope.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
AQ*:											
Andok	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
Quintana	Poor	Fair	Good	---	Fair	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Fair.
AY*:											
Apache	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Ayon	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Fair.
BA*. Badland											
Be Bernal	Poor	Poor	Fair	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
BR*:											
Bernal	Poor	Poor	Fair	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.											
CA*:											
Canez	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Ima	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Cb, Cc Carnero	Fair	Fair	Fair	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
CD*:											
Carnero	Poor	Fair	Fair	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
Partri	Poor	Fair	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Cf Colmor	Good	Good	Fair	---	Fair	Good	Poor	Good	---	Poor	Fair.
Cg, CH Colmor	Fair	Good	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
CK*:											
Conchas	Poor	Fair	Fair	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.
Latom	Very poor.	Very poor.	Fair	Very poor.	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
CT*:											
Crews	Poor	Poor	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
Tricon	Poor	Poor	Fair	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Fair.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
DA*:											
Dioxice	Fair	Good	Fair	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.
Dean	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
DB*:											
Dumas	Fair	Fair	Fair	Very poor.	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
La Brier	Poor	Fair	Fair	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
GA Gallegos	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
GB*:											
Gullied land.											
Manzano	Poor	Fair	Fair	---	Poor	Poor	Poor	Fair	---	Poor	Poor.
GC*:											
Gullied land.											
Montoya	Poor	Poor	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
KA*:											
Karde	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Vermejo	Poor	Poor	Fair	---	Poor	Poor	Poor	Poor	---	Poor	Poor.
KR* Kiln	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Very poor.
Rock outcrop.											
La La Brier	Poor	Fair	Fair	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Poor.
LB*:											
Lacita	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
San Jose	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
LC*:											
La Lande	Poor	Good	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Redona	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
LE*:											
Laporte	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Escabosa	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
LF*:											
Laporte	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.											

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
LF*:											
Escabosa	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
LN*:											
Latom	Very poor.	Very poor.	Fair	Very poor.	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Newkirk	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.											
Lo	Fair	Good	Fair	---	Poor	Fair	Poor	Fair	---	Fair	Fair.
Litle											
Lp	Poor	Fair	Fair	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.
Litle											
MA	Fair	Good	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Manter											
Mb	Good	Good	Good	---	Fair	Fair	Fair	Good	---	Fair	Fair.
Manzano											
MC	Poor	Fair	Fair	---	Poor	Poor	Poor	Fair	---	Poor	Poor.
Manzano											
Md	Good	Good	Good	---	Fair	Fair	Fair	Good	---	Fair	Fair.
Manzano											
ME*:											
Mion	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Penrose	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Litle	Poor	Fair	Fair	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.
MF*:											
Montoya.											
Tucumcari	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Lacita	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
MG*:											
Moreno	Poor	Fair	Good	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Brycan	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
NW*:											
Newkirk	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Walkon	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Conchas	Poor	Fair	Fair	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Pa---------- Partri	Good	Good	Fair	---	Fair	Poor	Poor	Good	---	Poor	Fair.
Pb---------- Partri	Fair	Good	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
PC---------- Partri	Poor	Fair	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
PD*: Partri----------	Poor	Fair	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.
Tricon----------	Poor	Poor	Fair	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Fair.
PM*: Penrose----------	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Litle----------	Poor	Fair	Fair	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.
Mion----------	Very poor.	Very poor.	Fair	---	Fair	Poor	Poor	Poor	---	Poor	Fair.
QU---------- Quintana	Poor	Fair	Good	---	Fair	Very poor.	Very poor.	Fair	Very poor.	Very poor.	Fair.
RE*: Redona----------	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Quay----------	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
RF*: Ribera----------	Poor	Fair	Good	---	Good	Poor	Very poor.	Fair	---	Very poor.	Good.
Sombordoro--------	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
Vibo----------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
RG*: Rocio----------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Very poor.	Good	Very poor.	Good.
Dargol----------	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.	Fair.
Stout----------	Very poor.	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Poor.
RH*: Rock outcrop.											
Haploborolls.											
RT*: Rock outcrop.											
Torriorthents.											

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
SR*:											
Stout	Very poor.	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Poor.
Rocio	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	Very poor.
Dargol	Very poor.	Very poor.	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	---
SW Swastika	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
Sx Swastika	Good	Good	Fair	---	Fair	Poor	Poor	Fair	---	Poor	Good.
Sy Swastika	Fair	Good	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Good.
TD*:											
Tapia	Poor	Fair	Fair	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.
Dean	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
TE Teco	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
TG Tinaja	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
TR*:											
Tuloso	Very poor.	Very poor.	Poor	Good	Poor	Very poor.	Very poor.	Very poor.	Good	Very poor.	Poor.
Rock outcrop.											
Sombordoro	Very poor.	Very poor.	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
TS*:											
Tuloso	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
Sombordoro	Very poor.	Very poor.	Fair	Good	Fair	Very poor.	Very poor.	Poor	Good	Very poor.	Fair.
Rock outcrop.											
UF*. Ustifluvents											
UR*: Ustorthents.											
Rock outcrop.											
Va Vermejo	Poor	Poor	Fair	---	Poor	Poor	Poor	Poor	---	Poor	Poor.
VB*:											
Vibo	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Ribera	Poor	Fair	Good	---	Good	Poor	Very poor.	Fair	---	Very poor.	Good.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
VC*:											
Vibo	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Rock outcrop.											
Ribera	Poor	Fair	Good	---	Good	Poor	Very poor.	Fair	---	Very poor.	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
AQ*:					
Andok	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: shrink-swell, slope.
Quintana	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell, frost action.
AY*:					
Apache	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Ayon	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones, slope.	Severe: large stones.
BA*.					
Badland					
Be--	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, low strength.
Bernal					
BR*:					
Bernal	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, low strength.
Rock outcrop.					
CA*:					
Canez	Slight	Slight	Slight	Slight	Moderate: low strength.
Ima	Slight	Slight	Slight	Slight	Slight.
Cb, Cc	Severe: depth to rock.	Severe: shrink-swell, low strength.	Severe: depth to rock, low strength, shrink-swell.	Severe: depth to rock, low strength, shrink-swell.	Severe: shrink-swell, low strength.
Carnero					
CD*:					
Carnero	Severe: depth to rock.	Severe: shrink-swell, low strength.	Severe: depth to rock, low strength, shrink-swell.	Severe: depth to rock, low strength, shrink-swell.	Severe: shrink-swell, low strength.
Partri	Slight	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Cf	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
Colmor					
Cg	Slight	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: slope, low strength, shrink-swell.	Severe: low strength.
Colmor					

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
CH---------- Colmor	Slight----------	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
CK*: Conchas----------	Severe: depth to rock.	Moderate: depth to rock, shrink-swell, low strength.	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: low strength.
Latom----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
CT*: Crews----------	Severe: cemented pan.	Severe: cemented pan, shrink-swell.	Severe: cemented pan, shrink-swell.	Severe: cemented pan, shrink-swell.	Severe: cemented pan, shrink-swell, low strength.
Tricon----------	Severe: cemented pan.	Severe: shrink-swell.	Severe: cemented pan, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
DA*: Dioxice----------	Slight----------	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
Dean----------	Slight----------	Slight----------	Slight----------	Moderate: slope.	Slight.
DB*: Dumas----------	Slight----------	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
La Brier----------	Moderate: floods.	Severe: floods, low strength, shrink-swell.	Severe: floods, low strength, shrink-swell.	Severe: floods, low strength, shrink-swell.	Severe: low strength, shrink-swell.
GA---------- Gallegos	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GB*: Gullied land.					
Manzano----------	Slight----------	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, shrink-swell, frost action.
GC*: Gullied land.					
Montoya----------	Moderate: too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: shrink-swell, low strength.
KA*: Karde----------	Slight----------	Slight----------	Slight----------	Slight----------	Moderate: low strength.
Vermejo----------	Moderate: too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: shrink-swell, low strength.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
KR*---------- Kiln	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.
Rock outcrop.					
La---------- La Brier	Moderate: too clayey.	Severe: floods, low strength, shrink-swell.	Severe: floods, low strength, shrink-swell.	Severe: floods, low strength, shrink-swell.	Severe: low strength, shrink-swell.
LB*:					
Lacita---------- 	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
San Jose--------- 	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
LC*:					
La Lande--------- 	Slight----------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope, low strength.	Moderate: shrink-swell, low strength.
Redona---------- 	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: low strength, shrink-swell.
LE*:					
Laporte---------- 	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.
Escabosa--------- 	Severe: depth to rock.	Moderate: depth to rock, low strength.	Severe: depth to rock.	Moderate: slope, depth to rock, low strength.	Severe: low strength.
LF*:					
Laporte---------- 	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.
Rock outcrop.					
Escabosa--------- 	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: low strength, slope.
LN*:					
Latom---------- 	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Newkirk---------- 	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Rock outcrop.					
Lo, Lp---------- Litle	Moderate: too clayey. depth to rock.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.
MA---------- Manter	Slight----------	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength, frost action.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Mb---------- Manzano	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength, frost action.
MC---------- Manzano	Slight----------	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, shrink-swell, frost action.
Md---------- Manzano	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength, frost action.
ME*: Mion----------	Severe: slope, depth to rock.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, low strength, depth to rock.
Penrose----------	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock, slope.	Moderate: depth to rock.
Litle----------	Moderate: too clayey, depth to rock.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: corrosive, shrink-swell, low strength.	Severe: low strength, shrink-swell.
MF*: Montoya----------	Moderate: too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: shrink-swell, low strength.
Tucumcari--------	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Lacita----------	Slight----------	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, low strength, shrink-swell.
MG*: Moreno----------	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Brycan----------	Slight----------	Slight----------	Moderate: shrink-swell, low strength.	Moderate: slope.	Moderate: low strength, frost action.
NW*: Newkirk----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Walkon----------	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Conchas----------	Severe: depth to rock.	Moderate: depth to rock, shrink-swell, low strength.	Severe: depth to rock.	Moderate: depth to rock, slope, shrink-swell.	Severe: low strength.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Pa, Pb, PC--------- Partri	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
PD*: Partri----------	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.
Tricon----------	Severe: cemented pan.	Severe: shrink-swell.	Severe: cemented pan, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
PM*: Penrose----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Litle----------	Moderate: too clayey, depth to rock.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: corrosive, shrink-swell, low strength.	Severe: low strength, shrink-swell.
Mion----------	Severe: depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: depth to rock, shrink-swell, low strength.	Severe: depth to rock, shrink-swell, corrosive.	Severe: low strength, shrink-swell, depth to rock.
QU---------- Quintana	Slight----------	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell, frost action.
RE*: Redona----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.
Quay----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
RF*: Ribera----------	Severe: depth to rock.	Moderate: low strength, depth to rock.	Severe: depth to rock.	Moderate: low strength, depth to rock, slope.	Moderate: depth to rock, low strength.
Sombordoro--------	Severe: depth to rock, large stones.	Severe: depth to rock, shrink-swell, large stones.	Severe: depth to rock, shrink-swell, large stones.	Severe: depth to rock, shrink-swell, large stones.	Severe: depth to rock, shrink-swell, large stones.
Vibo----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: frost action, low strength.
RG*: Rocio----------	Severe: slope.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, shrink-swell, low strength.
Dargol----------	Severe: depth to rock.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, depth to rock.	Severe: slope, shrink-swell, depth to rock.	Severe: shrink-swell, low strength.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
RG*:					
Stout	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
RH*:					
Rock outcrop.					
Haploborolls.					
RT*:					
Rock outcrop.					
Torriorthents.					
SR*:					
Stout	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rocio	Severe: slope.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, shrink-swell, low strength.
Dargol	Severe: slope, depth to rock.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, shrink-swell, low strength.
SW, Sx, Sy---- Swastika	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
TD*:					
Tapia	Slight	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.
Dean	Slight	Slight	Slight	Slight	Slight.
TE---- Teco	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
TG---- Tinaja	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
TR*:					
Tuloso	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.
Rock outcrop.					
Sombordoro	Severe: depth to rock, large stones.	Severe: depth to rock, shrink-swell, large stones.	Severe: depth to rock, shrink-swell, large stones.	Severe: depth to rock, shrink-swell, large stones.	Severe: depth to rock, shrink-swell, large stones.
TS*:					
Tuloso	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
TS*:					
Sombordoro	Severe: depth to rock, large stones.	Severe: depth to rock, shrink-swell, large stones.	Severe: depth to rock, shrink-swell, large stones.	Severe: depth to rock, shrink-swell, large stones.	Severe: depth to rock, shrink-swell, large stones.
Rock outcrop.					
UF*.					
Ustifluvents					
UR*:					
Ustorthents.					
Rock outcrop.					
Va	Moderate: too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: shrink-swell, low strength.
Vermejo					
VB*:					
Vibo	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: frost action, low strength.
Ribera	Severe: depth to rock.	Moderate: low strength, depth to rock.	Severe: depth to rock.	Moderate: low strength, depth to rock, slope.	Moderate: depth to rock, low strength.
VC*:					
Vibo	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: frost action, low strength.
Rock outcrop.					
Ribera	Severe: depth to rock.	Moderate: low strength, depth to rock.	Severe: depth to rock.	Moderate: low strength, depth to rock, slope.	Moderate: depth to rock, low strength.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AQ*:					
Andok	Moderate: percs slowly, slope.	Severe: slope, seepage.	Severe: seepage.	Moderate: slope.	Fair: small stones, slope.
Quintana	Slight	Moderate: slope, seepage.	Severe: seepage.	Slight	Fair: small stones.
AY*:					
Apache	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
Ayon	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.	Moderate: slope.	Poor: large stones.
BA*.					
Badland					
Be	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
Bernal					
BR*:					
Bernal	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
Rock outcrop.					
CA*:					
Canez	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Ima	Slight	Severe: seepage.	Slight	Slight	Good.
Cb, Cc	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, too clayey, area reclaim.
Carnero					
CD*:					
Carnero	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, too clayey, area reclaim.
Partri	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Cf, Cg, CH	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Colmor					
CK*:					
Conchas	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Latom	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CT*:					
Crews	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: thin layer, area reclaim, too clayey.
Tricon	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: area reclaim, thin layer, too clayey.
DA*:					
Dioxice	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Fair: too clayey.
Dean	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Fair: small stones.
DB*:					
Dumas	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
La Brier	Severe: percs slowly.	Severe: floods.	Moderate: floods, too clayey.	Moderate: floods.	Fair: hard to pack, too clayey.
GA	Severe:	Severe:	Severe:	Severe:	Poor:
Gallegos	slope.	slope, seepage.	seepage.	seepage, slope.	slope, small stones, seepage.
GB*:					
Gullied land.					
Manzano	Severe: percs slowly.	Severe: floods.	Moderate: floods.	Moderate: floods.	Fair: too clayey.
GC*:					
Gullied land.					
Montoya	Severe: percs slowly.	Severe: floods.	Severe: too clayey.	Moderate: floods.	Poor: too clayey.
KA*:					
Karde	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Vermejo	Severe: percs slowly.	Severe: floods.	Severe: too clayey.	Moderate: floods.	Poor: too clayey.
KR*	Severe:	Severe:	Severe:	Severe:	Poor:
Kiln	depth to rock, slope.	depth to rock, slope.	depth to rock.	slope.	slope, thin layer, area reclaim.
Rock outcrop.					
La	Severe:	Severe:	Moderate:	Moderate:	Fair:
La Brier	percs slowly.	floods.	floods, too clayey.	floods.	hard to pack, too clayey.
LB*:					
Lacita	Severe: percs slowly, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Fair: too clayey.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
LB*:					
San Jose	Severe: floods.	Severe: floods, seepage.	Severe: floods.	Severe: floods.	Good.
LC*:					
La Lande	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Redona	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
LE*:					
Laporte	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, area reclaim.
Escabosa	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
LF*:					
Laporte	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Poor: thin layer, slope, area reclaim.
Rock outcrop.					
Escabosa	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
LN*:					
Latom	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer.
Newkirk	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Rock outcrop.					
Lo, Lp Litle	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
MA Manter	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Mb Manzano	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
MC Manzano	Severe: percs slowly.	Severe: floods.	Moderate: floods, too clayey.	Moderate: floods.	Fair: too clayey.
Md Manzano	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
ME*:					
Mion	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ME*:					
Penrose	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Litle	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
MF*:					
Montoya	Severe: percs slowly.	Severe: floods.	Severe: too clayey.	Moderate: floods.	Poor: too clayey.
Tucumcari	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
Lacita	Severe: percs slowly.	Severe: floods.	Moderate: floods.	Moderate: floods.	Good.
MG*:					
Moreno	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Brycan	Severe: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
NW*:					
Newkirk	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Walkon	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight	Poor: thin layer.
Conchas	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Pa, Pb, PC---------- Partri	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
PD*:					
Partri	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Tricon	Severe: cemented pan, percs slowly.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: area reclaim, thin layer, too clayey.
PM*:					
Penrose	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Litle	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer.
Mion	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight	Poor: thin layer.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
QU---------- Quintana	Moderate: percs slowly.	Severe: slope.	Severe: seepage.	Slight----------	Good.
RE*: Redona----------	Moderate: percs slowly.	Moderate: seepage.	Slight----------	Slight----------	Good.
Quay----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
RF*: Ribera----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight----------	Poor: thin layer, area reclaim.
Sombordoro---------	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Slight----------	Poor: thin layer, area reclaim, large stones.
Vibo----------	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
RG*: Rocio----------	Severe: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Severe: slope.	Poor: slope, too clayey.
Dargol----------	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: too clayey, depth to rock.	Moderate: slope.	Poor: thin layer, area reclaim, too clayey.
Stout----------	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: thin layer, area reclaim.
RH*: Rock outcrop. Haploborolls.					
RT*: Rock outcrop. Torriorthents.					
SR*: Stout----------	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
Rocio----------	Severe: percs slowly, slope.	Severe: slope.	Severe: too clayey, slope.	Severe: slope.	Poor: slope, too clayey.
Dargol----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
SW, Sx, Sy---------- Swastika	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
TD*:					
Tapia	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: small stones.
Dean	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Fair: small stones.
TE Teco	Severe: percs slowly.	Severe: slope, seepage.	Severe: seepage, too clayey.	Slight	Poor: too clayey.
TG Tinaja	Moderate: slope, percs slowly.	Severe: slope, seepage.	Severe: seepage.	Moderate: slope.	Poor: small stones.
TR*:					
Tuloso	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: seepage, slope.	Poor: thin layer, area reclaim, slope.
Rock outcrop.					
Sombordoro	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Slight	Poor: thin layer, area reclaim, large stones.
TS*:					
Tuloso	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: seepage.	Poor: thin layer, area reclaim.
Sombordoro	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Slight	Poor: thin layer, area reclaim, large stones.
Rock outcrop.					
UF*. Ustifluvents					
UR*: Ustorthents.					
Rock outcrop.					
Va Vermejo	Severe: percs slowly.	Severe: floods.	Severe: too clayey.	Moderate: floods.	Poor: too clayey.
VB*:					
Vibo	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Ribera	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.
VC*:					
Vibo	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Rock outcrop.					

