United States Department of Agriculture

NRCS

Natural Resources Conservation Service

In cooperation with United States Department of the Interior, National Park Service

Utah Agricultural Experiment Station

Soil Survey of Glen Canyon National Recreation Area, Arizona and Utah

How To Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

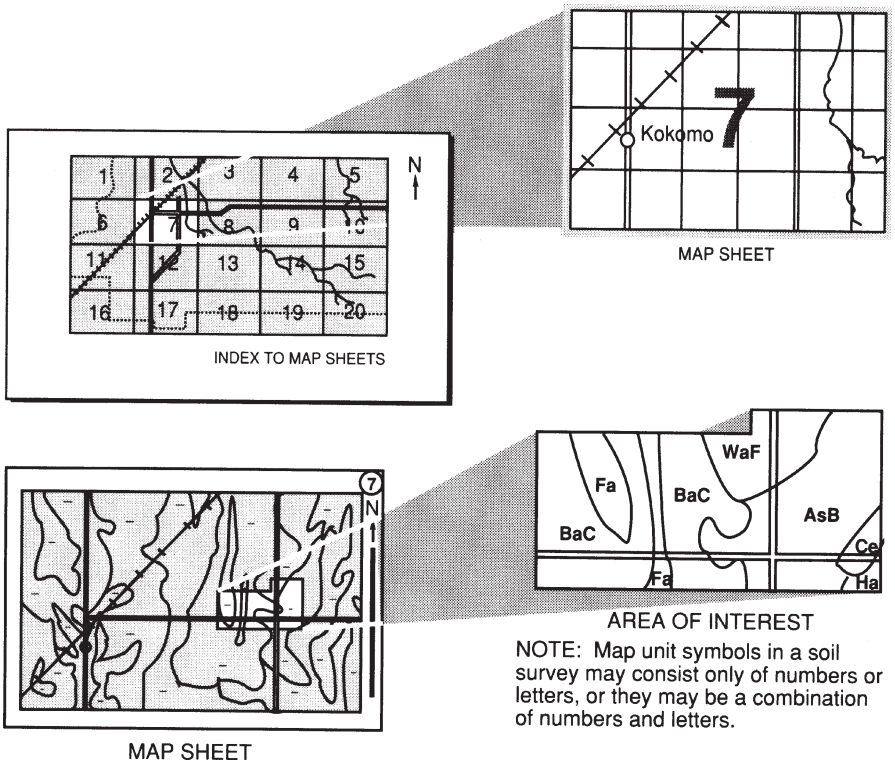
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies; State agencies, including the Agricultural Experiment Stations; and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 2009. Soil names and descriptions were approved in 2009. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2009. This survey was made cooperatively by the Natural Resources Conservation Service and the United States Department of the Interior, National Park Service, Soil Inventory and Monitoring Program.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

The correct citation for this soil survey is as follows: United States Department of Agriculture, Natural Resources Conservation Service. 2010. Soil survey of Glen Canyon National Recreation Area, Arizona and Utah. Accessible online at: http://soils.usda.gov/survey/ printed_surveys/.

Cover: Lake Powell and the colorful cliff faces of the Glen Canyon National Recreation Area as viewed from Alstrom Point. Navajo Mountain, a prominent landmark, is in the background. Rock outcrop-Torriorthents complex, 20 to 65 percent slopes, and Water dominate the landscape.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

Contents

Issued 2010

Foreword

This soil survey was developed in conjunction with the National Park Service Inventory and Monitoring Program and is intended to serve as the official source document for soils occurring within Glen Canyon National Recreation Area.

This soil survey contains information that affects current and future land use planning in the park. It contains predictions of soil behavior for selected land uses. The surveys highlight soil limitations, actions needed to overcome the limitations, and the impact of selected land uses on the environment. This soil survey is designed to meet the needs of the National Park Service and its partners. Understanding the soils in the park and their effects on other natural ecological properties will enable the National Park Service and its partners to protect and enhance the environment more effectively.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations. Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as 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 map unit is shown on the detailed soil maps. Each soil in the survey area is described, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or Glen Canyon National Recreation Area.

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Soil Survey of
Glen Canyon National Recreation Area, Arizona and Utah

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United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the United States Department of the Interior, National Park Service

General Nature of the Survey Area

Glen Canyon National Recreation Area lies within the two states of Arizona and Utah (fig. 1). It is linear in shape, extending approximately 150 miles from Marble Canyon in the south to the Orange Cliffs in the north. Established in 1972 to preserve and protect Lake Powell and the surrounding lands, the Recreation Area comprises approximately 1.25 million acres (505,000 hectares) (USBR, 2009).

A major portion of the Recreation Area joins other public lands. Most of these lands are administered by the Bureau of Land Management. However, the Recreation Area shares a common boundary with Canyonlands National Park in the northeast corner, Capitol Reef National Park in the north central part, and Grand Staircase-Escalante National Monument in the northwest and western part. The southern boundary, except for a small area that joins the Grand Canyon National Park, joins the Navajo Indian Reservation.

Most of the Recreation Area is remote and inaccessible by vehicle or watercraft. US Route 89 runs along a portion of the southwest part of the Recreation Area near the town of Page and Wahweap Marina. State Highway 95 crosses the Recreation Area in the northern part near the Hite Marina. Other paved roads provide access to Lees Ferry and to Bullfrog and Halls Crossing Marinas. A regularly scheduled ferry connects these two marinas. Page, Arizona, near Glen Canyon Dam, has a population of almost 9,000 and is the only commercial and tourist center in the area (City of Page, 2009).

Various parts of the Recreation Area have been mapped in five previously published soil surveys. These five areas are Coconino County Area, Arizona, North Kaibab Part (Jorgensen, 2005); Henry Mountains Area, Utah, Parts of Garfield, Kane and Wayne Counties (Downs, 1990); Canyonlands Area, Utah, Parts of Grand and San Juan Counties (Lammers, 1991); San Juan County, Utah, Central Part (Hansen, 1993); and the San Juan County, Utah, Navajo Indian Reservation (Nielson, 1980). The present soil survey updates these earlier surveys and provides additional information to address natural resource concerns of the Recreation Area more fully.

Descriptions, names, and delineations of soils in the survey do not fully agree with some of the soil maps for adjacent soil survey areas. The differences are the result of

Figure 1.—Location of Glen Canyon Recreation Area in Utah and Arizona.

a better knowledge of soils, modifications in series concepts, or extent of soils within the survey.

History and development

Glen Canyon National Recreation Area was established by the U.S. Congress on October 27, 1972 to “provide for public outdoor recreation use and enjoyment of Lake Powell and lands adjacent thereto in the States of Arizona and Utah and to preserve the scenic, scientific, and historic features contributing to the public enjoyment of the area” (USBR, 2009).

Construction on the Glen Canyon Dam began in 1956. It was mandated by the Colorado River Storage Project Act of 1956 and overseen by the Bureau of Reclamation. The dam and Lake Powell were to “regulate the flow of the Colorado River; provide for flood control; provide for storage and delivery of water for irrigation, municipal, industrial, and other beneficial purposes; and generate electrical power” (USBR, 2009). This provided a stable, reliable, and economical means of allowing the Upper Colorado River Basin states to meet the obligations required by the Colorado Compact of 1922. The Compact divided the Colorado River into an Upper Basin and a Lower Basin, with the dividing point at Lees Ferry, Arizona. It required that each basin would receive 7.5 million acre-feet of water annually. The Compact further required the Upper Basin “to ensure delivery of 75 million acre-feet to the Lower Basin in any 10-year period regardless of hydrology” (USBR, 2009).

In 1958, a large tract of land in Utah was exchanged for 24 square miles of Navajo land near the dam site. In 1957, the Bureau of Reclamation built a government camp to house construction workers and their families. This community, later known as Page, was incorporated in 1975 (City of Page, 2009). Page is now the home of the administrative offices for Glen Canyon Dam and Recreation Area.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Page, Arizona, in the period 1971 to 2000. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring, and the length of the growing season.

In winter, the average temperature is 41.8 degrees F and the average daily minimum temperature is 32.2 degrees. The lowest temperature on record, which occurred on January 27, 1975, is -11 degrees. In summer, the average temperature is 78.2 degrees and the average daily maximum temperature is 91.1 degrees. The highest recorded temperature, which occurred on July 5, 1985, is 109 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall (USDA, 2009).

The total annual precipitation is about 6.8 inches. Of this, 3 inches, or 44 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 0.6 inches. The heaviest 1-day rainfall during the period of record was 2 inches on December 31, 1978. Thunderstorms occur on about 35 days each year, and most occur in summer.

The average seasonal snowfall is about 4.7 inches. On the average, 2 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 20 percent. Humidity is

higher at night, and the average at dawn is about 50 percent. The sun shines 90 percent of the time possible in summer and 80 percent in winter. The prevailing wind is from the west. Average wind speed is highest, 6 miles per hour, in spring (WRCC, 2009)

Physiography

Glen Canyon National Recreation Area lies within the Colorado Plateau province. This relatively stable plateau of colorful uplifted sedimentary rock dips generally to the west. As a result, the geologic formations are generally younger at the lower end of Lake Powell than at the Hite Marina (Everhart, 1983). The Recreation Area is within the Canyon Lands section of the Colorado Plateau province. This section, aptly named, is defined by impressive, deeply incised canyons. Other distinctive features of this section are large monoclines and laccolithic mountains. The Waterpocket Fold near the Bullfrog Marina is an example of a monocline. And the nearby igneous bodies of Navajo Mountain and the Henry Mountains are examples of laccoliths (Foos, 1999).

The Colorado River travels over 200 miles (320 kilometers) through the Recreation Area. It enters the Recreation Area approximately 30 miles northeast of Hite Marina, when Lake Powell is at full pool, at an elevation of 3,700 feet (1,128 meters). The river leaves the Recreation Area at its lowest point, at Lees Ferry, at approximately 3,150 feet (955 meters). Navajo Point, at over 7,500 feet (2,280 meters), is the Recreation Area's highest elevation.

All of the Recreation Area is within the Colorado River watershed. Three major rivers, San Juan, Escalante, and Dirty Devil, flow into the Recreation Area and ultimately, Lake Powell. Lake Powell, formed by damming the waters of the Colorado River, serves to control floodwaters and retain sediment for the lower Colorado River basin (fig. 2). Also used for water storage and recreation, the lake has a storage capacity of 26 million acre feet (32 million cubic meters) of water and, at full pool, a surface area of almost 170 thousand acres (69 thousand hectares) (USBR, 2009).

How This Survey Was Made

This survey was made in conjunction with the National Park Service Soil Inventory and Monitoring Program to provide information about the soils and miscellaneous areas in Glen Canyon National Recreation Area. A scoping meeting was held in 2007 with park staff to identify their soil resource information needs and to relate these needs into the development of the final products. Of particular importance to park staff was information regarding the relationship of soil types and plant communities to climatic regimes and landforms in the park. Following the meeting, additional interviews were conducted to identify additional particular geographic areas of interest and concern.

During the soil survey, ecological site and soil component relationships were observed, and soil-site correlation concepts were established to help in designing the map units. Soil and plant specialists tested the concepts during mapping and collected field documentation at numerous points across the landscape.