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
VC*: Ribera	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Slight	Poor: thin layer, area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AQ*:				
Andok	Poor: low strength.	Unsuited	Poor: excess fines.	Poor: small stones, slope.
Quintana	Fair: shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
AY*:				
Apache	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer, small stones, area reclaim.
Ayon	Poor: large stones.	Unsuited	Unsuited	Poor: large stones.
BA*.				
Badland				
Be	Poor: thin layer, area reclaim, low strength.	Unsuited	Unsuited	Poor: area reclaim, thin layer.
Bernal				
BR*:				
Bernal	Poor: thin layer, area reclaim, low strength.	Unsuited	Unsuited	Poor: area reclaim, thin layer.
Rock outcrop.				
CA*:				
Canez	Fair: low strength.	Unsuited	Unsuited	Good.
Ima	Good	Poor: excess fines.	Unsuited	Fair: too sandy.
Cb, Cc	Poor: shrink-swell, thin layer, low strength.	Unsuited	Unsuited	Fair: thin layer, area reclaim, too clayey.
Carnero				
CD*:				
Carnero	Poor: shrink-swell, thin layer, low strength.	Unsuited	Unsuited	Fair: thin layer, area reclaim, too clayey.
Partri	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey.
Cf, Cg, CH	Poor: low strength.	Unsuited	Unsuited	Fair: too clayey.
Colmor				
CK*:				
Conchas	Poor: thin layer, low strength.	Unsuited	Unsuited	Fair: thin layer, too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CK*:				
Latom	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer.
CT*:				
Crews	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: thin layer, area reclaim, too clayey.
Tricon	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: thin layer, area reclaim, too clayey.
DA*:				
Dioxice	Poor: low strength.	Unsuited	Unsuited	Good.
Dean	Fair: low strength.	Poor: excess fines.	Poor: excess fines.	Poor: excess lime, small stones.
DB*:				
Dumas	Fair: low strength.	Unsuited	Unsuited	Fair: too clayey.
La Brier	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
GA	Fair: slope.	Unsuited	Fair: excess fines.	Poor: slope, small stones.
Gallegos				
GB*:				
Gullied land.				
Manzano	Fair: low strength, shrink-swell, frost action.	Unsuited	Unsuited	Good.
GC*:				
Gullied land.				
Montoya	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
KA*:				
Karde	Fair: low strength.	Unsuited	Unsuited	Fair: excess salt.
Vermejo	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey, excess salt.
KR*	Poor: area reclaim, thin layer.	Unsuited	Unsuited	Poor: area reclaim, large stones, slope.
Kiln				
Rock outcrop.				
La	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
La Brier				

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
LB*:				
Lacita	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
San Jose	Fair: low strength.	Poor: excess fines.	Unsuited	Good.
LC*:				
La Lande	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Redona	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
LE*:				
Laporte	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: thin layer, small stones, area reclaim.
Escabosa	Poor: low strength.	Unsuited	Unsuited	Poor: small stones.
LF*:				
Laporte	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: small stones, slope, area reclaim.
Rock outcrop.				
Escabosa	Poor: low strength.	Unsuited	Unsuited	Poor: slope, small stones.
LN*:				
Latom	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer.
Newkirk	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer.
Rock outcrop.				
Lo, Lp Litle	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: too clayey.
MA Manter	Fair: low strength, frost action.	Poor: excess fines.	Unsuited	Fair: too sandy.
Mb, MC Manzano	Fair: low strength, shrink-swell, frost action.	Unsuited	Unsuited	Good.
Md Manzano	Fair: low strength, shrink-swell, frost action.	Unsuited	Unsuited	Fair: too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ME*:				
Mion	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: slope, thin layer, area reclaim.
Penrose	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: area reclaim, thin layer, small stones.
Litle	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: too clayey.
MF*:				
Montoya	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey, excess salt.
Tucumcari	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
Lacita	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
MG*:				
Moreno	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey.
Brycan	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Good.
NW*:				
Newkirk	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: thin layer.
Walkon	Poor: low strength, thin layer.	Unsuited	Unsuited	Fair: too clayey, thin layer.
Conchas	Poor: thin layer, low strength.	Unsuited	Unsuited	Fair: too clayey, excess sodium.
Pa, Pb, PC Partri	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
PD*:				
Partri	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
Tricon	Poor: low strength, shrink-swell, thin layer.	Unsuited	Unsuited	Fair: thin layer, too clayey, area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
PM*:				
Penrose	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: area reclaim, thin layer, small stones.
Litle	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: too clayey.
Mion	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: thin layer, area reclaim.
QU	Fair: shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Quintana				
RE*:				
Redona	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Quay	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
RF*:				
Ribera	Poor: area reclaim, thin layer.	Unsuited	Unsuited	Fair: area reclaim, thin layer, too clayey.
Sombordoro	Poor: shrink-swell, low strength, area reclaim.	Unsuited	Unsuited	Poor: too clayey, large stones, area reclaim.
Vibo	Fair: low strength, shrink-swell.	Poor: excess fines.	Unsuited	Fair: too clayey.
RG*:				
Rocio	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: slope.
Dargol	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: too clayey.
Stout	Poor: thin layer, area reclaim.	Unsuited	Unsuited	Poor: thin layer, large stones, area reclaim.
RH*:				
Rock outcrop.				
Haploborolls.				
RT*:				
Rock outcrop.				
Torriorthents.				

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
SR*:				
Stout	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope, thin layer, large stones.
Rocio	Poor: low strength, shrink-swell, slope.	Unsuited	Unsuited	Poor: slope.
Dargol	Poor: slope, low strength, thin layer.	Unsuited	Unsuited	Poor: slope, too clayey.
SW, Sx, Sy---- Swastika	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey.
TD*:				
Tapia	Fair: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
Dean	Fair: low strength.	Poor: excess fines.	Poor: excess fines.	Poor: excess lime, small stones.
TE---- Teco	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
TG---- Tinaja	Good	Fair: excess fines.	Fair: excess fines.	Poor: small stones.
TR*:				
Tuloso	Poor: thin layer, slope, area reclaim.	Unsuited	Poor: excess fines.	Poor: large stones, thin layer, area reclaim.
Rock outcrop.				
Sombordoro	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: too clayey, large stones, thin layer.
TS*:				
Tuloso	Poor: thin layer, area reclaim.	Unsuited	Poor: excess fines.	Poor: large stones, thin layer, area reclaim.
Sombordoro	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: too clayey, large stones, thin layer.
Rock outcrop.				
UF*. Ustifluvents				
UR*: Ustorthents.				
Rock outcrop.				