The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of vegetation; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is

Figure 2. —The Carl Hayden Visitor Center overlooks the massive Glen Canyon Dam and Lake Powell.

devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the topography, climate, vegetation and geology of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept or model of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, the soil scientist must determine the boundary between soil map units. The use of remotely sensed data greatly improves the soil scientist's ability detect changes in the soil. When available, data such as Landsat imagery is extensively used in soil mapping. The manipulation of the spectral bands on this imagery can enhance certain properties, such as basic minerals or vegetation types, when compared with visible light imagery. Since soil scientists can observe only a limited number of soil profiles, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship and the use of remotely sensed data, are sufficient to verify predictions of the kinds of soil in an area and to determine the soil boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable

them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses. Soil scientists interpret the data from these analyses as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management (fig. 3).

Soils within the 6- to 10-inch (15- to 25-cm) precipitation zone

Percentage of survey area: 58 percent

1—Rock Outcrop-Needle Association

Ecological site association: Sandstone Rockland
Dominant vegetation: Sand Sagebrush
Landform setting: Structural benches
Elevation: 3,670 to 5,310 feet (1,120 to 1,620 meters)
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands
Slope: 1 to 30 percent

Composition
Extent of the association in the survey area: 22 percent
Extent of the components in the association:
Rock outcrop: 59 percent
Needle and similar soils: 35 percent

Soils of Minor Extent
- Bluechief soils on sideslopes and structural benches
- Sheppard soils on drainageways and interfluves

Component Descriptions

Rock outcrop
Position on the landform: Interfluves and side slopes
Parent material: Sandstone

Needle
Position on the landform: Interfluves and side slopes

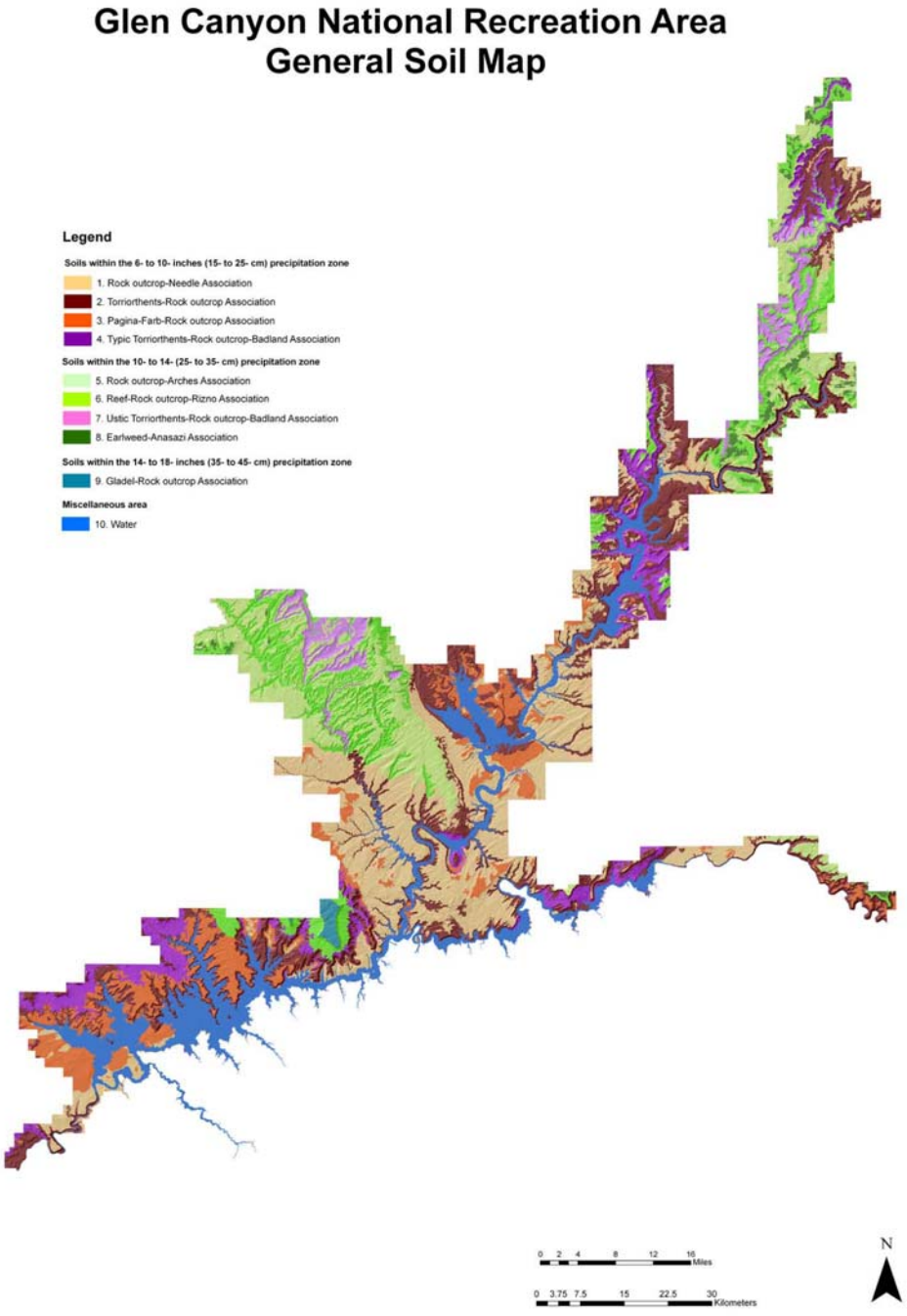

Figure 3.—General Soil Map of Glen Canyon Recreation Area.

Parent material: Eolian deposits derived from sandstone
Depth class: Shallow
Drainage class: Excessively drained
Permeability: Rapid to very rapid
Surface layer texture: Sand

2—Torriorthents-Rock Outcrop Association

Ecological site association: Talus slope and shallow sandy loam
Dominant vegetation: Blackbrush and shadscale
Landform setting: Talus slopes and structural benches
Elevation: 3,120 to 5,840 feet (950 to 1,780 meters)
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands
Slope: 1 to 70 percent

Composition
Extent of the association in the survey area: 20 percent
Extent of the components in the association:
Torriorthents and similar soils: 47 percent
Rock outcrop: 42 percent

Soils of Minor Extent
- Myton soils on drainageways and alluvial fans
- Razito soils on flood plains

Component Descriptions

Torriorthents
Position on the landform: Talus slopes, interfluves, and side slopes
Parent material: Sandy and gravelly talus derived from sandstone and shale and/or residuum weathered from sandstone and shale
Depth class: Variable
Drainage class: Somewhat excessively drained
Permeability: Moderate and moderately rapid
Surface layer texture: Loam

Rock outcrop
Position on the landform: Interfluves and side slopes
Parent material: Sandstone and shale

3—Pagina-Farb-Rock Outcrop Association

Ecological site association: Sandy Loam-Shallow Sandy Loam
Dominant vegetation: Blackbrush
Landform setting: Structural benches
Elevation: 3,670 to 5,310 feet (1,120 to 1,620 meters)
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands
Slope: 2 to 20 percent

Composition
Extent of the association in the survey area: 9 percent
Extent of the components in the association:
Pagina and similar soils: 42 percent
Farb and similar soils: 20 percent
Rock outcrop: 14 percent

Soils and Miscellaneous Areas of Minor Extent
- Denazar soils on interfluves and swales or drainageways

Component Descriptions

Pagina
Position on the landform: Interfluves and shoulders

Parent material: Eolian deposits derived from sandstone and/or residuum weathered from sandstone
Depth class: Moderately deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Surface layer texture: Fine sandy loam

Farb
Position on the landform: Interfluves and side slopes
Parent material: Eolian deposits derived from sandstone and/or residuum weathered from sandstone
Depth class: Shallow
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Surface layer texture: Fine sandy loam

Rock outcrop
Position on the landform: Interfluves and side slopes
Parent material: Sandstone

4—Typic Torriorthents-Rock Outcrop-Badland Association

Ecological site association: Very steep stony loam and shallow clay
Dominant vegetation: Mat Saltbush, shadscale
Landform setting: Talus slopes and structural benches
Elevation: 3,580 to 5,710 (1,090 to 1,740 meters)
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands
Slope: 2 to 70 percent

Composition
Extent of the association in the survey area: 7 percent
Extent of the components in the association:
Torriorthents and similar soils: 52 percent
Rock outcrop: 24 percent
Badland: 15 percent

Soils of Minor Extent
- Cowboy soils on foot slopes
- Seeg soils on drainageways and alluvial fans

Component Descriptions

Torriorthents
Position on the landform: Talus slopes, interfluves, and side slopes
Parent material: Colluvium derived from sandstone and shale
Depth class: Variable
Drainage class: Well drained
Permeability: Moderate
Surface layer texture: Sandy clay loam

Rock outcrop
Position on the landform: Cliff face and side slopes
Parent material: Sandstone

Badlands
Position on the landform: Side slopes

Parent material: Shale

Soils within the 10- to 14-inch (25- to 35-cm) precipitation zone

Percentage of survey area: 29 percent

5—Rock Outcrop-Arches Association

Ecological site association: Shallow Sand
Dominant vegetation: Utah Juniper-Pinyon
Landform setting: Plateau
Elevation: 4,590 to 5,580 feet (1,400 to 1,700 meters)
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands
Slope: 2 to 60 percent

Composition
Extent of the association in the survey area: 13 percent
Extent of the components in the association:
Rock outcrop: 54 percent
Arches and similar soils: 32 percent

Soils of Minor Extent
- Mido soils on drainageways and swales

Component Descriptions

Rock outcrop
Position on the landform: Interfluves and side slopes
Parent material: Sandstone

Arches
Position on the landform: Interfluves and side slopes
Parent material: Eolian deposits derived from sandstone
Depth class: Shallow
Drainage class: Excessively drained
Permeability: Rapid
Surface layer texture: Fine sand

6—Reef-Rizno-Rock Outcrop Association

Ecological site association: Very steep stony loam and shallow sandy loam
Dominant vegetation: Utah Juniper, Pinyon, and Blackbrush
Landform setting: Talus slopes and structural benches
Elevation: 4,000 to 6,000 feet (1,510 to 1,830 meters)
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands
Slope: 1 to 60 percent

Composition
Extent of the association in the survey area: 11 percent
Extent of the components in the association:
Reef and similar soils: 36 percent
Rock outcrop: 23 percent
Rizno and similar soils: 22 percent

Soils of Minor Extent
- Remorris soils on interfluves and crests
- Jaconita soils on shoulders and side slopes

Component Descriptions

Reef
Position on the landform: Talus slopes, interfluves, and side slopes
Parent material: Sandy and gravelly talus derived from sandstone and shale and/or residuum weathered from sandstone.
Depth class: Shallow
Drainage class: Somewhat excessively drained
Permeability: Moderate
Surface layer texture: Very channery loam

Rock outcrop
Position on the landform: Interfluves and side slopes
Parent material: Sandstone

Rizno
Position on the landform: Interfluves and side slopes
Parent material: Residuum weathered from sandstone
Depth class: Shallow
Drainage class: Well drained
Permeability: Moderately rapid
Surface layer texture: Gravelly sandy loam

7—Ustic Torriorthents-Rock Outcrop-Badland Association

Ecological site association: Very steep stony loam
Dominant vegetation: Pinyon and Utah Juniper
Landform setting: Talus slopes
Elevation: 4,200 to 7,050 feet (1,280 to 2,150 meters)
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands
Slope: 4 to 54 percent

Composition
Extent of the association in the survey area: 4 percent
Extent of the components in the association:
Ustic Torriorthents and similar soils: 49 percent
Rock outcrop: 29 percent
Badland: 19 percent

Component Descriptions

Ustic Torriorthents
Position on the landform: Talus slopes
Parent material: Colluvium and/or slope alluvium derived from sandstone and shale
Depth class: Moderately deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Surface layer texture: Cobbly sandy loam

Rock outcrop
Position on the landform: Cliff face and side slopes
Parent material: Interbedded sandstone and shale

Badlands
Position on the landform: Side slopes and interfluves
Parent material: Shale

8—Earlweed-Anasazi Association

Ecological site association: Sand and Sandy loam
Dominant vegetation: Fourwing Saltbush and Blackbrush
Landform setting: Structural benches
Elevation: 5,680 to 6,270 feet (1,730 to 1,900 meters)
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands
Slope: 5 to 22 percent

Composition
Extent of the association in the survey area: 1 percent
Extent of the components in the association:
Earlweed and similar soils: 56 percent
Anasazi and similar soils: 31 percent

Soils of Minor Extent
- Rizno soils on shoulders and crests

Component Descriptions

Earlweed
Position on the landform: Interfluves
Parent material: Eolian deposits
Depth class: Very deep
Drainage class: Excessively drained
Permeability: Moderately rapid
Surface layer texture: Loamy fine sand

Anasazi
Position on the landform: Interfluves and side slopes
Parent material: eolian deposits and/or residuum weathered from sandstone
Depth class: Moderately deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Surface layer texture: Fine sandy loam

Soils within the 14- to 18-inch (35- to 45-cm) precipitation zone

Percentage of survey area: <1 percent

9—Gladel-Rock Outcrop Association

Ecological site association: Shallow loam
Dominant vegetation: Pinyon-Utah Juniper
Landform setting: Plateau
Elevation: 7,220 to 7,550 (2,200 to 2,300 meters)
Land Resource Unit: 35-6 Colorado Plateau Pinyon-Juniper-Sagebrush
Slope: 2 to 22 percent

Composition
Extent of the association in the survey area: <1 percent
Extent of the components in the association:
Gladel and similar soils: 37 percent
Rock outcrop: 27 percent

Soils of Minor Extent
- Parkelei soils on drainageways and swales

- Kydestea soils on shoulders and side slopes that have slopes up to 60 percent

Component Descriptions

Gladel
Position on the landform: Interfluves
Parent material: slope alluvium and/or residuum weathered from sandstone
Depth class: Shallow
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Surface layer texture: Sandy loam

Rock outcrop
Position on the landform: Interfluves and side slopes
Parent material: Sandstone

Miscellaneous area

Percentage of survey area: 13 percent

10—Water

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

A *miscellaneous area* has essentially no soil and will support little or no vegetation. They can result from active erosion, washing by water, unfavorable soil conditions, or human activities. Some miscellaneous areas can be made productive, but only after major reclamation efforts. The map unit Rock outcrop is an example of a miscellaneous area.

Soils that have profiles that are almost alike make up a *soil series*. Except for

differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

A soil series *family* has properties that are slightly outside the official series range but is in the same taxonomic classification as the official series. For example Juanalo family-Rock outcrop complex, 4 to 28 percent slopes, bouldery. For a further decision of soil series and soil series family see the Classification of Soils section below.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Seeg gravelly loam, 4 to 24 percent slopes, bouldery, is a phase of the Seeg series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Pagina-Denazar complex, 2 to 14 percent slopes, is an example.

1—Arches-Mido-Rock outcrop complex, 2 to 15 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 4)
Elevation: 4,590 to 5,250 feet (1,400 to 1,600 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Map Unit Composition

Arches and similar soils: 40 percent
Mido and similar soils: 35 percent
Rock outcrop: 20 percent
Minor components: A few areas have soils that have rock fragments throughout the profile.

Soil Properties and Qualities

Arches soils (fig. 5)
Taxonomic classification: Mixed, mesic Lithic Torripsamments
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches as sandsheets
Parent material: eolian sands and/or residuum weathered from sandstone
Slope: 2 to 15 percent
Biological crust
Cyanobacteria: 4 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent

Gypsum: 0 percent
Physical cover (fig. 6)
Canopy plant cover: 3 percent
Woody debris: 5 percent
Bare soil: 17 percent
Rock fragments
- gravel: 14 percent
- cobble: 2 percent

Depth to restrictive feature(s): 7 to 12 inches to bedrock, lithic
Drainage class: excessively drained
Ksat solum: 5.95 to 19.98 inches per hour (42.00 to 141.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.7 (very low)
Shrink-swell potential: about 1.0 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Semidesert Shallow Sand (Utah Juniper-Pinyon)
Ecological site number: R035XY227UT
Present vegetation: mesa dropseed, Utah juniper, Cutler Mormon tea, crispleaf buckwheat
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System: 37° 35' 58.60'' north, 111° 11' 17.30'' west

Figure 4.—An area of Arches-Mido-Rock outcrop complex, 2 to 15 percent slopes.

Figure 5.— Profile of the Arches component. Scale is in centimeters.

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 4 percent clay; weak thin platy structure; loose, nonsticky and nonplastic; many very fine roots throughout; common fine tubular pores; very slightly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

C—1 inch to 12 inches (3 to 30 cm); yellowish red (5YR 5/6) fine sand, yellowish red (5YR 4/6), moist; 5 percent clay; massive; loose, nonsticky and nonplastic; many very fine and fine roots throughout; many fine tubular pores; 3 percent fine gravel; noneffervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

R—12 inches (30 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.9 to 8.4 (slightly or moderately alkaline)

A horizon
- Hue: 5YR, 7.5YR
- Value: 4 or 5 dry, 3 to 5 moist
- Chroma: 4 to 8, dry or moist

C horizon
- Hue: 5YR, 7.5YR
- Value: 4 or 5 dry, 3 to 5 moist
- Chroma: 4 to 8, dry or moist
- Texture: sand, fine sand, loamy fine sand
- Clay: 3 to 6 percent
- Rock fragments: 0 to 5 percent

Mido soils (fig. 7)
Taxonomic classification: Mixed, mesic Ustic Torripsamments

Geomorphic position: occurs on interfluves on hills, mesas, and structural benches as dunes
Parent material: eolian sands derived from sandstone and/or alluvium derived from sandstone
Slope: 2 to 15 percent
Biological crust
Cyanobacteria: percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 8)
Canopy plant cover: percent
Woody debris: percent
Bare soil: percent
Rock fragments: 0 percent
Drainage class: excessively drained
Ksat solum: 5.95 to 19.98 inches per hour (42.00 to 141.00 micrometers per second)
Available water capacity total inches: 3.6 (low)
Shrink-swell potential: about 1.0 LEP (low)
Flooding hazard: none
Runoff class: low
Hydrologic group: A
Ecological site name: Semidesert Sand (Fourwing Saltbush)
Ecological site number: R035XY212UT

Figure 6.—A close-up of the surface near the sample pit for Arches fine sand.

Figure 7.—Profile of the Mido component. Scale is in centimeters.

Present vegetation: Resinbush, Utah juniper, rosemary mint, mesa dropseed
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System: 37° 36' 1.70'' north, 111° 11' 26.00'' west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) fine sand, reddish brown (5YR 4/4), moist; 3 percent clay; weak thin platy structure; loose, nonsticky and nonplastic; many very fine and fine roots throughout; many fine tubular pores; noneffervescent; slightly alkaline, pH 7.8 ; clear smooth boundary.

C1—1 inch to 16 inches (3 to 41 cm); yellowish red (5YR 5/6) fine sand, reddish brown (5YR 4/4), moist; 3 percent clay; massive; loose, nonsticky and nonplastic; many very fine and fine roots throughout; many fine tubular pores; very slightly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

C2—16 to 60 inches (41 to 152 cm); yellowish red (5YR 5/6) fine sand, reddish brown (5YR 4/4), moist; 4 percent clay; massive; loose, nonsticky and nonplastic; many very fine and fine roots throughout; many fine tubular pores; noneffervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
Hue: 5YR, 7.5YR
Value: 4 or 5 dry, 3 to 5 moist

Chroma: 4 to 6, dry or moist

C horizons
Hue: 5YR, 7.5YR
Value: 4 or 5 dry, 3 to 5 moist
Chroma: 4 to 8, dry or moist
Texture: sand, fine sand
Clay: 3 to 6 percent

Rock outcrop
Slope: 4 to 15 percent

Rock outcrop consists of sandstone bedrock, typically small exposed slick rock areas of the Navajo or Cedar Mesa Sandstone. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

2—Bluechief-Needle complex, 2 to 15 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 9)
Elevation: 3,940 to 5,300 feet (1,200 to 1,615 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days

Figure 8.—A close-up of the surface near the sample pit for Mido fine sand.

Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Bluechief and similar soils: 45 percent
Needle and similar soils: 40 percent
Minor Components: Shallow Moenkopie soils on shoulders. Very deep Sheppard soils in depositional areas.

Soil Properties and Qualities

Bluechief soils (fig. 10)
Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Typic Haplocalcids
Geomorphic position: occurs on side slopes on structural benches
Parent material: eolian deposits derived from sandstone and/or residuum weathered from sandstone
Slope: 2 to 8 percent
Biological crust
Cyanobacteria: 25 percent
Lichen: 7 percent
Moss: 3 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 11)

Figure 9.—An area of Bluechief-Needle complex, 2 to 15 percent slopes. Torriorthents-Rock outcrop-Badland complex, 4 to 70 percent slopes, extremely bouldery is in the background.

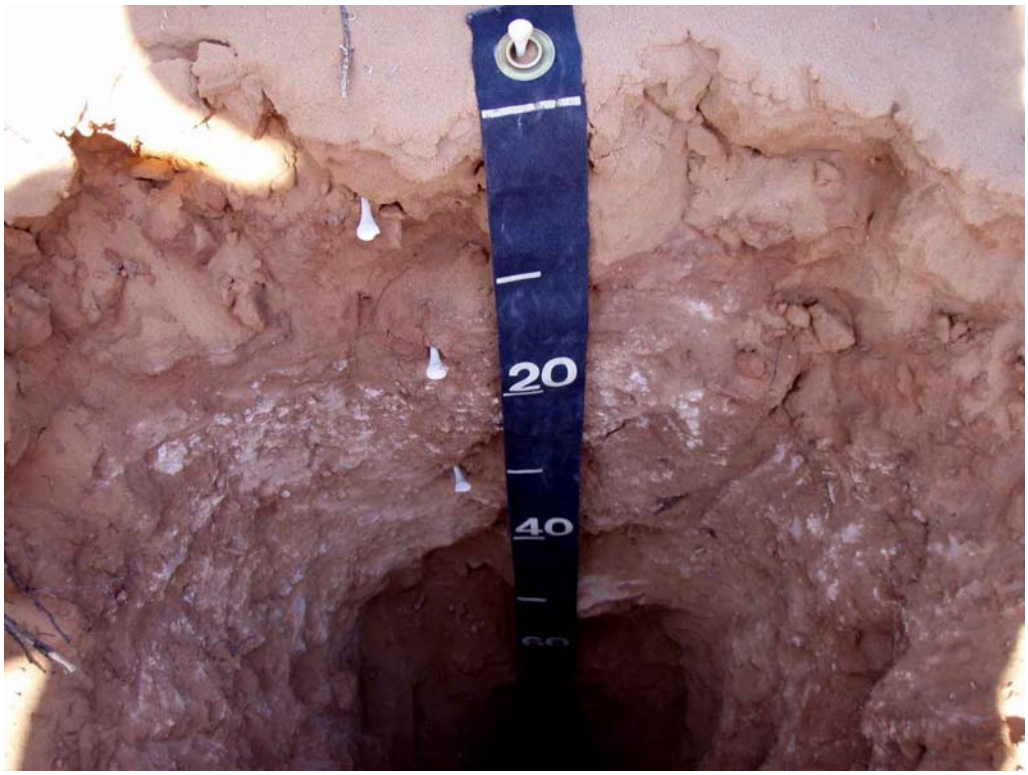

Figure 10.—Profile of Bluechief component. Calcic horizon begins at 6.5 inches (17 cm). Scale is in centimeters.