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Va---------- Vermejo	Poor: shrink-swell, low strength.	Unsuited----------	Unsuited----------	Poor: too clayey, excess salt.
VB*: Vibo----------	Fair: low strength, shrink-swell.	Poor: excess fines.	Unsuited----------	Fair: too clayey.
Ribera----------	Poor: area reclaim, thin layer.	Unsuited----------	Unsuited----------	Fair: area reclaim, thin layer.
VC*: Vibo----------	Fair: low strength, shrink-swell.	Poor: excess fines.	Unsuited----------	Fair: too clayey.
Rock outcrop.				
Ribera----------	Poor: area reclaim, thin layer.	Unsuited----------	Unsuited----------	Fair: area reclaim, thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
AQ*:					
Andok	Seepage	Seepage	Slope	Droughty, slope.	Slope.
Quintana	Seepage	Seepage	Favorable	Slope, erodes easily.	Favorable.
AY*:					
Apache	Depth to rock	Thin layer, piping.	Depth to rock, slope.	Rooting depth, slope.	Depth to rock.
Ayon	Seepage	Large stones	Slope, large stones.	Large stones, slope, droughty.	Large stones, slope.
BA*.					
Badland					
Be	Depth to rock, slope.	Thin layer	Depth to rock, slope.	Rooting depth, slope.	Depth to rock.
Bernal					
BR*:					
Bernal	Depth to rock, slope.	Thin layer	Depth to rock, slope.	Rooting depth, slope.	Depth to rock.
Rock outcrop.					
CA*:					
Canez	Seepage, slope.	Piping	Favorable	Slope, soil blowing.	Soil blowing.
Ima	Seepage	Seepage	Favorable	Erodes easily	Erodes easily.
Cb, Cc	Depth to rock, slope.	Hard to pack, thin layer.	Depth to rock, percs slowly.	Rooting depth, percs slowly.	Depth to rock, rooting depth, percs slowly.
Carnero					
CD*:					
Carnero	Depth to rock, slope.	Hard to pack, thin layer.	Depth to rock, percs slowly.	Rooting depth, percs slowly.	Depth to rock, rooting depth, percs slowly.
Partri	Slope	Favorable	Percs slowly	Percs slowly, slope, erodes easily.	Percs slowly.
Cf, Cg, CH	Slope	Piping	Favorable	Slope. slope.	Slope.
Colmor					
CK*:					
Conchas	Depth to rock	Thin layer	Depth to rock, excess sodium.	Rooting depth, erodes easily.	Depth to rock.
Latom	Depth to rock	Thin layer	Depth to rock, slope.	Rooting depth, droughty, slope.	Depth to rock, slope.
CT*:					
Crews	Cemented pan	Thin layer	Cemented pan	Rooting depth	Cemented pan, rooting depth.
Tricon	Cemented pan	Thin layer	Percs slowly, cemented pan, slope.	Percs slowly, rooting depth, slope.	Cemented pan, percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
DA*:					
Dioxice	Slope	Piping	Favorable	Erodes easily	Favorable.
Dean	Slope	Favorable	Slope, percs slowly.	Percs slowly	Percs slowly.
DB*:					
Dumas	Seepage	Favorable	Slope	Slope	Favorable.
La Brier	Favorable	Hard to pack	Percs slowly	Percs slowly	Percs slowly.
GA---------- Gallegos	Slope, seepage.	Seepage	Slope	Droughty, slope.	Slope, droughty.
GB*:					
Gullied land.					
Manzano	Slope	Favorable	Complex slope	Slope	Favorable.
GC*:					
Gullied land.					
Montoya	Favorable	Hard to pack	Percs slowly, excess salt.	Percs slowly	Percs slowly.
KA*:					
Karde	Slope, seepage.	Favorable	Favorable	Erodes easily, slope.	Favorable.
Vermejo	Favorable	Hard to pack	Excess salt, percs slowly.	Excess salt, percs slowly.	Percs slowly.
KR*---------- Kiln	Slope, depth to rock, seepage.	Thin layer, large stones.	Depth to rock, slope.	Large stones, rooting depth, slope.	Depth to rock, slope, large stones.
Rock outcrop.					
La---------- La Brier	Favorable	Hard to pack	Percs slowly	Percs slowly	Percs slowly.
LB*:					
Lacita	Favorable	Favorable	Floods, slope.	Erodes easily, floods.	Erodes easily.
San Jose	Seepage	Piping	Floods	Floods, soil blowing.	Soil blowing.
LC*:					
La Lande	Slope, seepage.	Favorable	Slope	Slope, erodes easily.	Favorable.
Redona	Slope	Favorable	Favorable	Slope	Favorable.
LE*:					
Laporte	Depth to rock, slope.	Thin layer	Depth to rock, slope.	Rooting depth, slope.	Depth to rock, rooting depth, slope.
Escabosa	Depth to rock, slope.	Thin layer	Depth to rock, slope.	Rooting depth, slope.	Depth to rock, slope.
LF*:					
Laporte	Depth to rock, slope.	Thin layer	Depth to rock, slope.	Rooting depth, slope.	Depth to rock, rooting depth, slope.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
LF*:					
Rock outcrop.					
Escabosa	Depth to rock, slope.	Thin layer	Depth to rock, slope.	Rooting depth, slope.	Depth to rock, slope.
LN*:					
Latom	Depth to rock	Thin layer	Depth to rock	Rooting depth, droughty, slope.	Depth to rock, slope, droughty.
Newkirk	Depth to rock, slope.	Thin layer	Depth to rock, slope.	Rooting depth, slope, soil blowing.	Depth to rock, soil blowing.
Rock outcrop.					
Lo, Lp Litle	Depth to rock	Hard to pack, thin layer.	Excess salt, percs slowly, depth to rock.	Rooting depth, excess salt, percs slowly.	Depth to rock, percs slowly, slope.
MA Manter	Seepage	Piping	Slope	Droughty, slope.	Soil blowing.
Mb Manzano	Slope	Favorable	Complex slope	Complex slope	Favorable.
MC Manzano	Slope	Favorable	Complex slope	Complex slope	Favorable.
Md Manzano	Slope	Favorable	Complex slope	Complex slope	Favorable.
ME*:					
Mion	Slope, depth to rock.	Thin layer	Depth to rock, percs slowly, slope.	Slope, erodes easily, percs slowly.	Complex slope, depth to rock, percs slowly.
Penrose	Depth to rock, slope.	Thin layer, piping.	Depth to rock, slope.	Droughty, rooting depth, slope.	Depth to rock, slope, droughty.
Litle	Depth to rock	Hard to pack, thin layer.	Excess salt, percs slowly, depth to rock.	Rooting depth, excess salt, percs slowly.	Depth to rock, percs slowly, slope.
MF*:					
Montoya	Favorable	Hard to pack	Percs slowly, excess salt, floods.	Percs slowly	Percs slowly.
Tucumcari	Favorable	Hard to pack	Favorable	Slope, erodes easily.	Favorable.
Lacita	Slope	Favorable	Slope	Erodes easily, slope.	Erodes easily.
MG*:					
Moreno	Slope	Hard to pack	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Brycan	Slope	Favorable	Favorable	Favorable	Favorable.
NW*:					
Newkirk	Depth to rock, slope.	Thin layer	Depth to rock, slope.	Rooting depth, slope, soil blowing.	Depth to rock, soil blowing.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
NW*:					
Walkon	Slope, depth to rock.	Thin layer	Slope, percs slowly, depth to rock.	Slope, percs slowly, rooting depth.	Depth to rock, percs slowly.
Conchas	Depth to rock	Thin layer	Depth to rock, excess sodium.	Rooting depth, erodes easily.	Depth to rock.
Pa, Pb, PC Partri	Slope	Favorable	Percs slowly	Percs slowly, slope, erodes easily.	Percs slowly.
PD*:					
Partri	Slope	Favorable	Percs slowly	Percs slowly, slope, erodes easily.	Percs slowly.
Tricon	Cemented pan	Thin layer	Percs slowly, cemented pan, slope.	Percs slowly, rooting depth, slope.	Cemented pan, percs slowly.
PM*:					
Penrose	Depth to rock, slope.	Thin layer, piping.	Depth to rock, slope.	Droughty, rooting depth, slope.	Depth to rock, slope.
Litle	Depth to rock	Hard to pack	Excess salt, percs slowly. depth to rock.	Rooting depth, excess salt, percs slowly.	Depth to rock, percs slowly, slope.
Mion	Slope, depth to rock.	Thin layer	Depth to rock, percs slowly, slope.	Slope, percs slowly, rooting depth.	Complex slope, depth to rock, percs slowly.
QU Quintana	Seepage	Seepage	Slope	Slope, erodes easily.	Favorable.
RE*:					
Redona	Seepage	Piping	Favorable	Slope	Favorable.
Quay	Slope, seepage.	Favorable	Favorable	Slope, erodes easily.	Favorable.
RF*:					
Ribera	Depth to rock, seepage.	Thin layer	Depth to rock, slope.	Slope, soil blowing, rooting depth.	Slope, soil blowing, depth to rock.
Sombordoro	Depth to rock	Thin layer	Percs slowly, depth to rock.	Large stones, percs slowly, rooting depth.	Large stones, depth to rock.
Vibo	Seepage, slope.	Piping, seepage.	Slope, cutbanks cave.	Slope, soil blowing.	Slope, soil blowing.
RG*:					
Rocio	Slope	Hard to pack	Complex slope, percs slowly.	Slope, erodes easily, percs slowly.	Slope, percs slowly.
Dargol	Slope, depth to rock.	Thin layer, hard to pack.	Slope, depth to rock.	Slope, rooting depth.	Depth to rock.
Stout	Slope, depth to rock, seepage.	Thin layer	Slope, depth to rock.	Droughty, slope, rooting depth.	Depth to rock, slope.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
RH*: Rock outcrop.					
Haploborolls.					
RT*: Rock outcrop.					
Torriorthents.					
SR*: Stout	Slope, depth to rock, seepage.	Thin layer	Slope, depth to rock.	Droughty, slope, rooting depth.	Depth to rock, slope.
Rocio	Slope	Hard to pack	Complex slope, percs slowly.	Slope, erodes easily, percs slowly.	Slope, percs slowly.
Dargol	Slope, depth to rock.	Thin layer, hard to pack.	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock.
SW, Sx, Sy: Swastika	Slope	Hard to pack	Percs slowly	Percs slowly, slope, erodes easily.	Percs slowly.
TD*: Tapia	Seepage, slope.	Seepage	Favorable	Favorable	Favorable.
Dean	Slope	Favorable	Slope, percs slowly.	Percs slowly	Percs slowly.
TE: Teco	Seepage	Hard to pack	Slope	Slope, erodes easily.	Erodes easily.
TG: Tinaja	Slope, seepage.	Seepage	Slope	Slope, droughty.	Slope, droughty.
TR*: Tuloso	Seepage, depth to rock.	Thin layer, large stones.	Depth to rock, slope.	Droughty, slope, rooting depth.	Large stones, depth to rock, slope.
Rock outcrop.					
Sombordoro	Depth to rock	Thin layer	Percs slowly, depth to rock.	Large stones, percs slowly, rooting depth.	Large stones, depth to rock.
TS*: Tuloso	Seepage, depth to rock.	Thin layer, large stones.	Depth to rock, slope.	Droughty, slope, rooting depth.	Large stones, depth to rock, slope.
Sombordoro	Depth to rock	Thin layer	Percs slowly, depth to rock.	Large stones, percs slowly, rooting depth.	Large stones, depth to rock.
Rock outcrop.					
UF*. Ustifluvents					
UR*: Ustorthents.					

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
UR*: Rock outcrop.					
Va---------- Vermejo	Favorable---------	Hard to pack-----	Excess salt, percs slowly.	Excess salt, percs slowly.	Percs slowly.
VB*: Vibo----------	Seepage, slope.	Piping, seepage.	Slope----------	Slope, soil blowing.	Slope, soil blowing.
Ribera----------	Depth to rock, seepage, slope.	Thin layer-------	Depth to rock, slope.	Slope, soil blowing, rooting depth.	Slope, soil blowing, depth to rock.
VC*: Vibo----------	Seepage, slope.	Piping, seepage.	Slope----------	Slope, soil blowing.	Slope, soil blowing.
Rock outcrop.					
Ribera----------	Depth to rock, seepage, slope.	Thin layer-------	Depth to rock, slope.	Slope, soil blowing, rooting depth.	Slope, soil blowing, depth to rock.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AQ*:											
Andok	0-9	Very gravelly loam.	GM	A-4	5-20	60-70	50-60	40-55	35-50	15-30	NP-5
	9-37	Very cobbly clay loam, very gravelly sandy clay loam.	GC	A-6, A-2	25-35	55-65	50-60	40-55	25-45	30-40	10-20
	37-60	Very gravelly sandy loam, very gravelly loam.	GM, SM, GP-GM, SP-SM	A-1, A-2	0-10	30-60	25-55	15-50	5-35	15-25	NP-5
Quintana	0-6	Loam	ML	A-4	0	95-100	90-100	80-95	65-85	25-35	NP-10
	6-19	Clay loam, sandy clay loam, loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	0	95-100	90-100	75-95	35-75	25-40	5-15
	19-60	Very gravelly sandy loam, gravelly sandy clay loam.	SM, SP-SM, GM, GP-GM	A-1, A-2	0	35-95	40-60	30-50	5-30	20-25	NP-5
AY*:											
Apache	0-6	Cobbly loam	CL	A-6	15-40	80-100	75-95	65-90	50-75	30-40	10-20
	6-19	Cobbly loam, cobbly clay loam.	CL	A-6	15-40	80-100	75-95	70-90	60-80	30-40	10-20
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Ayon	0-11	Stony loam	ML	A-6, A-7	10-20	90-100	85-100	80-100	70-90	35-50	10-20
	11-60	Very stony loam, stony loam, stony clay loam	GM	A-2	40-65	40-50	30-45	30-40	25-35	35-50	10-20
BA*.											
Badland											
Be	0-6	Loam	CL	A-6	0	100	100	90-100	60-80	25-40	10-20
Bernal	6-19	Sandy clay loam, clay loam.	CL	A-6	0	100	80-100	70-90	50-70	30-40	15-25
	19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
BR*:											
Bernal	0-5	Loam	CL, CL-ML	A-6, A-4	0	100	100	65-95	50-65	20-35	5-20
	5-12	Sandy clay loam, clay loam.	CL	A-6	0	100	80-100	70-90	50-70	25-40	15-25
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
CA*:											
Canez	0-10	Fine sandy loam	SM, ML	A-4	0	100	100	75-90	40-55	---	NP
	10-32	Sandy loam, fine sandy loam, sandy clay loam.	CL-ML, CL, SC, SM-SC	A-4, A-6	0	100	100	70-90	35-55	25-35	5-15
	32-60	Sandy clay loam, loam, clay loam	ML, SM	A-4	0	100	100	70-90	40-60	25-35	NP-10