Figure 11.—A close-up of the surface near the sample pit for Bluechief fine sand.

Canopy plant cover: 45 percent
Woody debris: 3 percent
Bare soil: 23 percent
Rock fragments
• channer: 5 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 2.00 to 20.00 inches per hour (14.11 to 141.14 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 3.0 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: B
Ecological site name: Desert Sandy Loam (Blackbrush)
Ecological site number: R035XY121UT
Present vegetation: blackbrush, Indian ricegrass, galleta, Torrey Mormon tea
Land capability (non irrigated): 7c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Location

Geographic Coordinate System: 38° 21' 53.00'' north, 109° 54' 51.30'' west

A—0 to 2.5 inches (0 to 6 cm); reddish yellow (5YR 6/6) fine sand, yellowish red (5YR 5/6), moist; 2 percent clay; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; many very fine interstitial pores; very slightly effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Bw—2.5 to 6.5 inches (6 to 17 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 6 percent clay; moderate medium and coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common fine roots throughout; common very fine irregular pores; 2 percent fine gravel; strongly effervescent, 4 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

Bk1—6.5 to 13.5 inches (17 to 34 cm); reddish yellow (5YR 6/8) fine sandy loam, yellowish red (5YR 5/8), moist; 13 percent clay; moderate fine and medium subangular blocky structure; moderately hard, firm, slightly sticky and nonplastic; common fine roots throughout; common very fine irregular pores; common prominent irregular carbonate masses in matrix; 8 percent fine gravel; violently effervescent, 12 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

Bk2—13.5 to 34.5 inches (34 to 87 cm); reddish yellow (5YR 6/6) gravelly fine sandy loam, reddish yellow (5YR 6/8), moist; 15 percent clay; moderate fine and medium subangular blocky structure; moderately hard, firm, slightly sticky and nonplastic; common fine roots throughout; common very fine irregular pores; many prominent irregular carbonate masses in matrix; 20 percent fine gravel; violently effervescent, 28 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

2R—34.5 inches (87 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 4 to 6, dry or moist

Bw horizon
- Hue: 5YR, 7.5YR
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 4 to 8, dry or moist
- Clay: 5 to 10 percent
- Calcium carbonate equivalent: 0 to 5 percent
- Rock fragments: 0 to 5 percent

Bk horizons
- Hue: 5YR, 7.5YR
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 4 to 8, dry or moist
- Texture: sandy loam, fine sandy loam
- Clay: 12 to 18 percent
- Calcium carbonate equivalent: 5 to 35 percent
- Rock fragments: 0 to 20 percent

Calcic horizon—the zone from 6.5 to 34.5 inches (17 to 87 cm) (Bk horizons)

Needle soils
Taxonomic classification: Mixed, mesic Lithic Torripsamments
Geomorphic position: occurs on side slopes on structural benches
Parent material: eolian sands derived from sandstone
Slope: 2 to 15 percent
- Biological crust
  - Cyanobacteria: 25 percent
- Lichen: 7 percent
  - Moss: 3 percent
- Chemical crust
  - Salt: 0 percent
  - Gypsum: 0 percent
- Physical cover
  - Canopy plant cover: 45 percent
  - Woody debris: 3 percent
  - Bare soil: 23 percent
  - Rock fragments
    - gravel: 1 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic
Drainage class: excessively drained
Ksat solum: 6.00 to 20.00 inches per hour (42.34 to 141.14 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.3 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Desert Shallow Sandy Loam (Blackbrush)

Ecological site number: R035XY133UT
Present vegetation: blackbrush, rubber rabbitbrush, Indian ricegrass, Douglas rabbitbrush, Torrey Mormon tea, broom snakeweed, desert trumpet buckwheat, galleta, gooseberryleaf globemallow
Land capability (non irrigated): 7c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Location
Geographic Coordinate System: 38° 22' 26.40'' north, 110° 1' 8.40'' west

C—0 to 5 inches (0 to 13 cm); reddish brown (5YR 5/4) fine sand, yellowish red (5YR 4/6), moist; 1 percent clay; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots throughout; many fine irregular pores; 1 percent gravel; slightly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

2R—5 inches (13 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.9 to 8.4 (moderately alkaline)

C horizon
Value: 5 or 6 dry, 4 to 6 moist
Chroma: 4 to 6, dry or moist
Texture: loamy sand, fine sand, loamy fine sand
Clay: 1 to 12 percent
Rock fragments: 0 to 10 percent

3—Claysprings-Badland complex, 2 to 40 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 12)
Elevation: 3,870 to 5,050 feet (1,180 to 1,540 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Claysprings and similar soils: 65 percent
Badland: 30 percent
Minor components: Some areas are moderately deep to paralithic bedrock. Very deep Cowboy soils are in areas of deposition. Very deep Dient soils are on more stable areas.

Soil Properties and Qualities

Claysprings soils (fig. 13)
Taxonomic classification: Clayey, mixed, superactive, calcareous, mesic, shallow Typic Torriorthents

Figure 12.—An area of Claysprings-Badland complex, 2 to 40 percent slopes.

Figure 13.—Profile of Claysprings component. Scale is in centimeters.

Geomorphic position: occurs on base slopes on hills and benches
Parent material: residuum weathered from calcareous shale
Slope: 2 to 40 percent
Biological crust
Cyanobacteria: 28 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 6 percent
Gypsum: 0 percent
Physical cover (fig. 14)
Canopy plant cover: 1 percent
Woody debris: 1 percent
Bare soil: 32 percent
Rock fragments
- gravel: 1 percent
- channer: 11 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 0.06 to 0.20 inches per hour (0.42 to 1.40 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.1 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: very high

Figure 14.—A close-up of the surface near the sample pit for Claysprings clay.

Hydrologic group: D
Ecological site name: Desert Shallow Clay (Mat Saltbush)
Ecological site number: R035XY124UT
Present vegetation: mat saltbush, shadscale saltbush
Land capability (non irrigated): 7c

Typical Profile

Location
Geographic Coordinate System: 37° 4' 55.60'' north, 111° 34' 10.20'' west

A—0 to 1 inch (0 to 3 cm); light gray (5Y 7/2) clay, light olive gray (5Y 6/2), moist; 45 percent clay; weak thin platy structure; soft, very friable, very sticky and very plastic; common very fine roots throughout; common very fine dendritic tubular pores; violently effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

Cy—1 inch to 7 inches (3 to 18 cm); light gray (5Y 7/2) clay, light olive gray (5Y 6/2), moist; 45 percent clay; massive; slightly hard, friable, very sticky and very plastic; common fine gypsum masses throughout; strongly effervescent, 3 percent gypsum; moderately alkaline, pH 8.0; abrupt wavy boundary.

Cr—7 inches (18 cm); weathered shale bedrock.

Range in Characteristics

Claysprings, as used in this survey, is a taxadjunct to the official series because it has mixed mineralogy. The Claysprings series is clayey, smectitic, calcareous, mesic, shallow Typic Torriorthents. This does not affect use and management.

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Hue: 5Y, 2.5Y
- Value: 5 to 7 dry, 4 to 6 moist
- Chroma: 1 or 2, dry or moist

Cy horizon
- Hue: 5Y, 2.5Y
- Value: 4 to 7 dry, 3 to 6 moist
- Chroma: 1 or 2, dry or moist
- Texture: clay, clay loam
- Clay: 35 to 55 percent
- Rock fragments: 0 to 12 percent

Badland
Slope: 4 to 60 percent

Badland is gently sloping to very steep barren land that is dissected by many intermittent drainage channels. These areas are cut into soft geologic material of Topic Shale. Badland also includes areas where the depth to soft bedrock is less than four inches (10 cm).

4—Cowboy clay loam, 3 to 10 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 15)
Elevation: 3,840 to 4,590 feet (1,170 to 1,400 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Cowboy and similar soils: 85 percent
Minor components: Very deep Seeg soils and shallow Claysprings soils. These soils usually occur on higher more stable positions.

Soil Properties and Qualities

Cowboy soils (fig. 16)
Taxonomic classification: Fine, smectitic, mesic Typic Haplogypsids
Geomorphic position: occurs on base slopes on hills and structural benches.
Parent material: alluvium and/or slope alluvium derived from calcareous shale
Slope: 3 to 10 percent
Biological crust
Cyanobacteria: 19 percent
Lichen: 2 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 17)
Canopy plant cover: 10 percent

Figure 15.—An area of Cowboy clay loam, 3 to 10 percent slopes. Claysprings-Badland complex, 2 to 40 percent slopes is in the background.

Figure 16.—Profile of Cowboy component. Gypsic horizon begins at 19 inches (48 cm). Scale is in centimeters.

Woody debris: 13 percent
Bare soil: 53 percent
Rock fragments
- gravel: 6 percent
- cobble: 1 percent
- channer: 3 percent

Drainage class: well drained
Ksat solum: 0.06 to 2.00 inches per hour (0.42 to 14.11 micrometers per second)
Available water capacity total inches: 9.3 (high)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: high
Hydrologic group: C
Ecological site name: Desert Shallow Clay (Mat Saltbush)
Ecological site number: R035XY124UT
Present vegetation: mat saltbush, Native American pipeweed
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 37° 4' 24.50'' north, 111° 24' 15.40'' west

A—0 to 2 inches (0 to 5 cm); light yellowish brown (2.5Y 6/3) clay loam, light olive brown (2.5Y 5/3), moist; 34 percent clay; weak thin platy structure; loose, slightly sticky and moderately plastic; common fine roots throughout; many fine dendritic tubular pores; common fine salt masses throughout and common fine gypsum masses throughout; 2 percent channer; violently effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

By1—2 to 6 inches (5 to 15 cm); light olive brown (2.5Y 5/4) sandy clay loam, olive brown (2.5Y 4/4), moist; 30 percent clay; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; many very fine dendritic tubular pores; common fine salt masses throughout and common fine gypsum masses throughout; 5 percent channer; violently effervescent, 1 percent gypsum; moderately alkaline, pH 8.2; abrupt smooth boundary.

By2—6 to 19 inches (15 to 48 cm); light olive brown (2.5Y 5/4) sandy clay loam, olive brown (2.5Y 4/4), moist; 34 percent clay; moderate medium prismatic structure; moderately hard, very friable, slightly sticky and moderately plastic; common fine and medium roots throughout; many fine and medium dendritic tubular pores; common fine gypsum crystals and common fine gypsum masses throughout and common salt masses throughout; 10 percent channer; violently effervescent, 8 percent calcium carbonate equivalent and 3 percent gypsum; moderately alkaline, pH 8.2; clear smooth boundary.

Figure 17.—A close-up of the surface near the sample pit for Cowboy clay loam.

By3—19 to 47 inches (48 to 119 cm); light olive brown (2.5Y 5/4) clay, light olive brown (2.5Y 5/3), moist; 45 percent clay; massive; hard, very friable, moderately sticky and very plastic; common fine roots throughout; many fine dendritic tubular pores; many fine salt masses on faces of peds and common fine gypsum crystals; 2 percent channer; violently effervescent, 11 percent calcium carbonate equivalent and 12 percent gypsum; moderately alkaline, pH 8.2; gradual smooth boundary.