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CA*:											
Ima	0-7	Loamy fine sand	SM	A-2, A-4	0	90-100	85-100	75-100	25-50	20-30	NP-5
	7-46	Loam, sandy loam	SM	A-2, A-4	0	90-100	85-100	75-100	25-50	20-30	NP-5
	46-60	Clay loam.	CL	A-6	0	95-100	90-100	85-95	65-75	30-40	10-20
Cb, Cc	0-4	Loam	CL	A-6, A-7	0-5	85-100	75-100	70-100	60-95	30-45	10-20
Carnero	4-24	Clay, silty clay, clay loam.	CL, CH	A-7	0-5	85-100	80-100	80-100	60-95	40-55	15-30
	24-32	Sandy clay loam.	CL	A-6, A-7	0-5	85-100	75-100	70-100	60-95	30-45	10-20
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CD*:											
Carnero	0-4	Loam	CL	A-6, A-7	0-5	85-100	75-100	70-100	60-95	30-45	10-20
	4-27	Clay, silty clay, clay loam.	CL, CH	A-7	0-5	85-100	80-100	80-100	60-95	40-55	15-30
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Partri	0-9	Silt loam	CL-ML	A-4	0	100	100	90-100	70-95	20-30	NP-10
	9-34	Clay loam, silty clay loam, clay.	CL	A-6, A-7	0	95-100	90-100	80-100	70-85	30-50	10-30
	34-60	Gravelly clay loam, cobbly silty clay loam, silty clay loam.	GC, CL	A-6	0-30	60-100	55-100	45-95	45-80	30-40	10-20
Cf, Cg	0-8	Loam	ML, CL	A-4, A-6	0	100	100	90-100	70-90	30-35	5-15
Colmor	8-32	Silty clay loam, clay loam, silt loam.	CL	A-6	0	100	100	95-100	80-95	30-40	10-20
	32-60	Loam, silt loam	CL-ML, ML	A-4, A-6, A-7	0	100	100	90-100	60-85	25-45	5-15
CH	0-4	Silt loam	ML, CL	A-4, A-6	0	100	100	90-100	70-90	30-35	5-15
Colmor	4-32	Silty clay loam, clay loam, silt loam.	CL	A-6	0	100	100	95-100	80-95	30-40	10-20
	32-60	Loam, silt loam	CL-ML, ML	A-4, A-6, A-7	0	100	100	90-100	60-85	25-45	5-15
CK*:											
Conchas	0-2	Loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-90	25-35	5-15
	2-30	Silt loam, silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-90	30-45	10-20
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Latom	0-10	Fine sandy loam	SM	A-4, A-2	0-5	80-100	75-100	70-90	25-45	20-25	NP-5
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CT*:											
Crews	0-5	Loam	CL-ML, CL	A-4, A-6	0	85-100	80-100	70-100	50-85	25-35	5-15
	5-16	Clay loam, clay	CL, CH	A-6, A-7	0	85-100	80-100	75-100	55-95	35-55	15-30
	16	Indurated	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CT*:											
Tricon	0-7	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	70-90	20-35	5-15
	7-33	Clay loam, clay, silty clay loam.	CL, CH	A-6, A-7	0	100	100	90-100	75-95	35-55	15-30
	33	Indurated	---	---	---	---	---	---	---	---	---
DA*:											
Dioxice	0-4	Loam	CL	A-6	0	95-100	90-100	80-100	70-85	30-40	10-15
	4-24	Loam, clay loam	ML, CL	A-4, A-6, A-7	0	95-100	90-100	85-100	60-85	30-45	5-20
	24-60	Loam, clay loam, gravelly loam.	ML, CL	A-4, A-6, A-7	0-15	65-100	60-100	55-100	50-85	30-45	5-20
Dean	0-8	Loam	ML, CL-ML	A-4	0	80-100	75-100	65-95	60-85	20-30	NP-10
	8-60	Gravelly loam, loam.	GM, SM	A-4	5-10	60-80	55-80	50-65	35-50	20-30	NP-5
DB*:											
Dumas	0-4	Loam	CL, CL-ML	A-4, A-6	0	100	100	95-100	50-70	25-35	5-15
	4-60	Clay loam, sandy clay loam.	CL	A-6, A-7	0	100	100	95-100	50-75	25-45	10-25
La Brier	0-4	Silt loam	ML	A-4, A-6	0	100	100	95-100	70-85	30-40	5-15
	4-40	Silty clay loam, clay loam, clay.	CL, CH	A-7	0	100	100	95-100	85-100	40-55	15-30
	40-60	Silty clay loam, clay loam.	ML, CL	A-7	0	100	100	95-100	85-100	40-50	10-25
GA	0-3	Very gravelly fine sandy loam.	GM	A-1, A-2	5-10	50-65	45-55	30-45	10-35	20-25	NP-5
Gallegos	3-13	Gravelly clay loam, very gravelly sandy clay loam, very gravelly loam.	SM-SC, SC, GM-GC, GC	A-2, A-6, A-4	5-15	50-75	30-60	25-50	10-40	20-30	5-15
	13-60	Very gravelly sandy loam, gravelly sandy loam, very gravelly loam.	GP-GM, GP	A-1	5-15	20-40	15-30	5-15	0-10	---	NP
GB*:											
Gullied land.											
Manzano	0-14	Loam	CL-ML	A-4	0	100	100	85-100	60-80	20-30	5-10
	14-60	Loam, clay loam	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-85	25-40	5-15
GC*:											
Gullied land.											
Montoya	0-2	Clay loam	CL, CH	A-6, A-7	0	100	100	90-100	70-80	30-55	10-35
	2-60	Clay, clay loam.	CL, CH	A-7	0	100	100	90-100	75-95	45-55	25-35

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
KA*:											
Karde	0-6	Loam	ML, CL-ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	6-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	75-85	25-35	5-15
Vermejo	0-3	Clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-25
	3-60	Silty clay, clay	CL, CH	A-7	0	100	100	90-100	75-95	45-55	20-35
KR*	0-4	Stony loam	ML, CL-ML	A-4	20-45	90-100	85-95	75-90	55-70	25-35	5-10
Kiln	4-14	Stony clay loam, stony silty clay loam.	ML, CL	A-6, A-7	20-45	90-100	85-95	75-95	50-75	35-45	10-20
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
La	0-4	Silty clay loam	ML, CL	A-6, A-7	0	100	100	95-100	85-100	35-45	10-20
La Brier	4-60	Silty clay loam, clay loam, clay.	CL, CH	A-7	0	100	100	95-100	85-100	40-55	15-30
LB*:											
Lacita	0-4	Silty clay loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	4-60	Silt loam, silty clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
San Jose	0-12	Fine sandy loam	SM, ML	A-4	0	100	100	70-85	40-55	15-25	NP-5
	12-60	Stratified sandy loam, sandy clay loam.	SM, ML, CL-ML, SM-SC	A-4	0	100	100	65-90	35-65	15-25	NP-10
LC*:											
La Lande	0-3	Sandy loam	SM, ML	A-4	0	100	100	90-100	35-75	---	NP
	3-31	Loam, sandy clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	100	100	85-95	55-75	25-35	5-15
	31-60	Loam, sandy clay loam, clay loam	CL-ML	A-4	0	100	100	85-95	50-60	20-30	5-10
Redona	0-5	Loam	ML	A-4	0	100	100	85-100	60-75	15-25	NP-5
	5-60	Sandy clay loam, clay loam, silty clay loam	SM-SC, SC, CL-ML, CL	A-4, A-6	0	100	100	80-100	35-55	20-35	5-15
LE*:											
Laporte	0-5	Channery loam	ML, GM	A-4	0-15	50-90	50-75	45-70	35-60	20-30	NP-5
	5-13	Channery loam, channery clay loam, stony loam.	GM	A-2, A-4, A-1	0-15	50-70	50-70	35-65	20-45	20-30	NP-5
	13	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
LE*:											
Escabosa----------	0-3	Channery loam---	SM, ML, GM	A-4	0-10	65-80	55-75	50-70	35-60	20-30	NP-5
	3-28	Gravelly loam, cobbly loam, cobbly clay loam.	CL-ML, GM-GC, CL, SC	A-4, A-6	0-30	65-80	60-75	50-70	40-60	25-40	5-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
LF*:											
Laporte----------	0-5	Stony loam------	GM, ML	A-2, A-4	25-35	50-90	50-90	40-70	25-60	20-30	NP-5
	5-13	Channery loam, channery clay loam, loam.	GM	A-2, A-4, A-1	0-15	50-70	50-70	35-65	20-45	20-30	NP-5
	13	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Escabosa----------	0-2	Stony loam------	SM, ML, GM	A-4	0-10	65-80	55-75	50-70	35-60	20-30	NP-5
	2-26	Gravelly loam, cobbly loam, cobbly clay loam.	CL-ML, GM-GC, CL, SC	A-4, A-6	0-30	65-80	60-75	50-70	40-60	25-40	5-20
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
LN*:											
Latom----------	0-13	Fine sandy loam	SM	A-4, A-2	0-5	80-100	75-100	70-90	25-45	20-25	NP-5
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Newkirk----------	0-4	Fine sandy loam	SM, ML	A-2, A-4	0-5	85-100	80-100	50-85	25-55	20-30	NP-5
	4-13	Sandy clay loam, clay loam.	SM-SC, CL-ML, SC, CL	A-2, A-4, A-6	0-5	85-100	80-100	65-95	30-75	25-40	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Lo, Lp----------	0-5	Clay loam-------	CL	A-6, A-7	0	100	100	90-100	70-80	30-45	10-20
Litle	5-23	Clay, silty clay, clay loam	CL, CH	A-7	0	100	100	90-100	80-95	40-55	15-30
	23	Weathered bedrock.	---	---	---	---	---	---	---	---	---
MA----------	0-5	Loamy fine sand	SM	A-2, A-4, A-1	0	95-100	75-100	45-85	15-45	---	NP
Manter	5-33	Fine sandy loam, sandy loam.	SM, ML	A-2, A-4	0	95-100	75-100	50-85	30-55	15-25	NP-5
	33-60	Sandy loam, loamy fine sand	SM	A-2, A-4, A-1	0	95-100	75-100	40-85	15-50	---	NP
Mb----------	0-6	Fine sandy loam	SM, ML	A-4	0	100	100	70-85	40-55	20-25	NP
Manzano	6-60	Loam, clay loam	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-85	25-40	5-15
MC----------	0-3	Loam----------	CL-ML, CL	A-4	0	100	100	85-100	60-80	20-30	5-10
Manzano	3-60	Loam, clay loam	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-85	25-40	5-15
Md----------	0-11	Clay loam-------	CL	A-6	0	100	100	90-100	75-85	30-40	10-15
Manzano	11-60	Loam, clay loam	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-85	25-40	5-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
ME*:											
Mion	0-4	Silty clay loam	CL	A-6	0	100	100	90-100	65-95	30-40	10-15
	4-12	Silty clay, clay	CL, CH	A-7	0	100	100	90-100	75-95	40-55	15-25
	12	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Penrose	0-4	Channery loam	ML, CL-ML, GM	A-4	5-20	60-75	60-75	50-75	40-60	15-25	NP-10
	4-14	Clay loam, loam.	CL-ML	A-4	5-20	85-95	80-90	70-80	50-75	20-30	5-10
	14	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Litle	0-5	Clay loam	CL	A-6, A-7	0	100	100	90-100	70-80	30-45	10-20
	5-23	Clay, silty clay, clay loam	CL, CH	A-7	0	100	100	90-100	80-95	40-55	15-30
	23	Weathered bedrock.	---	---	---	---	---	---	---	---	---
MF*:											
Montoya	0-4	Clay loam	CL, CH	A-6, A-7	0	100	100	90-100	70-80	30-55	10-35
	4-60	Clay, clay loam.	CL, CH	A-7	0	100	100	90-100	75-95	45-55	25-35
Tucumcari	0-4	Loam	CL, CL-ML	A-4, A-6	0	100	100	85-95	65-75	25-35	5-15
	4-51	Clay loam, silty clay, silty clay loam.	CL, CH	A-6, A-7	0	100	100	90-100	60-90	35-55	20-30
	51-60	Clay loam, silty clay loam, clay	CL	A-6	0	100	100	90-100	60-90	30-40	10-20
Lacita	0-4	Silty clay loam	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
	4-60	Silt loam, silty clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
MG*:											
Moreno	0-4	Loam	ML, CL-ML	A-4	5-10	95-100	90-95	75-90	55-70	25-35	5-10
	4-53	Clay loam, clay.	CL	A-6, A-7	5-15	95-100	75-95	65-90	50-75	35-50	15-25
	53-60	Gravelly clay, gravelly sandy clay, clay loam	CL, CH, SC	A-7	10-20	80-90	60-80	50-70	40-55	40-55	20-30
Brycan	0-5	Loam	CL-ML, ML	A-4	0	100	100	85-95	60-75	25-35	5-10
	5-50	Loam, clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0-10	95-100	90-100	75-90	35-55	25-35	5-15
	50-60	Clay loam, loam, sandy clay loam	CL, ML	A-6, A-4	0-15	90-100	85-100	70-90	60-80	30-40	5-20
NW*:											
Newkirk	0-4	Sandy loam	SM, ML	A-2, A-4	0-5	85-100	80-100	50-85	25-55	20-30	NP-5
	4-13	Sandy clay loam, clay loam.	SM-SC, CL-ML, SC, CL	A-2, A-4, A-6	0-5	85-100	80-100	65-95	30-75	25-40	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Walkon	0-4	Fine sandy loam	SM	A-2, A-4	0-5	90-100	90-100	55-70	25-40	15-20	NP-5
	4-31	Clay loam, silt loam, sandy clay loam.	CL	A-6, A-7	0-5	95-100	95-100	95-100	95-100	35-50	15-25
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
NW*:											
Conchas	0-5	Loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	60-90	25-35	5-15
	5-30	Silt loam, silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	75-90	30-45	10-20
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Pa, Pb, PC	0-4	Loam	CL-ML	A-4	0	100	100	90-100	70-95	20-30	NP-10
Partri	4-60	Clay loam, silty clay loam, clay.	CL	A-6, A-7	0	95-100	90-100	80-100	70-85	30-50	10-30
PD*:											
Partri	0-4	Silt loam	CL-ML, ML	A-4	0	100	100	90-100	70-95	20-30	NP-10
	4-29	Clay loam, silty clay loam, clay.	CL	A-6, A-7	0	95-100	90-100	80-100	70-85	30-50	10-30
	29-60	Gravelly clay loam, cobbly silty clay loam, silty clay loam.	GC, CL	A-6	0-30	60-100	55-100	45-95	45-80	30-40	10-20
Tricon	0-7	Silt loam	CL-ML, CL	A-4, A-6	0	100	100	85-100	70-90	20-35	5-15
	7-33	Clay loam, clay, silty clay loam.	CL, CH	A-6, A-7	0	100	100	90-100	75-95	35-55	15-30
	33	Indurated	---	---	---	---	---	---	---	---	---
PM*:											
Penrose	0-4	Channery silt loam.	ML, GM	A-4	5-10	60-75	60-75	50-75	40-60	15-25	NP-5
	4-14	Clay loam, loam, channery loam.	ML, CL-ML, GM, GM-GC	A-4	5-10	60-80	60-80	50-75	40-60	15-25	NP-10
	14	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Litle	0-5	Clay	CL, CH	A-7	0	100	100	90-100	80-95	40-55	15-30
	5-23	Clay, silty clay, clay loam	CL, CH	A-7	0	100	100	90-100	80-95	40-55	15-30
	23	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Mion	0-4	Clay loam	CL	A-4, A-6	0	100	100	90-100	65-95	30-40	10-15
	4-12	Silty clay, clay	CL, CH	A-7	0	100	100	90-100	75-95	40-55	15-25
	12	Weathered bedrock.	---	---	---	---	---	---	---	---	---
QU	0-6	Gravelly loam	SM, GM, SM-SC, GM-GC	A-4	0	65-80	60-75	50-70	35-50	25-35	NP-10
Quintana	6-33	Clay loam, sandy clay loam, loam.	CL-ML, CL, SM-SC, SC	A-4, A-6	0	95-100	90-100	75-95	35-75	25-40	5-15
	33-41	Sandy loam	SM	A-1, A-2	0	80-90	75-85	45-60	20-35	20-25	NP-5
	41-60	Very gravelly sandy loam.	SM, SP-SM, GM, GP-GM	A-1, A-2	0	35-65	30-50	20-40	5-30	20-25	NP-5

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
RE*:											
Redona	0-5	Loam	ML	A-4	0	100	100	85-100	60-75	15-25	NP-5
	5-60	Sandy clay loam, clay loam, silty clay loam	SM-SC, SC, CL-ML, CL	A-4, A-6	0	100	100	80-100	35-55	20-35	5-15
Quay	0-6	Loam	ML, CL-ML	A-4	0	100	100	85-100	55-70	25-35	5-10
	6-60	Clay loam, silty clay loam, loam.	CL, CL-ML	A-4, A-6	0	100	100	85-100	75-85	25-35	5-15
RF*:											
Ribera	0-5	Loam	ML, SM	A-4	0	100	100	70-90	40-60	20-25	NP-5
	5-26	Clay loam, sandy clay loam.	CL-ML, CL	A-4	0	100	100	85-95	50-75	25-30	5-10
	26-31	Loam, sandy loam	ML, SM	A-4	0	100	100	70-90	45-60	20-25	NP-5
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Sombordoro	0-7	Very stony fine sandy loam.	GM, SM	A-1, A-2, A-4	25-40	60-100	55-95	40-65	15-40	---	NP
	7-16	Extremely stony clay, extremely stony sandy clay.	CL, CH	A-6, A-7	40-95	85-100	80-100	70-100	50-90	35-55	20-30
	16	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Vibo	0-8	Sandy loam	SM, ML	A-4	0	100	100	60-85	35-55	20-30	NP-5
	8-24	Sandy clay loam, loam, clay loam	SM-SC, SC, CL-ML, CL	A-4, A-6	0	100	100	80-90	35-55	25-35	5-15
	24-60	Sandy loam, loam	SM	A-2, A-4	0	100	100	60-70	30-40	20-30	NP-5
RG*:											
Rocio	0-5	Stony loam	SM	A-2, A-4	10-15	70-95	65-80	55-80	25-40	---	NP
	5-18	Stony sandy loam	SM, GM	A-2, A-4	10-15	60-80	55-75	45-65	25-40	---	NP
	18-60	Clay, sandy clay	CH	A-7	0-10	90-100	90-100	75-100	50-95	50-60	25-35
Dargol	0-9	Stony loam	ML, SM	A-4	5-15	90-100	70-90	55-85	35-65	---	NP-5
	9-37	Clay, clay loam	CH, MH	A-7	5-15	90-100	70-100	65-90	60-80	50-60	20-30
	37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Stout	0-4	Cobbly sandy loam.	SM	A-2	25-35	95-100	90-100	50-70	20-35	---	NP
	4-10	Cobbly fine sandy loam, cobbly sandy loam.	SM	A-2, A-4	30-40	95-100	90-100	55-75	30-45	---	NP
	10	Weathered bedrock.	---	---	---	---	---	---	---	---	---
RH*:											
Rock outcrop.											
Haploborolls.											
RT*:											
Rock outcrop.											
Torriorthents.											

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
SR*:											
Stout	0-4	Cobbly fine sandy loam.	SM	A-2	25-35	95-100	90-100	50-70	20-35	---	NP
	4-10	Cobbly fine sandy loam, cobbly sandy loam.	SM	A-2, A-4	30-40	95-100	90-100	55-75	30-45	---	NP
	10	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rocio	0-5	Gravelly loam---	SM	A-2, A-4	0-10	70-95	65-80	55-80	25-40	---	NP
	5-18	Gravelly fine sandy loam.	SM, GM	A-2, A-4	0-10	60-80	55-75	45-65	25-40	---	NP
	18-60	Clay, sandy clay	CH	A-7	0-10	90-100	90-100	75-100	50-95	50-60	25-35
Dargol	0-12	Stony loam------	ML	A-4	10-20	90-100	75-100	75-95	60-75	20-30	NP-5
	12-22	Clay, clay loam	CH, MH	A-7	5-15	90-100	70-100	65-90	60-80	50-60	20-30
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
SW	0-7	Silt loam-------	ML, CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	NP-15
Swastika	7-30	Clay loam, clay, silty clay loam	CL, CH	A-6, A-7	0	100	100	95-100	90-95	35-55	15-30
	30-60	Silty clay loam, clay loam.	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
Sx	0-3	Clay loam-------	ML, CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	NP-15
Swastika	3-31	Clay loam, clay, silty clay loam	CL, CH	A-6, A-7	0	100	100	95-100	90-95	35-55	15-30
	31-60	Silty clay loam, clay loam.	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
Sy	0-2	Clay loam-------	ML, CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	25-35	NP-15
Swastika	2-30	Clay loam, clay, silty clay loam	CL, CH	A-6, A-7	0	100	100	95-100	90-95	35-55	15-30
	30-60	Silty clay loam, clay loam.	CL, CH	A-6, A-7	0	100	100	95-100	90-95	35-55	15-30
TD*:											
Tapia	0-5	Loam------------	ML, CL-ML	A-4	0	100	100	85-100	55-80	20-30	NP-10
	5-22	Clay loam, sandy clay loam, loam.	CL	A-6, A-7	0	100	100	85-100	55-85	30-45	10-20
	22-60	Gravelly loam, very gravelly loam.	SM, SM-SC	A-4, A-2	5-15	50-70	45-65	35-55	25-40	20-35	NP-10
Dean	0-13	Loam------------	ML, CL-ML	A-4	0	80-100	75-100	65-95	60-85	20-30	NP-10
	13-60	Gravelly loam, loam.	GM, SM	A-4	5-10	60-80	55-80	50-65	35-50	20-30	NP-5
TE	0-6	Loam------------	CL-ML	A-4	0	100	100	85-95	65-85	15-25	5-10
Teco	6-36	Silty clay loam, clay, clay loam	CL, CH	A-7	0	95-100	90-100	80-100	70-95	40-55	15-30
	36-60	Gravelly fine sandy loam, sandy loam, clay loam.	SM-SC, SM, GM-GC, GM, Cl	A-1, A-2, A-4, A-6	0-5	55-95	50-90	30-80	15-60	15-30	5-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
TG	0-7	Gravelly loam	SM	A-2, A-4	0-5	70-90	60-75	45-70	25-50	20-30	NP-5
Tinaja	7-14	Gravelly clay loam, gravelly sandy clay loam, gravelly loam.	SM, SM-SC	A-2, A-4	0-10	70-90	60-80	45-70	25-50	20-30	NP-10
	14-42	Very gravelly sandy clay loam, very gravelly loam, very gravelly sandy loam.	GM, SM	A-1, A-2	0-5	50-70	30-50	25-50	10-35	20-30	NP-5
	42-60	Very gravelly loamy sand, very gravelly sand, very gravelly sandy loam.	GP, GP-GM	A-1	0-5	20-45	15-35	5-20	0-10	---	NP
TR*:											
Tuloso	0-3	Stony sandy loam	SM	A-2, A-4	20-25	80-90	75-85	50-65	25-40	15-20	NP-5
	3-11	Very stony fine sandy loam, very stony loam, stony loam.	GM, GM-GC	A-1, A-2, A-4	35-45	55-65	50-60	35-55	20-40	15-30	NP-10
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Sombordoro	0-7	Very stony fine sandy loam.	GM, SM	A-1, A-2, A-4	25-40	60-100	55-95	40-65	15-40	---	NP
	7-16	Extremely stony clay, very stony sandy clay.	CL, CH	A-6, A-7	40-95	85-100	80-100	70-100	50-90	35-55	20-30
	16	Weathered bedrock.	---	---	---	---	---	---	---	---	---
TS*:											
Tuloso	0-3	Stony sandy loam	SM	A-2, A-4	20-25	80-90	75-85	50-65	25-40	15-20	NP-5
	3-11	Very stony fine sandy loam, very stony loam, stony loam.	GM, GM-GC	A-1, A-2, A-4	35-45	55-65	50-60	35-55	20-40	15-30	NP-10
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Sombordoro	0-3	Very stony loam.	GM, SM	A-1, A-2, A-4	25-40	60-100	55-95	40-65	15-40	---	NP
	3-11	Very stony clay, very stony sandy clay.	CL, CH	A-6, A-7	40-95	85-100	80-100	70-100	50-90	35-55	20-30
	11	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
UF*. Ustifluvents											