By4—47 to 56 inches (119 to 142 cm); light yellowish brown (2.5Y 6/4) clay loam, light yellowish brown (2.5Y 6/3), moist; 38 percent clay; massive; hard, friable, slightly sticky and moderately plastic; many fine dendritic tubular pores; many fine salt masses on faces of peds and common fine gypsum crystals; 5 percent channer and 10 percent parachanner; violently effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

By5—56 to 60 inches (142 to 152 cm); light olive brown (2.5Y 5/4) clay, light olive brown (2.5Y 5/3), moist; 45 percent clay; massive; moderately hard, friable, slightly sticky and moderately plastic; many very fine and fine dendritic tubular pores; many fine salt masses on faces of peds and many fine gypsum crystals; 5 percent channer; violently effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Cowboy, as used in this survey, is a taxadjunct because the gypsic horizon is deeper than 7 inches. The Cowboy series is a fine, smectitic, mesic, Leptic Haplogypsids. This does not affect use and management.

Reaction: 7.9 to 9.0 (moderately to strongly alkaline)

A horizon
- Hue: 10YR, 2.5Y
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 3 or 4, dry or moist

By horizons
- Hue: 10YR, 2.5Y
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy clay loam, clay, clay loam
- Clay: 28 to 50 percent, averages greater than 35 percent
- Calcium carbonate equivalent: 0 to 15 percent
- Gypsum: 1 to 15 percent
- Rock fragments: 0 to 10 percent

Gypsic horizon—the zone from 19 to 47 inches (48 to 119 cm) (By horizon)

5—Dient-Claysprings, complex, 5 to 65 percent slopes, bouldery

Map Unit Setting

Landform(s): plateaus (fig. 18)
Elevation: 3,970 to 5,540 feet (1,210 to 1,690 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau

Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Dient and similar soils: 65 percent
Claysprings and similar soils: 30 percent
Minor components: A few areas of Badland and gullies.

Soil Properties and Qualities

Dient soils (fig. 19)
Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic Typic Torriorthents
Geomorphic position: occurs on base slopes on alluvial fans and fan remnants
Parent material: colluvium and/or slope alluvium derived from sandstone and shale
Slope: 5 to 65 percent
Biological crust
Cyanobacteria: 6 percent
Lichen: 4 percent
Moss: 5 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 20)
Canopy plant cover: 28 percent
Woody debris: 28 percent
Bare soil: 5 percent

Figure 18.—An area of Dient-Claysprings complex, 5 to 65 percent slopes, bouldery. Rock outcrop-Tsaya complex, 15 to 60 percent slopes, extremely bouldery is in the background.

Figure 19.—Profile of Dient component. Scale is in centimeters.

Rock fragments
- gravel: 35 percent
- cobble: 5 percent
- stone: 3 percent
- boulder: 5 percent
- channer: 9 percent
- flagstone:1 percent

Drainage class: well drained
Ksat solum: 0.60 to 6.00 inches per hour (4.23 to 42.34 micrometers per second)
Available water capacity total inches: 3.8 (low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: high
Hydrologic group: B
Ecological site name: Desert Stony Loam (Blackbrush)
Ecological site number: R035XY139UT
Present vegetation: blackbrush, shadscale saltbush, galleta
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 37° 8' 39.00'' north, 111° 20' 2.50'' west

A—0 to 2 inches (0 to 5 cm); brown (10YR 5/3) very gravelly loam, brown (10YR 4/3), moist; 26 percent clay; weak thin platy structure; soft, very friable, slightly sticky and nonplastic; many very fine roots throughout; many fine dendritic tubular pores; 40

Figure 20.—A close-up of the surface near the sample pit for Dient very gravelly loam.

percent gravel; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Bw—2 to 7 inches (5 to 18 cm); brown (10YR 5/3) very gravelly loam, brown (10YR 4/3), moist; 26 percent clay; moderate fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; many very fine and fine roots throughout; many fine dendritic tubular pores; 35 percent gravel and 5 percent cobble; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C1—7 to 15 inches (18 to 38 cm); brown (10YR 5/3) extremely cobbly sandy loam, brown (10YR 4/3), moist; 19 percent clay; weak fine subangular blocky structure; loose, slightly sticky and nonplastic; many very fine and fine roots throughout; many fine dendritic tubular pores; 40 percent gravel and 20 percent cobble and 5 percent stone; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C2—15 to 22 inches (38 to 56 cm); light yellowish brown (10YR 6/4) extremely stony sandy loam, yellowish brown (10YR 5/4), moist; 18 percent clay; massive; loose, nonsticky and nonplastic; many very fine and fine roots throughout; common fine dendritic tubular pores; 40 percent gravel and 10 percent cobble and 10 percent stone; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C3—22 to 60 inches (56 to 152 cm); light yellowish brown (10YR 6/4) extremely gravelly sandy loam, yellowish brown (10YR 5/4), moist; 18 percent clay; massive; loose, nonsticky and nonplastic; many very fine and fine roots throughout; 50 percent gravel and 20 percent cobble and 5 percent stone; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Hue: 10YR, 2.5Y
- Value: 5 dry, 4 moist
- Chroma: 3, dry or moist

Bw horizon
- Hue: 10YR, 2.5Y
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3, dry or moist
- Texture: loam, sandy loam
- Clay: 15 to 27 percent
- Rock fragments: 35 to 55 percent

C horizons
- Hue: 10YR, 2.5Y
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 3 or 4, dry or moist
- Texture: sandy loam, loam
- Clay: 12 to 27 percent
- Rock fragments: 35 to 85 percent

Some pedons do not have a Bw horizon.

Claysprings soils

Taxonomic classification: Clayey, mixed, superactive, calcareous, mesic, shallow Typic Torriorthents
Geomorphic position: occurs on base slopes on alluvial fans and fan remnants
Parent material: gravelly colluvium derived from sandstone and shale over clayey residuum weathered from calcareous shale
Slope: 5 to 65 percent

Biological crust
- Cyanobacteria: 9 percent

Lichen: 6 percent
- Moss: 1 percent

Chemical crust
- Salt: 0 percent
- Gypsum: 0 percent

Physical cover
- Canopy plant cover: 21 percent
- Woody debris: 22 percent
- Bare soil: 6 percent
- Rock fragments
  - gravel: 33 percent
  - cobble: 10 percent
  - channer: 18 percent
  - flagstone:1 percent

Depth to restrictive feature(s): 7 to 20 inches to densic material
Drainage class: well drained
Ksat solum: 0.00 to 2.00 inches per hour (0.00 to 14.11 micrometers per second)
Available water capacity total inches: 2.8 (low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none

Runoff class: high
Hydrologic group: D
Ecological site name: Desert Shallow Clay (Mat Saltbush)
Ecological site number: R035XY124UT
Present vegetation: rayless goldenhead, blackbrush, galleta, Anderson wolfberry
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 37° 9' 3.80'' north, 111° 20' 16.00'' west

A—0 to 2 inches (0 to 5 cm); brown (10YR 5/3) channery sandy clay loam, dark grayish brown (10YR 4/2), moist; 25 percent clay; weak thin platy structure; soft, very friable, moderately sticky and moderately plastic; many very fine and common fine dendritic tubular pores; 15 percent channer; slightly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

2Cy1—2 to 6 inches (5 to 15 cm); light olive brown (2.5Y 5/3) clay loam, olive brown (2.5Y 4/3), moist; 35 percent clay; moderate coarse granular structure; slightly hard, friable, very sticky and very plastic; common very fine roots throughout; common fine gypsum masses; 3 percent channer; very slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

2Cy2—6 to 11 inches (15 to 28 cm); light olive brown (2.5Y 5/3) clay, olive brown (2.5Y 4/3), moist; 40 percent clay; weak fine subangular blocky structure; hard, firm, very sticky and very plastic; common very fine and common fine roots throughout; common very fine tubular pores; common fine gypsum masses; very slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

2Cy3—11 to 18 inches (28 to 46 cm); light yellowish brown (2.5Y 6/3) clay, light olive brown (2.5Y 5/3), moist; 40 percent clay; massive; very hard, very firm, very sticky and very plastic; common very fine roots throughout; common very fine tubular pores; common fine gypsum crystals and common fine gypsum masses; 2 percent gravel; very slightly effervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

2Cd—18 to 28 inches (46 to 71 cm); light yellowish brown (2.5Y 6/3) clay, light olive brown (2.5Y 5/3), moist; 40 percent clay; massive; extremely hard, very firm, very sticky and very plastic; common very fine tubular pores; common fine gypsum crystals and common fine gypsum masses; 2 percent gravel; very slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Claysprings, as used in this survey, is a taxadjunct to the official series because it has mixed mineralogy. The Claysprings series is a clayey, smectitic, calcareous, mesic, shallow Typic Torriorthents. This does not affect use and management.

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Hue: 2.5Y, 10YR
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 2 to 6, dry or moist

Cy horizons
- Hue: 2.5Y, 10YR
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 3 to 8, dry or moist
- Texture: clay loam, clay

Clay: 35 to 55 percent
Rock fragments: 0 to 5 percent

Cd horizon
Value: 5 or 6 dry, 4 to 6 moist
Chroma: 3 to 8, dry or moist
Texture: clay loam, clay
Clay: 35 to 55 percent
Rock fragments: 0 to 5 percent
Root limiting when dry

6—Earlweed-Anasazi complex, 5 to 22 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 21)
Elevation: 5,680 to 5,910 feet (1,730 to 1,800 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Map Unit Composition

Earlweed and similar soils: 60 percent

Figure 21.—An area of Earlweed-Anasazi complex, 5 to 22 percent slopes.

Anasazi and similar soils: 30 percent
Minor components: Soils that have a loamy very fine sand or a very fine sand texture; soils that are less than 20 inches deep.

Soil Properties and Qualities

Earlweed soils (fig. 22)
Taxonomic classification: Sandy, mixed, mesic Ustic Haplocalcids
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches as coppice mounds and dunes
Parent material: eolian deposits
Slope: 5 to 22 percent
Biological crust
Cyanobacteria: 47 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent

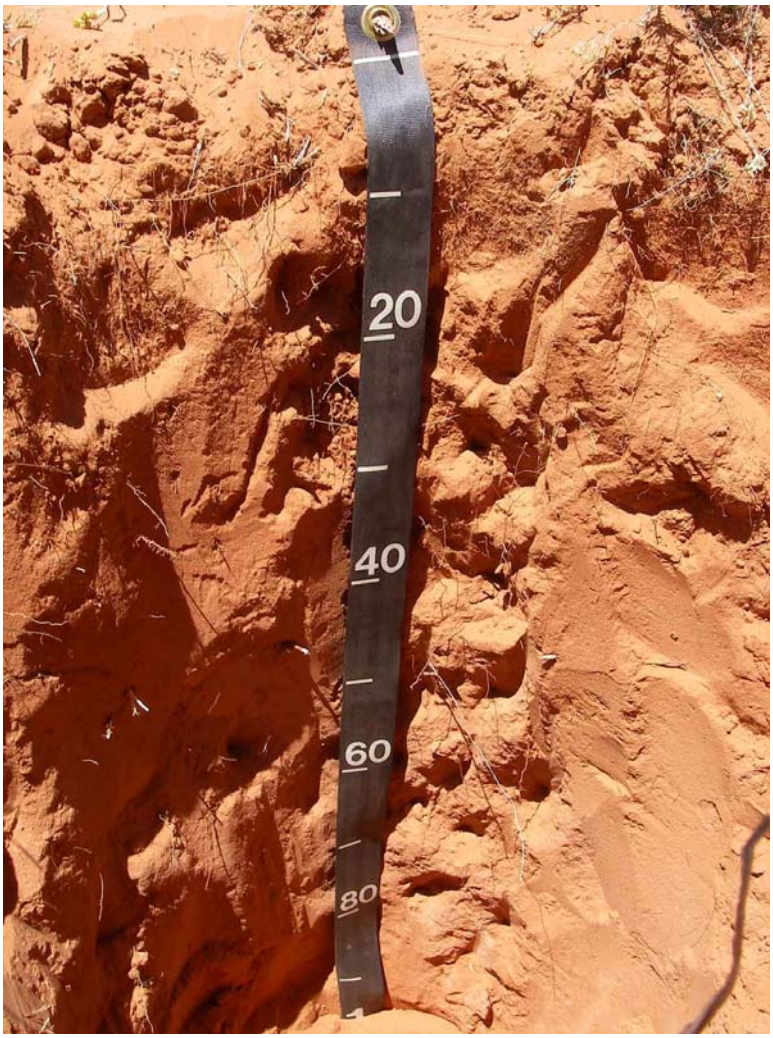

Figure 22.—Profile of Earlweed component. Calcic horizon begins at 30 inches (76 cm). Scale is in centimeters.