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
UR*:											
Ustorthents.											
Rock outcrop.											
Va---------- Vermejo	0-2	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	85-95	35-45	15-20
	2-60	Silty clay, clay	CL, CH	A-7	0	100	100	90-100	75-95	45-55	20-35
VB*:											
Vibo----------	0-8	Fine sandy loam	SM, ML	A-4	0	100	100	60-85	35-55	20-30	NP-5
	8-24	Sandy clay loam, loam, clay loam	SM-SC, SC, CL-ML, CL	A-4, A-6	0	100	100	80-90	35-55	25-35	5-15
	24-60	Sandy loam, loam	SM	A-2, A-4	0	100	100	60-70	30-40	20-30	NP-5
Ribera----------	0-5	Fine sandy loam	ML, SM	A-4	0	100	100	70-90	40-60	20-25	NP-5
	5-26	Clay loam, sandy clay loam.	CL-ML	A-4	0	100	100	85-95	50-75	25-30	5-10
	26-31	Loam, sandy loam	ML, SM	A-4	0	100	100	70-90	45-60	20-25	NP-5
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
VC*:											
Vibo----------	0-8	Fine sandy loam	SM, ML	A-4	0	100	100	60-85	35-55	20-30	NP-5
	8-24	Sandy clay loam, loam, clay loam.	SM-SC, CL-ML, CL	A-4, A-6	0	100	100	80-90	35-55	25-35	5-15
	24-60	Sandy loam, loam	SM	A-2, A-4	0	100	100	60-70	30-40	20-30	NP-5
Rock outcrop.											
Ribera----------	0-5	Fine sandy loam	ML, SM	A-4	0	100	100	70-90	40-60	20-25	NP-5
	5-26	Clay loam, sandy clay loam.	CL-ML	A-4	0	100	100	85-95	50-75	25-30	5-10
	26-31	Loam, sandy loam	ML, SM	A-4	0	100	100	70-90	45-60	20-25	NP-5
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
AQ*:										
Andok	0-9	12-18	0.6-2.0	0.09-0.11	7.9-8.4	<2	Low	0.24	5	8
	9-37	24-30	0.6-2.0	0.07-0.10	7.9-8.4	<2	Moderate	0.24		
	37-60	5-15	2.0-6.0	0.05-0.08	7.9-8.4	<2	Low	0.20		
Quintana	0-6	15-27	0.6-2.0	0.17-0.19	7.4-7.8	<2	Low	0.37	5	6
	6-19	20-30	0.6-2.0	0.16-0.19	7.4-8.4	<2	Moderate	0.32		
	19-60	10-23	2.0-6.0	0.09-0.15	7.9-8.4	<2	Low	0.20		
AY*:										
Apache	0-6	20-27	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low	0.28	1	8
	6-19	25-35	0.6-2.0	0.12-0.16	7.4-8.4	<2	Low	0.28		
	19	---	---	---	---	---	---	---		
Ayon	0-11	18-27	0.6-2.0	0.09-0.13	7.4-9.0	<2	Low	0.24	5	8
	11-60	16-30	0.6-2.0	0.09-0.13	7.4-9.0	<2	Low	0.24		
BA*.										
Badland										
Be	0-6	18-27	0.6-2.0	0.18-0.21	6.6-7.8	<2	Moderate	0.28	1	6
Bernal	6-19	25-35	0.6-2.0	0.18-0.21	6.6-7.8	<2	Moderate	0.28		
	19	---	---	---	---	---	---	---		
BR*:										
Bernal	0-5	18-35	0.6-2.0	0.13-0.16	6.6-7.8	<2	Moderate	0.28	1	5
	5-12	18-35	0.6-2.0	0.18-0.21	6.6-7.8	<2	Moderate	0.28		
	12	---	---	---	---	---	---	---		
Rock outcrop.										
CA*:										
Canez	0-10	5-15	2.0-6.0	0.13-0.15	6.6-8.4	<2	Low	0.32	5	3
	10-32	18-25	0.6-2.0	0.12-0.16	6.6-8.4	<2	Low	0.32		
	32-60	18-30	0.6-2.0	0.12-0.16	7.9-8.4	<2	Low	0.32		
Ima	0-7	5-10	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low	0.37	5	3
	7-46	8-18	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low	0.43		
	46-60	30-35	0.6-2.0	0.15-0.20	7.9-8.4	<2	Low	0.32		
Cb, Cc	0-4	20-27	0.2-0.6	0.17-0.19	6.6-7.8	<2	Moderate	0.24	2	6
Carnero	4-24	35-50	0.06-0.2	0.13-0.20	6.6-8.4	<2	High	0.24		
	24-32	20-25	0.6-2.0	0.17-0.19	6.6-7.8	<2	Moderate	0.24		
	32	---	---	---	---	---	---	---		
CD*:										
Carnero	0-4	20-27	0.2-0.6	0.17-0.19	6.6-7.8	<2	Moderate	0.24	2	6
	4-27	35-50	0.06-0.2	0.13-0.20	6.6-8.4	<2	High	0.24		
	27	---	---	---	---	---	---	---		
Partri	0-9	18-27	0.6-2.0	0.16-0.21	6.6-8.4	<2	Low	0.37	5	6
	9-34	35-55	0.06-0.2	0.14-0.21	6.6-8.4	<2	High	0.32		
	34-60	35-40	0.2-0.6	0.15-0.17	7.9-8.4	<2	High	0.28		
Cf, Cg	0-8	20-27	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.37	5	4L
Colmor	8-32	24-35	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.49		
	32-60	17-27	0.2-2.0	0.16-0.18	7.9-8.4	<2	Low	0.43		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
CH----------	0-4	20-27	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate-----	0.37	5	4L
Colmor	4-32	24-35	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate-----	0.49		
	32-60	17-27	0.2-2.0	0.16-0.18	7.9-8.4	<2	Low----------	0.43		
CK*:										
Conchas----------	0-2	12-25	0.6-2.0	0.16-0.21	7.4-8.4	<2	Low----------	0.37	2	5
	2-30	22-35	0.2-0.6	0.19-0.21	7.9-9.0	<2	Moderate-----	0.49		
	30	---	---	---	---	---	----------	---		
CK*:										
Latom----------	0-10	8-15	0.6-2.0	0.10-0.15	7.9-8.4	<2	Low----------	0.24	1	3
	10	---	---	---	---	---	----------	---		
CT*:										
Crews----------	0-5	10-25	0.6-2.0	0.16-0.21	6.6-7.8	<2	Moderate-----	0.32	1	6
	5-16	35-50	0.2-0.6	0.14-0.20	6.6-7.8	<2	High----------	0.37		
	16	---	---	---	---	---	----------	---		
Tricon----------	0-7	20-27	0.2-2.0	0.19-0.21	6.6-7.8	<2	Low----------	0.32	2	6
	7-33	35-50	0.06-0.2	0.14-0.21	6.6-8.4	<2	High----------	0.28		
	33	---	---	---	---	---	----------	---		
DA*:										
Dioxice----------	0-4	15-27	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate-----	0.37	3	4L
	4-24	20-35	0.2-0.6	0.16-0.21	7.4-8.4	<2	Moderate-----	0.37		
	24-60	20-30	0.2-0.6	0.08-0.16	7.4-8.4	<2	Moderate-----	0.37		
Dean----------	0-8	10-25	0.6-2.0	0.11-0.17	7.9-8.4	<2	Low----------	0.32	1	4L
	8-60	18-25	0.06-0.2	0.04-0.06	7.9-8.4	2-4	Low----------	0.28		
DB*:										
Dumas----------	0-4	15-25	0.6-2.0	0.14-0.19	6.6-7.8	<2	Low----------	0.32	5	5
	4-60	25-35	0.6-2.0	0.15-0.20	7.4-8.4	<2	Low----------	0.32		
La Brier---------	0-4	18-27	0.6-2.0	0.13-0.19	6.6-8.4	<2	Moderate-----	0.32	5	6
	4-40	35-60	<0.06	0.13-0.17	7.4-8.4	<2	High----------	0.32		
	40-60	30-40	0.06-0.2	0.15-0.19	7.9-8.4	<2	Moderate-----	0.37		
GA----------	0-3	10-20	2.0-6.0	0.07-0.13	6.6-8.4	<2	Low----------	0.20	2	7
Gallegos	3-13	20-30	2.0-6.0	0.04-0.10	7.4-8.4	<2	Low----------	0.10		
	13-60	5-15	6.0-20	0.03-0.05	7.9-8.4	<2	Low----------	0.10		
GB*:										
Gullied land.										
Manzano----------	0-14	10-25	0.6-2.0	0.16-0.18	6.6-8.4	<2	Low----------	0.28	5	6
	14-60	18-34	0.2-0.6	0.16-0.21	7.4-8.4	<2	Moderate-----	0.32		
GC*:										
Gullied land.										
Montoya----------	0-2	30-40	0.2-0.6	0.19-0.21	7.4-8.4	2-8	High----------	0.37	5	4
	2-60	35-60	<0.06	0.14-0.16	7.4-8.4	2-8	High----------	0.37		
KA*:										
Karde----------	0-6	15-25	0.6-2.0	0.13-0.17	7.9-8.4	2-8	Low----------	0.37	5	4L
	6-60	20-35	0.6-2.0	0.13-0.17	7.9-9.0	2-8	Low----------	0.37		
Vermejo----------	0-3	30-40	0.2-0.6	0.19-0.21	7.9-9.0	>2	Moderate-----	0.28	5	4L
	3-60	40-50	<0.06	0.15-0.17	7.9-9.0	>2	High----------	0.32		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
KR*--------	0-4	18-27	0.6-2.0	0.10-0.15	6.6-7.8	<2	Low----------	0.28	1	8
Kiln	4-14	28-35	0.6-2.0	0.10-0.15	6.6-7.8	<2	Moderate-----	0.28		
	14	---	---	---	---	---	----------	---		
Rock outcrop.										
La----------	0-4	28-35	0.2-0.6	0.15-0.19	6.6-8.4	<2	Moderate-----	0.32	5	7
La Brier	4-60	35-60	<0.06	0.13-0.17	7.4-8.4	<2	High---------	0.32		
LB*:										
Lacita----------	0-4	28-35	0.2-0.6	0.19-0.21	7.9-8.4	<2	Moderate-----	0.49	5	4L
	4-60	20-35	0.2-0.6	0.19-0.21	7.9-8.4	<2	Moderate-----	0.49		
San Jose--------	0-12	5-15	2.0-6.0	0.13-0.15	7.4-8.4	<2	Low----------	0.28	5	3
	12-60	5-15	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low----------	0.32		
LC*:										
La Lande--------	0-3	10-15	0.6-2.0	0.11-0.18	7.4-8.4	<2	Low----------	0.37	5	5
	3-31	18-35	0.6-2.0	0.14-0.21	7.9-8.4	<2	Moderate-----	0.32		
	31-60	18-30	0.6-2.0	0.14-0.18	7.9-8.4	<2	Low----------	0.32		
Redona----------	0-5	15-25	0.6-2.0	0.15-0.18	7.4-7.8	<2	Low----------	0.32	5	5
	5-60	20-35	0.6-2.0	0.14-0.21	7.4-8.4	<2	Moderate-----	0.32		
LE*:										
Laporte---------	0-5	20-30	0.6-2.0	0.08-0.15	7.9-8.4	<2	Low----------	0.10	1	8
	5-13	15-30	0.6-2.0	0.08-0.15	7.9-8.4	<2	Low----------	0.10		
	13	---	---	---	---	---	----------	---		
Escabosa--------	0-3	15-27	0.6-2.0	0.14-0.17	7.4-8.4	<2	Low----------	0.24	2	8
	3-28	18-35	0.6-2.0	0.13-0.19	7.9-8.4	<2	Low----------	0.32		
	28	---	---	---	---	---	----------	---		
LF*:										
Laporte---------	0-5	12-20	0.6-2.0	0.08-0.15	7.9-8.4	<2	Low----------	0.10	1	8
	5-13	15-30	0.6-2.0	0.08-0.15	7.9-8.4	<2	Low----------	0.10		
	13	---	---	---	---	---	----------	---		
Rock outcrop.										
Escabosa--------	0-2	15-27	0.6-2.0	0.14-0.17	7.4-8.4	<2	Low----------	0.24	2	8
	2-26	18-35	0.6-2.0	0.13-0.19	7.9-8.4	<2	Low----------	0.32		
	26	---	---	---	---	---	----------	---		
LN*:										
Latom-----------	0-13	8-15	0.6-2.0	0.10-0.15	7.9-8.4	<2	Low----------	0.24	1	3
	13	---	---	---	---	---	----------	---		
Newkirk---------	0-4	10-20	2.0-6.0	0.11-0.15	6.6-8.4	<2	Low----------	0.24	1	3
	4-13	18-35	0.6-2.0	0.13-0.20	7.4-8.4	<2	Moderate-----	0.28		
	13	---	---	---	---	---	----------	---		
Rock outcrop.										
Lo, Lp----------	0-5	30-40	0.2-0.6	0.15-0.21	7.4-8.4	<2	Moderate-----	0.37	3	4L
Litle	5-23	38-55	<0.06	0.12-0.16	7.9-8.4	2-8	High---------	0.32		
	23	---	---	---	---	---	----------	---		
MA----------	0-5	3-8	6.0-20	0.08-0.12	6.6-7.8	<2	Low----------	0.10	5	2
Manter	5-33	8-18	2.0-6.0	0.11-0.14	6.6-7.8	<2	Low----------	0.15		
	33-60	5-12	6.0-20	0.08-0.14	7.9-8.4	<2	Low----------	0.15		
Mb----------	0-6	8-20	0.6-2.0	0.13-0.15	6.6-7.8	<2	Low----------	0.24	5	3
Manzano	6-60	18-34	0.2-0.6	0.16-0.21	7.4-8.4	<2	Moderate-----	0.32		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
MC----------	0-3	10-25	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low----------	0.28	5	6
Manzano	3-60	18-34	0.2-0.6	0.16-0.21	7.4-8.4	<2	Moderate-----	0.32		
Md----------	0-11	28-35	0.2-2.0	0.19-0.21	6.6-7.8	<2	Moderate-----	0.28	5	6
Manzano	11-60	18-34	0.2-0.6	0.16-0.21	7.4-8.4	<2	Moderate-----	0.32		
ME*:										
Mion----------	0-4	27-35	0.6-2.0	0.19-0.21	7.9-8.4	<2	Moderate-----	0.37	1	5
	4-12	35-55	<0.06	0.15-0.17	7.9-8.4	<2	High----------	0.32		
	12	---	---	---	---	---	----------	---		
Penrose----------	0-4	15-20	0.6-2.0	0.14-0.16	7.9-8.4	<2	Low----------	0.10	1	8
	4-14	18-30	0.6-2.0	0.13-0.16	7.9-8.4	<2	Low----------	0.28		
	14	---	---	---	---	---	----------	---		
Litle----------	0-5	30-40	0.2-0.6	0.15-0.21	7.4-8.4	<2	Moderate-----	0.37	3	4L
	5-23	38-55	<0.06	0.12-0.16	7.9-8.4	2-8	High----------	0.32		
	23	---	---	---	---	---	----------	---		
MF*:										
Montoya----------	0-4	30-40	0.2-0.6	0.19-0.21	7.4-8.4	2-8	High----------	0.37	5	4
	4-60	35-60	<0.06	0.14-0.16	7.4-8.4	2-8	High----------	0.37		
Tucumcari--------	0-4	18-35	0.2-2.0	0.16-0.21	6.6-8.4	2-4	Moderate-----	0.37	5	4L
	4-51	35-45	0.2-0.6	0.14-0.21	7.4-8.4	2-4	High----------	0.32		
	51-60	35-45	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate-----	0.32		
Lacita----------	0-4	28-35	0.2-0.6	0.19-0.21	7.9-8.4	<2	Moderate-----	0.49	5	4L
	4-60	20-35	0.2-0.6	0.19-0.21	7.9-8.4	<2	Moderate-----	0.49		
MG*:										
Moreno----------	0-4	18-27	0.6-2.0	0.14-0.17	6.6-7.3	<2	Moderate-----	0.24	5	6
	4-53	35-50	0.2-0.6	0.16-0.20	6.6-7.3	<2	Moderate-----	0.28		
	53-60	35-50	0.06-0.2	0.10-0.14	6.6-7.3	<2	High----------	0.15		
Brycan----------	0-5	15-20	0.6-2.0	0.15-0.18	7.4-7.8	<2	Low----------	0.32	5	5
	5-50	20-30	0.6-2.0	0.14-0.19	7.4-7.8	<2	Low----------	0.20		
	50-60	20-30	0.2-0.6	0.16-0.19	7.4-8.4	<2	Moderate-----	0.37		
NW*:										
Newkirk----------	0-4	10-20	2.0-6.0	0.11-0.15	6.6-8.4	<2	Low----------	0.24	1	3
	4-13	20-35	0.6-2.0	0.13-0.20	7.4-8.4	<2	Moderate-----	0.28		
	13	---	---	---	---	---	----------	---		
Walkon----------	0-4	15-20	2.0-6.0	0.14-0.16	6.6-7.8	<2	Low----------	0.32	2	5
	4-31	25-30	0.06-0.2	0.15-0.21	6.6-8.4	<2	High----------	0.32		
	31	---	---	---	---	---	----------	---		
Conchas----------	0-5	12-25	0.6-2.0	0.16-0.21	7.4-8.4	<2	Low----------	0.37	2	5
	5-30	22-35	0.2-0.6	0.19-0.21	7.9-9.0	<2	Moderate-----	0.49		
	30	---	---	---	---	---	----------	---		
Pa, Pb, PC-------	0-4	18-27	0.6-2.0	0.16-0.21	6.6-8.4	<2	Low----------	0.37	5	6
Partri	4-60	35-55	0.06-0.2	0.14-0.21	6.6-8.4	<2	High----------	0.32		
PD*:										
Partri----------	0-4	18-27	0.6-2.0	0.16-0.21	6.6-8.4	<2	Low----------	0.37	5	6
	4-29	35-55	0.06-0.2	0.14-0.21	6.6-8.4	<2	High----------	0.32		
	29-60	35-40	0.2-0.6	0.15-0.17	7.9-8.4	<2	High----------	0.28		
Tricon----------	0-7	20-27	0.2-2.0	0.19-0.21	6.6-7.8	<2	Low----------	0.32	2	6
	7-33	35-50	0.06-0.2	0.14-0.21	6.6-8.4	<2	High----------	0.28		
	33	---	---	---	---	---	----------	---		

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
PM*:										
Penrose	0-4	15-20	0.6-2.0	0.14-0.16	7.9-8.4	<2	Low	0.10	1	8
	4-14	18-30	0.6-2.0	0.13-0.16	7.9-8.4	<2	Low	0.28		
	14	---	---	---	---	---	---	---		
Litle	0-5	40-55	0.06-0.2	0.14-0.16	7.4-8.4	<4	High	0.32	3	4
	5-23	38-55	<0.06	0.12-0.16	7.9-8.4	2-8	High	0.32		
	23	---	---	---	---	---	---	---		
Mion	0-4	27-35	0.6-2.0	0.19-0.21	7.9-8.4	<2	Moderate	0.37	1	5
	4-12	35-55	<0.06	0.15-0.17	7.9-8.4	<2	High	0.32		
	12	---	---	---	---	---	---	---		
QU	0-6	15-27	0.6-2.0	0.08-0.10	7.4-7.8	<2	Low	0.28	5	8
Quintana	6-33	20-30	0.6-2.0	0.16-0.19	7.4-8.4	<2	Moderate	0.32		
	33-41	10-16	2.0-6.0	0.10-0.12	7.9-8.4	<2	Low	0.24		
	41-60	10-16	2.0-6.0	0.07-0.15	7.9-8.4	<2	Low	0.20		
RE*:										
Redona	0-5	15-25	0.6-2.0	0.15-0.18	6.6-7.8	<2	Low	0.32	5	5
	5-60	20-35	0.6-2.0	0.14-0.21	7.4-8.4	<2	Moderate	0.32		
Quay	0-6	10-27	0.6-2.0	0.16-0.18	7.9-8.4	<2	Low	0.37	5	4L
	6-60	18-35	0.6-2.0	0.19-0.21	7.9-8.4	<2	Moderate	0.37		
RF*:										
Ribera	0-5	12-18	0.6-2.0	0.13-0.16	6.6-7.8	<2	Low	0.24	2	3
	5-26	20-30	0.6-2.0	0.16-0.19	6.6-8.4	<2	Low	0.32		
	26-31	12-18	0.6-2.0	0.13-0.16	7.9-8.4	<2	Low	0.24		
	31	---	---	---	---	---	---	---		
Sombordoro	0-7	10-18	2.0-6.0	0.09-0.11	7.4-8.4	<2	Low	0.37	1	8
	7-16	35-55	0.06-0.2	0.04-0.11	7.4-8.4	<2	High	0.24		
	16	---	---	---	---	---	---	---		
Vibo	0-8	10-20	2.0-6.0	0.11-0.15	6.6-8.4	<2	Low	0.24	5	3
	8-24	20-30	0.6-2.0	0.14-0.16	6.6-8.4	<2	Moderate	0.32		
	24-60	16-20	0.6-6.0	0.11-0.13	6.6-8.4	<2	Low	0.24		
RG*:										
Rocio	0-5	10-25	2.0-6.0	0.11-0.18	6.1-7.3	<2	Low	0.28	5	7
	5-18	8-15	2.0-6.0	0.07-0.10	6.1-7.3	<2	Low	0.28		
	18-60	45-60	0.06-0.2	0.14-0.18	6.1-7.3	<2	High	0.37		
Dargol	0-9	15-27	0.6-2.0	0.13-0.15	5.6-6.5	<2	Low	0.24	3	7
	9-37	35-55	<0.06	0.14-0.16	5.6-6.5	<2	High	0.28		
	37	---	---	---	---	---	---	---		
Stout	0-4	5-18	2.0-6.0	0.05-0.10	5.6-6.5	<2	Low	0.32	1	3
	4-10	5-18	6.0-20	0.04-0.09	5.6-6.5	<2	Low	0.37		
	10	---	---	---	---	---	---	---		
RH*:										
Rock outcrop.										
Haploborolls.										
RT*:										
Rock outcrop.										
Torriorthents.										

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
SR*:										
Stout	0-4	5-18	2.0-6.0	0.05-0.10	5.6-6.5	<2	Low	0.32	1	3
	4-10	5-18	6.0-20	0.04-0.09	5.6-6.5	<2	Low	0.37		
	10	---	---	---	---	---	---	---		
Rocio	0-5	10-25	2.0-6.0	0.11-0.18	6.1-7.3	<2	Low	0.28	5	7
	5-18	8-15	2.0-6.0	0.07-0.10	6.1-7.3	<2	Low	0.28		
	18-60	45-60	0.06-0.2	0.14-0.18	6.1-7.3	<2	High	0.37		
Dargol	0-12	15-27	0.6-2.0	0.13-0.15	5.6-6.5	<2	Low	0.24	3	7
	12-22	35-55	<0.06	0.14-0.16	5.6-6.5	<2	High	0.28		
	22	---	---	---	---	---	---	---		
SW	0-7	18-25	0.2-0.6	0.19-0.21	6.6-7.8	<2	Moderate	0.37	5	6
Swastika	7-30	35-50	0.06-0.2	0.15-0.17	7.4-8.4	<2	High	0.32		
	30-60	30-40	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.43		
Sx	0-3	27-35	0.2-0.6	0.19-0.21	6.6-7.8	<2	Moderate	0.37	5	6
Swastika	3-31	35-50	0.06-0.2	0.15-0.17	7.4-8.4	<2	High	0.32		
	31-60	30-40	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.43		
Sy	0-2	27-35	0.2-0.6	0.19-0.21	6.6-7.8	<2	Moderate	0.37	5	6
Swastika	2-30	30-40	0.06-0.2	0.19-0.21	7.4-8.4	<2	Moderate	0.37		
	30-60	35-50	0.2-0.6	0.15-0.17	7.4-8.4	<2	High	0.32		
TD*:										
Tapia	0-5	10-25	0.6-2.0	0.12-0.16	6.6-7.8	<2	Low	0.24	3	4L
	5-22	22-35	0.6-2.0	0.14-0.20	7.4-8.4	<2	Moderate	0.20		
	22-60	10-25	0.6-2.0	0.09-0.12	7.9-8.4	<2	Low	0.24		
Dean	0-13	10-25	0.6-2.0	0.11-0.17	7.9-8.4	<2	Low	0.32	1	4L
	13-60	18-25	0.06-0.2	0.04-0.06	7.9-8.4	2-4	Low	0.28		
TE	0-6	10-20	0.6-2.0	0.17-0.19	6.6-7.3	<2	Moderate	0.43	5	5
Teco	6-36	30-45	0.2-0.6	0.15-0.18	7.4-8.4	<2	High	0.28		
	36-60	15-30	2.0-6.0	0.10-0.12	7.9-8.4	<2	Low	0.28		
TG	0-7	15-25	0.6-2.0	0.10-0.14	7.4-7.8	<2	Low	0.10	5	7
Tinaja	7-14	18-30	0.6-2.0	0.04-0.10	7.4-8.4	<2	Low	0.10		
	14-42	18-25	2.0-6.0	0.10-0.13	7.4-8.4	<2	Low	0.10		
	42-60	5-18	6.0-20	0.01-0.04	7.4-8.4	<2	Low	0.10		
TR*:										
Tuloso	0-3	10-16	2.0-6.0	0.08-0.11	6.6-7.8	<2	Low	0.17	1	8
	3-11	10-18	0.6-2.0	0.07-0.09	6.6-7.8	<2	Low	0.17		
	11	---	---	---	---	---	---	---		
Rock outcrop.										
Sombordoro	0-7	10-18	2.0-6.0	0.09-0.11	7.4-8.4	<2	Low	0.37	1	8
	7-16	35-55	0.06-0.2	0.04-0.11	7.4-8.4	<2	High	0.24		
	16	---	---	---	---	---	---	---		
TS*:										
Tuloso	0-3	10-16	2.0-6.0	0.08-0.11	6.6-7.8	<2	Low	0.17	1	8
	3-11	10-18	0.6-2.0	0.07-0.09	6.6-7.8	<2	Low	0.17		
	11	---	---	---	---	---	---	---		
Sombordoro	0-3	10-18	2.0-6.0	0.09-0.11	7.4-8.4	<2	Low	0.37	1	8
	3-11	35-55	0.06-0.2	0.04-0.11	7.4-8.4	<2	High	0.24		
	11	---	---	---	---	---	---	---		
Rock outcrop.										