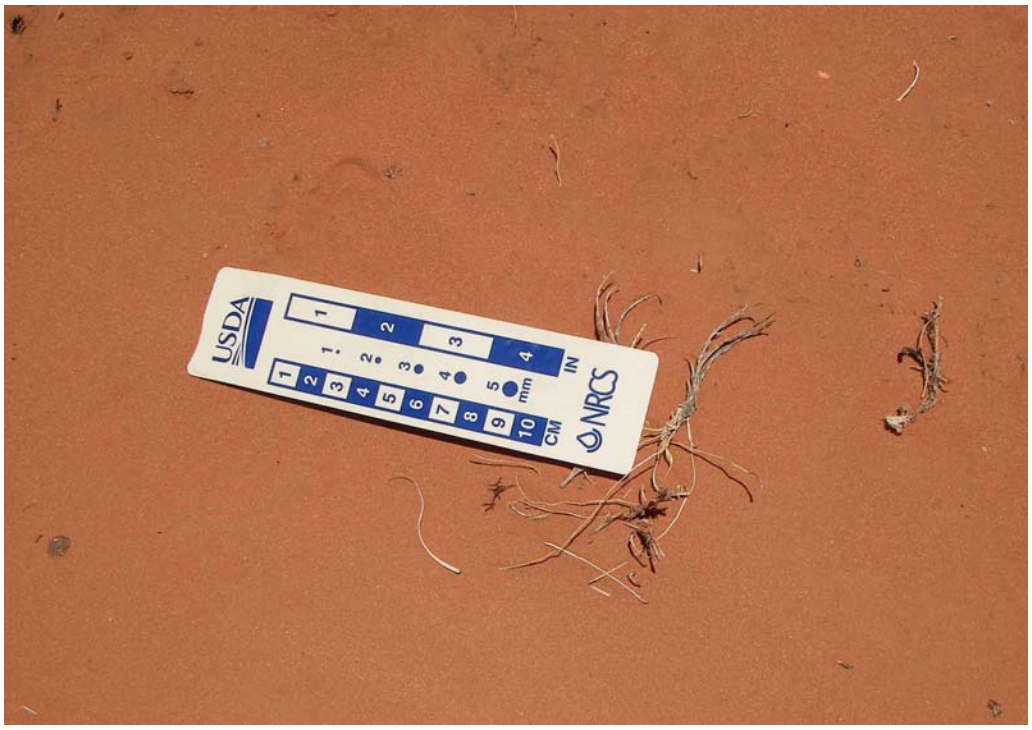

Figure 23.—A close-up of the surface near the sample pit for Earlweed loamy fine sand.

Gypsum: 0 percent
Physical cover (fig. 23)
Canopy plant cover: 11 percent
Woody debris: 29 percent
Bare soil: 26 percent
Rock fragments
• gravel: 1 percent
Drainage class: excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Available water capacity total inches: 6.0 (moderate)
Shrink-swell potential: about 1.0 LEP (low)
Flooding hazard: none
Runoff class: medium
Hydrologic group: A
Ecological site name: Semidesert Sand (Fourwing Saltbush)
Ecological site number: R035XY212UT
Present vegetation: Utah juniper, Cutler Mormon tea, Indian ricegrass, galleta
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System: 37° 37' 38.00'' north, 111° 15' 32.10'' west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) loamy fine sand, dark reddish brown (5YR 3/4), moist; 7 percent clay; single grain; loose, nonsticky and nonplastic; many fine roots throughout; common very fine tubular pores; slightly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

Bw1—1 inch to 13 inches (3 to 33 cm); yellowish red (5YR 5/8) loamy fine sand,

yellowish red (5YR 4/6), moist; 8 percent clay; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots throughout; common very fine tubular pores; slightly effervescent; moderately alkaline, pH 8.2; gradual wavy boundary.

Bw2—13 to 30 inches (33 to 76 cm); yellowish red (5YR 5/8) loamy fine sand, yellowish red (5YR 4/6), moist; 8 percent clay; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots throughout; common very fine tubular pores; slightly effervescent; moderately alkaline, pH 8.2; gradual wavy boundary.

Bk1—30 to 44 inches (76 to 112 cm); yellowish red (5YR 5/8) loamy fine sand, yellowish red (5YR 4/6), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; common fine roots throughout; common very fine tubular pores; common fine threadlike carbonate masses and common fine spherical carbonate masses; strongly effervescent, 8 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; gradual wavy boundary.

Bk2—44 to 60 inches (112 to 152 cm); reddish yellow (5YR 6/6) loamy fine sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; loose, nonsticky and nonplastic; common fine threadlike carbonate masses and common medium spherical carbonate masses; strongly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Value: 5 or 6 dry, 3 to 5 moist
- Chroma: 4 to 6, dry or moist

Bw horizons
- Hue: 2.5YR, 5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 6 to 8, dry or moist
- Texture: loamy fine sand, fine sand
- Clay: 4 to 10 percent
- Calcium carbonate equivalent: 0 to 2 percent

Bk horizons
- Hue: 2.5YR, 5YR
- Value: 4 to 7 dry, 3 to 5 moist
- Chroma: 3 to 8, dry or moist
- Texture: loamy fine sand, fine sand
- Clay: 4 to 10 percent
- Calcium carbonate equivalent: 5 to 15 percent

Calcic horizon—the zone from 30 to 60 inches (76 to 152 cm) (Bk horizons)

Anasazi soils (fig. 24)
Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Ustic Haplocalcids
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches
Parent material: eolian deposits and/or residuum weathered from sandstone
Slope: 5 to 22 percent
Biological crust
Cyanobacteria: 5 percent
Lichen: 0 percent
Moss: 0 percent

Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 25)
Canopy plant cover: 40 percent
Woody debris: 5 percent
Bare soil: 47 percent
Rock fragments
• gravel: 3 percent

Depth to restrictive feature(s): 20 to 35 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 2.6 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: medium
Hydrologic group: B
Ecological site name: Semidesert Sandy Loam (Blackbrush)
Ecological site number: R035XY218UT
Present vegetation: blackbrush, galleta, Cutler Mormon tea, Indian ricegrass, shadscale saltbush
Land capability (non irrigated): 6c

Figure 24.—Profile of Anasazi component. Calcic horizon begins at 8 inches (20 cm). Scale is in centimeters.

Figure 25.—A close-up of the surface near the sample pit for Anasazi fine sandy loam.

Typical Profile

Location

Geographic Coordinate System: 37° 37' 36.90'' north, 111° 15' 36.90'' west

A—0 to 1 inch (0 to 3 cm); reddish brown (5YR 5/4) fine sandy loam, yellowish red (5YR 4/6), moist; 8 percent clay; weak thin platy structure; loose, nonsticky and nonplastic; many very fine roots throughout; slightly effervescent; moderately alkaline, pH 8.4; abrupt smooth boundary.

Bw—1 inch to 8 inches (3 to 20 cm); reddish brown (5YR 5/4) loamy fine sand, yellowish red (5YR 4/6), moist; 7 percent clay; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and common medium roots throughout; common very fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Bk1—8 to 17 inches (20 to 43 cm); reddish brown (5YR 5/4) loamy fine sand, yellowish red (5YR 4/6), moist; 7 percent clay; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine and common fine roots throughout; common very fine and fine dendritic tubular pores; common fine spherical carbonate masses; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Bk2—17 to 29 inches (43 to 74 cm); reddish brown (5YR 5/4) gravelly sandy loam, yellowish red (5YR 4/6), moist; 12 percent clay; massive; hard, firm, slightly sticky and slightly plastic; common very fine roots throughout; common carbonate masses around rock fragments and common fine spherical carbonate masses; 15 percent gravel; violently effervescent, 18 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt smooth boundary.

R—29 inches (74 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Value: 5 or 6 dry, 3 to 5 moist
- Chroma: 4 or 6, dry or moist

Bw horizon
- Hue: 2.5YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 to 6, dry or moist
- Texture: fine sandy loam, loamy fine sand
- Clay: 6 to 12 percent
- Calcium carbonate equivalent: 0 to 5 percent
- Rock fragments: 0 to 5 percent

Bk horizons
- Hue: 2.5YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 to 6, dry or moist
- Texture: sandy loam, fine sandy loam, loamy fine sand
- Clay: 6 to 14 percent
- Calcium carbonate equivalent: 5 to 20 percent
- Rock fragments: 0 to 30 percent

Calcic horizon—the zone from 17 to 29 inches (43 to 74 cm) (Bk horizons)

7—Farb-Pagina-Rock outcrop complex, 4 to 20 percent slopes, bouldery

Map Unit Setting

Landform(s): plateaus (fig. 26)
Elevation: 3,670 to 5,310 feet (1,120 to 1,620 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Farb and similar soils: 35 percent
Pagina and similar soils: 30 percent
Rock outcrop: 25 percent
Minor components: Shallow Moenkopie soils. These soils occur on similar positions as Farb soils. A few areas have soils with clay greater than 18 percent. Some areas have slopes of less than 4 percent.

Soil Properties and Qualities

Farb soils (fig. 27)
Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic Lithic Torriorthents

Geomorphic position: occurs on interfluves on hills, mesas, and structural benches
Parent material: eolian sands derived from sandstone and/or residuum weathered from sandstone
Slope: 4 to 20 percent
Biological crust
Cyanobacteria: 31 percent
Lichen: 1 percent
Moss: 1 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 28)
Canopy plant cover: 10 percent
Woody debris: 8 percent
Bare soil: 37 percent
Rock fragments
- gravel: 14 percent
- boulder: 4 percent
- channer: 1 percent

Depth to restrictive feature(s): 5 to 19 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.0 (very low)
Shrink-swell potential: about 1.5 LEP (low)

Figure 26.—An area of Farb-Pagina-Rock outcrop complex, 4 to 20 percent slopes, bouldery.

Figure 27.—Profile of Farb component. Scale is in centimeters.

Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Desert Shallow Sandy Loam (Blackbrush)
Ecological site number: R035XY133UT
Present vegetation: blackbrush, galleta, broom snakeweed, plains pricklypear
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 37° 4' 12.70'' north, 111° 24' 27.60'' west

A—0 to 1 inch (0 to 3 cm); light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4), moist; 10 percent clay; weak thin platy structure; soft, very friable, nonsticky and nonplastic; many fine dendritic tubular pores; 3 percent gravel; slightly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C—1 to 9 inches (3 to 23 cm); light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4), moist; 10 percent clay; massive; soft, very friable,

Figure 28.—A close-up of the surface near the sample pit for Farb fine sandy loam.

nonsticky and nonplastic; common fine dendritic tubular pores; 5 percent gravel; strongly effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

R—9 inches (23 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Hue: 10YR, 7.5YR
- Value: 5 to 7 dry, 4 to 6 moist
- Chroma: 3 to 6, dry or moist

C horizon
- Hue: 10YR, 7.5YR
- Value: 5 to 8 dry, 4 to 6 moist
- Chroma: 2 to 6, dry or moist
- Texture: fine sandy loam, sandy loam
- Clay: 8 to 16 percent
- Rock fragments: 0 to 12 percent

Pagina soils

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Typic Haplocalcids

Geomorphic position: occurs on interfluves on hills, mesas, and structural benches

Parent material: eolian sands derived from sandstone and/or residuum weathered from sandstone and shale

Slope: 4 to 20 percent

Biological crust
Cyanobacteria: 31 percent
Lichen: 1 percent
Moss: 1 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 10 percent
Woody debris: 8 percent
Bare soil: 37 percent
Rock fragments
- gravel: 14 percent
- boulder: 4 percent
- channer: 1 percent

Depth to restrictive feature(s): 26 to 39 inches to bedrock, paralithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 2.5 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: medium
Hydrologic group: B
Ecological site name: Desert Sandy Loam (Blackbrush)
Ecological site number: R035XY121UT
Present vegetation: blackbrush, galleta, broom snakeweed, plains pricklypear
Land capability (non irrigated): 7c

Typical Profile

Location
Geographic Coordinate System: 37° 4' 1.70'' north, 111° 24' 25.60'' west

A—0 to 1 inch (0 to 3 cm); brownish yellow (10YR 6/6) fine sandy loam, yellowish brown (10YR 5/4), moist; 11 percent clay; weak thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and common medium roots throughout; many fine dendritic tubular pores; 2 percent gravel; strongly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

Bw—1 inch to 8 inches (3 to 20 cm); reddish yellow (7.5YR 6/6) fine sandy loam, brown (7.5YR 5/4), moist; 12 percent clay; weak fine subangular blocky and weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and common medium roots throughout; many fine dendritic tubular pores; 2 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

Bk1—8 to 12 inches (20 to 30 cm); brownish yellow (10YR 6/6) sandy loam, yellowish brown (10YR 5/4), moist; 14 percent clay; weak fine subangular blocky and weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, and common medium roots throughout; many fine dendritic tubular pores; common fine carbonate masses; 10 percent gravel; strongly effervescent, 14 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; clear smooth boundary.

Bk2—12 to 17 inches (30 to 43 cm); very pale brown (10YR 7/4) gravelly fine sandy

loam, yellow (10YR 7/6), moist; 18 percent clay; massive; hard, firm, slightly sticky and slightly plastic; many very fine, fine, and common medium roots throughout; many fine dendritic tubular pores; common fine carbonate masses; 25 percent gravel; violently effervescent, 27 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear smooth boundary.

Ck—17 to 26 inches (43 to 66 cm); light gray (10YR 7/2) gravelly fine sandy loam, yellow (10YR 7/6), moist; 16 percent clay; massive; very hard, firm, slightly sticky and slightly plastic; many fine roots throughout; many fine dendritic tubular pores; many fine carbonate masses; 30 percent gravel; violently effervescent, 23 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear smooth boundary.

Cr—26 inches (66 cm); weathered sandstone bedrock.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Hue: 10YR, 7.5YR
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 4 to 6, dry or moist

Bw horizon
- Hue: 10YR, 7.5YR
- Value: 5 to 7 dry, 4 to7 moist
- Chroma: 4 to 6, dry or moist
- Texture: sandy loam, fine sandy loam
- Clay: 6 to 14 percent
- Calcium carbonate equivalent: 0 to 5 percent
- Rock fragments: 0 to 10 percent

Bk horizons
- Hue: 10YR, 7.5YR
- Value: 5 to 7 dry, 4 to7 moist
- Chroma: 4 to 6, dry or moist
- Texture: sandy loam, fine sandy loam
- Clay: 8 to 18 percent
- Calcium carbonate equivalent: 5 to 30 percent
- Rock fragments: 5 to 30 percent

Ck horizons
- Hue: 10YR, 7.5YR
- Value: 5 to 7 dry, 4 to 7 moist
- Chroma: 2 to 6, dry or moist
- Texture: fine sandy loam, sandy loam
- Clay: 10 to 18 percent
- Calcium carbonate equivalent: 5 to 30 percent
- Rock fragments: 10 to 30 percent

Calcic horizon—the zone from 8 to 17 inches (20 to 43 cm) (Bk horizons)

Rock outcrop
Slope: 6 to 20 percent

Rock outcrop consists of interbedded sandstone and shale bedrock, typically exposed along ledges and slick rock areas of the Entrada Sandstone or the Carmel Formation. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

Figure 29.—An area of Gladel-Rock outcrop complex, 4 to 22 percent slopes, bouldery.

8—Gladel-Rock outcrop complex, 4 to 22 percent slopes, bouldery

Map Unit Setting

Landform(s): plateaus (fig. 29)
Elevation: 7,220 to 7,550 feet (2,200 to 2,300 meters)
Mean annual precipitation: 14 to 18 inches (350 to 450 millimeters)
Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)
Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)
Frost-free period: 120 to 150 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-6 Colorado Plateau Pinyon - Juniper - Sagebrush

Map Unit Composition

Gladel and similar soils: 50 percent
Rock outcrop: 30 percent
Minor components: Shallow Kydestea soils on shoulders. Soils that are greater than 20 inches (50 cm) deep on more stable, less sloping areas.

Soil Properties and Qualities

Gladel soils
Taxonomic classification: Loamy, mixed, superactive, mesic Aridic Lithic Haplustepts
Geomorphic position: occurs on interfluves on bedrock controlled surfaces.
Parent material: eolian sands and/or residuum weathered from sandstone

Slope: 4 to 22 percent
Biological crust
Cyanobacteria: 3 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 30)
Canopy plant cover: 41 percent
Woody debris: 70 percent
Bare soil: 2 percent
Rock fragments
- gravel: 15 percent
- cobble: 6 percent
- stone: 1 percent
- boulder: 1 percent
- channer: 3 percent

Depth to restrictive feature(s): 9 to 17 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.8 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high

Figure 30.—A close-up of the surface near the sample pit for Gladel sandy loam.

Hydrologic group: D
Ecological site name: Upland Shallow Loam (Pinyon-Utah Juniper)
Ecological site number: R035XY315UT
Present vegetation: pinyon, Wyoming big sagebrush, Utah juniper, dwarf lousewort, Utah serviceberry, muttongrass
Land capability (non irrigated): 6c

Typical Profile

Location
Geographic Coordinate System: 37° 11' 25.50'' north, 111° 1' 49.10'' west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/4) sandy loam, dark brown (7.5YR 3/4), moist; 10 percent clay; weak medium platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots throughout; many very fine tubular and fine tubular pores; 3 percent gravel; very slightly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

Bk—2 to 16 inches (5 to 41 cm); strong brown (7.5YR 4/6) sandy loam, brown (7.5YR 4/4), moist; 12 percent clay; moderate fine and medium subangular blocky structure; moderately hard, friable, nonsticky and nonplastic; many very fine, fine, and medium roots throughout; many very fine and fine tubular pores; common fine carbonate masses; 7 percent gravel and 3 percent cobble; strongly effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

R—16 inches (41 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)
Percent clay: 8 to 16

A horizon
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 4 to 6, dry or moist

Bk horizon
Hue: 5YR, 7.5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 4 to 6, dry or moist
Texture: fine sandy loamy, sandy loam
Calcium carbonate equivalent: 0 to 5 percent

Cambic horizon—the zone from 2 to 16 inches (5 to 41 cm) (Bk horizon)

Rock outcrop
Slope: 8 to 22 percent

Rock outcrop consists of sandstone bedrock, typically exposed along ledges and drainageways of the Straight Cliffs Formation. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

9—Goblin very gravelly sandy loam, 6 to 45 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 31)
Elevation: 3,940 to 5,220 feet (1,200 to 1,590 meters)

Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Goblin and similar soils: 90 percent
Minor Component: A few areas of Rock outcrop. Some areas have soils deeper than 20 inches (50 cm).

Soil Properties and Qualities

Goblin soils (fig. 32)
Taxonomic classification: Loamy-skeletal, gypsic, mesic Lithic Haplogypsids
Geomorphic position: occurs on side slopes on hills and structural benches
Parent material: gypsiferous residuum weathered from sandstone
Slope: 6 to 45 percent
Biological crust
Cyanobacteria: 10 percent
Lichen: 35 percent
Moss: 3 percent
Chemical crust
Salt: 0 percent
Gypsum: 7 percent

Figure 31.—An area of Goblin very gravelly sandy loam, 6 to 45 percent slopes. Rock outcrop-Torriorthents complex, 20 to 65 percent slopes, extremely bouldery is in the background.

Figure 32.—Profile of Goblin component. Scale is in centimeters.

Physical cover (fig. 33)
Canopy plant cover: 27 percent
Woody debris: 7 percent
Bare soil: 3 percent
Rock fragments
- gravel: 20 percent
- cobble: 5 percent

Depth to restrictive feature(s): 6 to 16 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.4 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Desert Very Shallow Gypsum (Torrey's Jointfir)
Ecological site number: R035XY142UT
Present vegetation: shadscale saltbush, rubber rabbitbrush, galleta, Torrey Mormon tea, scarlet globemallow, buckwheat
Land capability (non irrigated): 7c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Figure 33.—A close-up of the surface near the sample pit for Goblin very gravelly sandy loam.

Location
Geographic Coordinate System: 38° 14' 17.30'' north, 110° 2' 22.30'' west

By1—0 to 3 inches (0 to 8 cm); light yellowish brown (10YR 6/4) very gravelly sandy loam, yellowish brown (10YR 5/6), moist; 10 percent clay; massive; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine roots throughout; common very fine and fine tubular pores; many fine irregular gypsum crystals in matrix; 40 percent gravel; slightly effervescent, 2 percent calcium carbonate equivalent and 25 percent gypsum; moderately alkaline, pH 8.0; abrupt wavy boundary.

By2—3 to 9 inches (8 to 23 cm); light yellowish brown (10YR 6/4) extremely channery sandy loam, yellowish brown (10YR 5/6), moist; 11 percent clay; massive; slightly hard, friable, slightly sticky and nonplastic; common very fine roots throughout; common very fine tubular pores; many fine irregular gypsum crystals in matrix; 70 percent channer; very slightly effervescent, 1 percent calcium carbonate equivalent and 30 percent gypsum; moderately alkaline, pH 8.0; abrupt wavy boundary.

R—9 inches (23 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Goblin, as used in this survey, is a taxadjunct to the official series because it contains more than 35 percent rock fragments and has a layer of secondary gypsum accumulation. The Goblin series is a loamy, gypsic, mesic, shallow Typic Torriorthents. This does not affect use and management.