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group
								K	T	
	In	Pct	In/hr	In/in	pH	Mmhos/cm				
UF*.										
Ustifluvents										
UR*:										
Ustorthents.										
Rock outcrop.										
Va	0-2	30-40	0.2-0.6	0.19-0.21	7.9-9.0	>2	Moderate	0.28	5	4L
Vermejo	2-60	40-50	<0.06	0.15-0.17	7.9-9.0	>2	High	0.32		
VB*:										
Vibo	0-8	10-20	2.0-6.0	0.11-0.15	6.6-8.4	<2	Low	0.24	5	3
	8-24	20-30	0.6-2.0	0.14-0.16	6.6-8.4	<2	Moderate	0.32		
	24-60	16-20	0.6-6.0	0.11-0.13	6.6-8.4	<2	Low	0.24		
Ribera	0-5	12-18	0.6-2.0	0.13-0.16	6.6-7.8	<2	Low	0.24	2	3
	5-26	20-30	0.6-2.0	0.16-0.19	6.6-8.4	<2	Low	0.32		
	26-31	12-18	0.6-2.0	0.13-0.16	7.9-8.4	<2	Low	0.24		
	31	---	---	---	---	---	---	---		
VC*:										
Vibo	0-8	10-20	2.0-6.0	0.11-0.15	6.6-8.4	<2	Low	0.24	5	3
	8-24	20-30	0.6-2.0	0.14-0.16	6.6-8.4	<2	Moderate	0.32		
	24-60	16-20	0.6-6.0	0.11-0.13	6.6-8.4	<2	Low	0.24		
Rock outcrop.										
Ribera	0-5	12-18	0.6-2.0	0.13-0.16	6.6-7.8	<2	Low	0.24	2	3
	5-26	20-30	0.6-2.0	0.16-0.19	6.6-8.4	<2	Low	0.32		
	26-31	12-18	0.6-2.0	0.13-0.16	7.9-8.4	<2	Low	0.24		
	31	---	---	---	---	---	---	---		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
					In		In				
AQ*:											
Andok	C	None	---	---	>60	---	---	---	---	Moderate	Low.
Quintana	C	None	---	---	>60	---	---	---	Moderate	Moderate	Low.
AY*:											
Apache	D	None	---	---	4-20	Hard	---	---	Moderate	High	Low.
Ayon	B	None	---	---	>60	---	---	---	Moderate	High	Low.
BA*. Badland											
Be. Bernal	D	None	---	---	8-20	Hard	---	---	Moderate	Moderate	Low.
BR*:											
Bernal	D	None	---	---	8-20	Hard	---	---	Moderate	Moderate	Low.
Rock outcrop.											
CA*:											
Canez	B	None	---	---	>60	---	---	---	---	High	Low.
Ima	B	None	---	---	>60	---	---	---	---	High	Low.
Cb, Cc. Carnero	C	None	---	---	20-40	Hard	---	---	Low	High	Low.
CD*:											
Carnero	C	None	---	---	20-40	Hard	---	---	Low	High	Low.
Partri	C	None	---	---	>60	---	---	---	Low	High	Low.
Cf, Cg, CH. Colmor	B	None	---	---	>60	---	---	---	Moderate	High	Low.
CK*:											
Conchas	C	None	---	---	20-40	Hard	---	---	---	High	Low.
Latom	D	None	---	---	8-20	Rippable	---	---	---	Low	Low.
CT*:											
Crews	D	None	---	---	>60	---	8-20	Hard	Low	High	Low.
Tricon	C	None	---	---	>60	---	20-40	Hard	Low	High	Low.
DA*:											
Dioxice	B	None	---	---	>60	---	---	---	Moderate	High	Low.
Dean	C	None	---	---	>60	---	---	---	---	High	Low.
DB*:											
Dumas	B	None	---	---	>60	---	---	---	---	Moderate	Low.
La Brier	C	Rare	---	---	>60	---	---	---	Low	High	Low.
GA. Gallegos	B	None	---	---	>60	---	---	---	---	High	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
					In		In				
GB*:											
Gullied land.											
Manzano	C	Rare	Very brief	May-Oct	>60	---	---	---	Moderate	High	Low.
GC*:											
Gullied land.											
Montoya	D	Rare	Very brief	Jun-Sep	>60	---	---	---	Low	High	Moderate.
KA*:											
Karde	B	Rare	---	---	>60	---	---	---	Low	High	Low.
Vermejo	D	Rare	---	---	>60	---	---	---	Low	High	Low.
KR*	D	None	---	---	10-20	Hard	---	---	Moderate	Moderate	Low.
Kiln											
Rock outcrop.											
La	C	Rare	---	---	>60	---	---	---	Low	High	Low.
La Brier											
LB*:											
Lacita	B	Common	Very brief	Jul-Sep	>60	---	---	---	Moderate	High	Low.
San Jose	B	Common	Very brief	Jul-Sep	>60	---	---	---	Low	Moderate	Low.
LC*:											
La Lande	B	None	---	---	>60	---	---	---	Moderate	High	Low.
Redona	B	None	---	---	>60	---	---	---	---	Moderate	Low.
LE*:											
Laporte	D	None	---	---	10-20	Ripable	---	---	Low	High	Low.
Escabosa	C	None	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
LF*:											
Laporte	D	None	---	---	10-20	Ripable	---	---	Low	High	Low.
Rock outcrop.											
Escabosa	C	None	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
LN*:											
Latom	D	None	---	---	8-20	Ripable	---	---	---	Low	Low.
Newkirk	D	None	---	---	8-20	Hard	---	---	---	High	Low.
Rock outcrop.											
Lo, Lp	C	None	---	---	20-40	Ripable	---	---	Low	High	Moderate.
Litle											
MA	B	None	---	---	>60	---	---	---	Moderate	High	Low.
Manter											
Mb	C	None	---	---	>60	---	---	---	Moderate	High	Low.
Manzano											
MC	C	Rare	Very brief	May-Oct	>60	---	---	---	Moderate	High	Low.
Manzano											

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
					In		In				
Md---------- Manzano	C	None--------	---	---	>60	---	---	---	Moderate	High-----	Low.
ME*: Mion----------	D	None--------	---	---	10-20	Rippable	---	---	Low------	High-----	Low.
Penrose----------	D	None--------	---	---	10-20	Rippable	---	---	Low------	High-----	Low.
Litle----------	C	None--------	---	---	20-40	Rippable	---	---	Low------	High-----	Moderate.
MF*: Montoya----------	D	Rare--------	---	---	>60	---	---	---	Low------	High-----	Moderate.
Tucumcari--------	B	None--------	---	---	>60	---	---	---	---	High-----	Low.
Lacita----------	B	Rare--------	---	---	>60	---	---	---	Moderate	High-----	Low.
MG*: Moreno----------	C	None--------	---	---	>60	---	---	---	Moderate	Moderate	Low.
Brycan----------	B	None--------	---	---	>60	---	---	---	Moderate	High-----	Moderate.
NW*: Newkirk----------	D	None--------	---	---	8-20	Hard	---	---	---	High-----	Low.
Walkon----------	D	None--------	---	---	20-40	Hard	---	---	Low------	Moderate	Low.
Conchas----------	C	None--------	---	---	20-40	Hard	---	---	---	High-----	Low.
Pa, Pb, PC-------- Partri	C	None--------	---	---	>60	---	---	---	Low------	High-----	Low.
PD*: Partri----------	C	None--------	---	---	>60	---	---	---	Low------	High-----	Low.
Tricon----------	C	None--------	---	---	>60	---	20-40	Hard	Low------	High-----	Low.
PM*: Penrose----------	D	None--------	---	---	10-20	Rippable	---	---	Low------	High-----	Low.
Litle----------	C	None--------	---	---	20-40	Rippable	---	---	Low------	High-----	Moderate.
Mion----------	D	None--------	---	---	10-20	Rippable	---	---	Low------	High-----	Low.
QU---------- Quintana	C	None--------	---	---	>60	---	---	---	Moderate	Moderate	Low.
RE*: Redona----------	B	None--------	---	---	>60	---	---	---	---	Moderate	Low.
Quay----------	B	None--------	---	---	>60	---	---	---	---	High-----	Low.
RF*: Ribera----------	B	None--------	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
Sombordoro-------	D	None--------	---	---	8-20	Hard	---	---	Low------	High-----	Low.
Vibo----------	B	None--------	---	---	>60	---	---	---	Moderate	High-----	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
					In		In				
RG*:											
Rocio	C	None	---	---	>60	---	---	---	Low	Moderate	Moderate.
Dargol	D	None	---	---	20-40	Hard	---	---	Moderate	Moderate	Moderate.
Stout	D	None	---	---	6-20	Hard	---	---	Low	Low	Moderate.
RH*:											
Rock outcrop.											
Haploborolls.											
RT*:											
Rock outcrop.											
Torriorthents.											
SR*:											
Stout	D	None	---	---	6-20	Hard	---	---	Low	Low	Moderate.
Rocio	C	None	---	---	>60	---	---	---	Low	Moderate	Moderate.
Dargol	D	None	---	---	20-40	Hard	---	---	Moderate	Moderate	Moderate.
SW, Sx, Sy----- Swastika	C	None	---	---	>60	---	---	---	Low	High	Low.
TD*:											
Tapia	C	None	---	---	>60	---	---	---	Low	Moderate	Low.
Dean	C	None	---	---	>60	---	---	---	---	High	Low.
TE----- Teco	D	None	---	---	>60	---	---	---	Low	High	Low.
TG----- Tinaja	B	None	---	---	>60	---	---	---	Low	Moderate	Low.
TR*:											
Tuloso	D	None	---	---	10-20	Hard	---	---	Moderate	Moderate	Low.
Rock outcrop.											
Sombordoro	D	None	---	---	8-20	Hard	---	---	Low	High	Low.
TS*:											
Tuloso	D	None	---	---	10-20	Hard	---	---	Moderate	Moderate	Low.
Sombordoro	D	None	---	---	8-20	Hard	---	---	Low	High	Low.
Rock outcrop.											
UF*. Ustifluvents											
UR*:											
Ustorthents.											
Rock outcrop.											
Va----- Vermejo	D	Rare	---	---	>60	---	---	---	Low	High	Low.
VB*:											
Vibo	B	None	---	---	>60	---	---	---	Moderate	High	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Cemented pan		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Hardness	Depth	Hardness		Uncoated steel	Concrete
					In		In				
VB*:											
Ribera	B	None	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.
VC*:											
Vibo	B	None	---	---	>60	---	---	---	Moderate	High	Low.
Rock outcrop.											
Ribera	B	None	---	---	20-40	Hard	---	---	Moderate	Moderate	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Andok	Loamy-skeletal, mixed, mesic Typic Ustochrepts
Apache	Loamy, mixed, mesic Lithic Haplustolls
Ayon	Loamy-skeletal, mixed, mesic Aridic Calciustolls
Bernal	Loamy, mixed, mesic Lithic Argiustolls
Brycan	Fine-loamy, mixed Cumulic Haploborolls
Canez	Fine-loamy, mixed, thermic Ustollic Haplargids
Carnero	Fine, mixed, mesic Aridic Argiustolls
Colmor	Fine-silty, mixed, mesic Torriorthentic Haplustolls
Conchas	Fine-silty, mixed, thermic Ustollic Calciorthids
Crews	Clayey, mixed, mesic, shallow Petrocalcic Paleustolls
Dargol	Fine, mixed Typic Eutroboralfs
Dean	Fine-loamy, carbonatic, mesic Ustollic Calciorthids
Dioxice	Fine-loamy, mixed, mesic Aridic Calciustolls
Dumas	Fine-loamy, mixed, mesic Aridic Paleustolls
Escabosa	Fine-loamy, mixed, mesic Aridic Calciustolls
Gallegos	Loamy-skeletal, mixed, thermic Ustollic Camborthids
Ima	Coarse-loamy, mixed, thermic Ustochreptic Camborthids
Karde	Fine-silty, carbonatic, mesic Ustic Torriorthents
Kiln	Loamy, mixed Lithic Argiborolls
La Brier	Fine, mixed, mesic Torrertic Argiustolls
Lacita	Fine-silty, mixed (calcareous), thermic Ustic Torriorthents
La Lande	Fine-loamy, mixed, thermic Ustollic Camborthids
Laporte	Loamy, mixed, mesic Lithic Haplustolls
Latom	Loamy, mixed (calcareous), thermic Lithic Ustic Torriorthents
Litle	Fine, mixed, mesic Ustollic Camborthids
Manter	Coarse-loamy, mixed, mesic Aridic Argiustolls
Manzano	Fine-loamy, mixed, mesic Cumulic Haplustolls
Mion	Clayey, mixed (calcareous), mesic, shallow Ustic Torriorthents
Montoya	Fine, mixed, thermic Mollic Torrerts
Moreno	Fine, mixed Typic Argiborolls
Newkirk	Loamy, mixed, thermic Lithic Ustollic Haplargids
Partri	Fine, mixed, mesic Aridic Argiustolls
Penrose	Loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents
Quay	Fine-silty, mixed, thermic Ustochreptic Calciorthids
Quintana	Fine-loamy, mixed, mesic Typic Ustochrepts
Redona	Fine-loamy, mixed, thermic Ustollic Haplargids
Ribera	Fine-loamy, mixed, mesic Typic Haplustalfs
Rocio	Fine, mixed Mollic Eutroboralfs
San Jose	Coarse-loamy, mixed (calcareous), thermic Ustic Torrifluvents
Sombordoro	Clayey-skeletal, mixed, mesic Lithic Haplustalfs
Stout	Loamy, mixed, nonacid, frigid Lithic Ustorthents
Swastika	Fine, mixed, mesic Aridic Argiustolls
Tapia	Fine-loamy, mixed, mesic Ustollic Haplargids
Teco	Fine, mixed, mesic Aridic Haplustalfs
Tinaja	Loamy-skeletal, mixed, mesic Aridic Ustochrepts
Tricon	Fine, mixed, mesic Petrocalcic Paleustolls
Tucumcari	Fine, mixed, thermic Ustollic Haplargids
Tuloso	Loamy-skeletal, mixed, mesic Lithic Ustochrepts
Vermejo	Fine, mixed (calcareous), mesic Ustic Torriorthents
Vibo	Fine-loamy, mixed, mesic Typic Haplustalfs
Walkon	Fine-loamy, mixed, thermic Ustollic Haplargids

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