By horizon
Value: 6 or 7 dry, 3 to 5 moist

Chroma: 4 to 6 dry
Texture: sandy loam, fine sandy loam
Clay content: 10 to 15 percent
Calcium carbonate equivalent: 1 to 5 percent
Gypsum: 20 to 40 percent
Rock fragments: 35 to 70 percent

10—Jaconita family-Atchee complex, 8 to 60 percent slopes, extremely bouldery

Map Unit Setting

Landform(s): plateaus (fig. 34)
Elevation: 4,100 to 6,730 feet (1,250 to 2,050 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Map Unit Composition

Jaconita family and similar soils: 50 percent
Atchee and similar soils: 40 percent

Figure 34.—An area of Jaconita family-Atchee complex, 8 to 60 percent slopes, extremely bouldery. Rock outcrop-Atchee complex, 24 to 60 percent slopes, extremely bouldery is in the background.

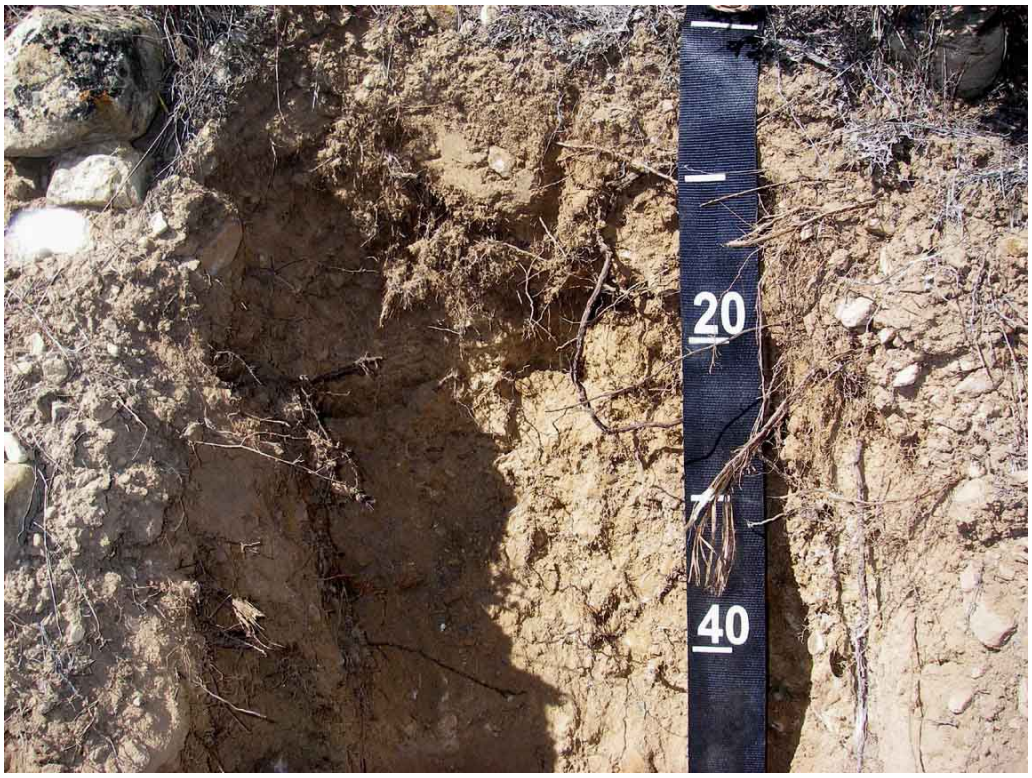

Figure 35.—Profile of Jaconita family component. Calcic horizon begins at 12 inches (30 cm). Scale is in centimeters.

Minor components: Soils that have less than 35 percent rock fragments throughout the profile.Soils with subsoil textures finer than sandy loam.

Soil Properties and Qualities

Jaconita family soils (fig. 35)
Taxonomic classification: Sandy-skeletal, mixed, mesic Ustic Haplocalcids
Geomorphic position: occurs on base slopes on fan remnants and structural benches
Parent material: colluvium and/or slope alluvium derived from sandstone
Slope: 8 to 60 percent

Biological crust
Cyanobacteria: 25 percent
Lichen: 0 percent
Moss: 1 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 36)
Canopy plant cover: 15 percent
Woody debris: 26 percent
Bare soil: 20 percent
Rock fragments
- gravel: 10 percent
- cobble: 5 percent
- stone: 3 percent

- boulder: 5 percent
- channer: 4 percent

Drainage class: excessively drained
Ksat solum: 6.00 to 20.00 inches per hour (42.34 to 141.14 micrometers per second)
Available water capacity total inches: 2.6 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: medium
Hydrologic group: A
Ecological site name: Semidesert Stony Loam (Utah Juniper-Pinyon)
Ecological site number: R035XY246UT
Present vegetation: Utah juniper, grassy rockgoldenrod
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System: 37° 13' 17.60'' north, 111° 0' 29.80'' west

A—0 to 2 inches (0 to 5 cm); yellowish brown (10YR 5/4) gravelly loamy sand, dark yellowish brown (10YR 3/4), moist; 8 percent clay; weak thin platy structure; loose, nonsticky and nonplastic; many very fine roots throughout; many fine dendritic tubular pores; 10 percent gravel and 10 percent channer; slightly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

Bw—2 to 12 inches (5 to 30 cm); yellowish brown (10YR 5/4) very gravelly loamy sand, dark yellowish brown (10YR 4/4), moist; 8 percent clay; weak fine subangular blocky structure; loose, nonsticky and nonplastic; many fine and medium roots

Figure 36.—A close-up of the surface near the sample pit for Jaconita family gravelly loamy sand.

throughout; many fine dendritic tubular pores; 25 percent gravel and 20 percent channer; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

Bk1—12 to 28 inches (30 to 71 cm); light yellowish brown (10YR 6/4) extremely gravelly loamy coarse sand, yellowish brown (10YR 5/4), moist; 6 percent clay; weak fine subangular blocky structure; loose, nonsticky and nonplastic; many fine and medium roots throughout; common fine dendritic tubular pores; common irregular carbonate masses and common threadlike carbonate masses; 40 percent gravel and 10 percent cobble and 10 percent channer; strongly effervescent, 10 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; gradual smooth boundary.

Bk2—28 to 44 inches (71 to 112 cm); light yellowish brown (10YR 6/4) very gravelly loamy sand, yellowish brown (10YR 5/4), moist; 6 percent clay; massive; loose, nonsticky and nonplastic; many fine and common medium roots throughout; common fine dendritic tubular pores; common threadlike carbonate masses and common irregular carbonate masses; 25 percent gravel and 10 percent cobble and 5 percent channer; strongly effervescent, 11 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear smooth boundary.

Ck—44 to 60 inches (112 to 152 cm); brownish yellow (10YR 6/6) gravelly loamy sand, dark yellowish brown (10YR 4/6), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; many fine roots throughout; many fine dendritic tubular pores; common irregular carbonate masses; 25 percent gravel; strongly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Jaconita family differs from the official series because the series has 5YR or 7.5YR hue, calcic horizon 2 to 3 inches (5 to 8 cm) from the surface, cooler air and soil temperature, and formed in granite, gneiss, schist, or micaceous sandstone.

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 3 or 4, dry or moist

Bw horizon
- Value: 5 or 6 dry, 3 to 5 moist
- Chroma: 4 to 6, dry or moist
- Clay: 5 to 10 percent
- Calcium carbonate equivalent: 0 to 5 percent
- Rock fragments: 35 to 60 percent

Bk horizons
- Value: 5 or 6 dry, 3 to 5 moist
- Chroma: 4 to 6, dry or moist
- Texture: loamy coarse sand, loamy sand
- Clay: 4 to 10 percent
- Calcium carbonate equivalent: 5 to 15 percent
- Rock fragments: 40 to 75 percent

Ck horizon
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 4 to 6, dry or moist
- Clay: 5 to 10 percent
- Calcium carbonate equivalent: 1 to 5 percent
- Rock fragments: 15 to 30 percent

Calcic horizon—the zone from 12 to 44 inches (30 to 112 cm) (Bk horizons)

Atchee soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents
Geomorphic position: occurs on base slopes on fan remnants and structural benches
Parent material: colluvium and/or residuum weathered from sandstone
Slope: 8 to 60 percent

Biological crust
Cyanobacteria: 3 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 26 percent
Woody debris: 42 percent
Bare soil: 11 percent
Rock fragments
- gravel: 11 percent
- cobble: 8 percent
- stone: 8 percent
- boulder: 13 percent
- channer: 3 percent
- flagstone:1 percent

Depth to restrictive feature(s): 6 to 17 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.9 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper)
Ecological site number: R035XY263UT
Present vegetation: Utah serviceberry, Wyoming big sagebrush, bluebunch wheatgrass, alderleaf mountain-mahogany, muttongrass
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System: 37° 13' 19.70'' north, 111° 0' 25.20'' west

A—0 to 2 inches (0 to 5 cm); yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 4/4), moist; 10 percent clay; weak thin platy structure; loose, nonsticky and nonplastic; many fine roots throughout; many fine dendritic tubular pores; 20 percent gravel and 10 percent channer; slightly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

Ck1—2 to 6 inches (5 to 15 cm); yellowish brown (10YR 5/6) very gravelly sandy loam, dark yellowish brown (10YR 4/4), moist; 14 percent clay; moderate fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; many fine

and medium roots throughout; many fine dendritic tubular pores; common carbonate masses; 30 percent gravel and 10 percent channer; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

Ck2—6 to 16 inches (15 to 41 cm); light yellowish brown (10YR 6/4) very gravelly sandy loam, yellowish brown (10YR 5/4), moist; 12 percent clay; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many fine and common medium roots throughout; many fine dendritic tubular pores; common carbonate masses; 30 percent gravel and 5 percent cobble and 15 percent channer; violently effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

R—16 inches (41 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Atchee, as used in this survey, is a taxadjunct to the official series because it has a superactive activity class. The Atchee series is loamy-skeletal, mixed, active, calcareous, mesic Lithic Ustic Torriorthents. This does not affect use and management.

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Value: 4 or 5 dry, 3 to 5 moist
- Chroma: 4 to 6 dry or moist

Ck horizons
- Value: 4 to 6 dry, 4 or 5 moist
- Chroma: 4 to 6, dry or moist
- Clay: 8 to 14 percent
- Rock fragments: 35 to 60 percent

11—Juanalo family-Rock outcrop complex, 4 to 28 percent slopes, bouldery

Map Unit Setting

Landform(s): plateaus (fig. 37)
Elevation: 3,840 to 4,590 feet (1,170 to 1,400 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Juanalo family and similar soils: 75 percent
Rock outcrop: 15 percent
Minor components: Very deep Cowboy and shallow Claysprings soils are on stable, less sloping areas. Some areas have soils with more than 35 percent rock fragments throughout the profile.

Soil Properties and Qualities

Juanalo family soils (fig. 38)

Figure 37.—An area of Juanalo family-Rock outcrop complex, 4 to 28 percent slopes, bouldery. Claysprings-Badland complex, 2 to 40 percent slopes is in the background.

Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic Lithic Torriorthents
Geomorphic position: occurs on interfluves on structural benches
Parent material: colluvium and/or residuum weathered from sandstone
Slope: 4 to 28 percent

Biological crust
Cyanobacteria: 13 percent
Lichen: 5 percent
Moss: 1 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 39)
Canopy plant cover: 11 percent
Woody debris: 22 percent
Bare soil: 20 percent
Rock fragments
- gravel: 17 percent
- cobble: 1 percent
- stone: 1 percent
- boulder: 1 percent
- channer: 14 percent
- flagstone:1 percent

Depth to restrictive feature(s): 4 to 19 inches to bedrock, lithic

Figure 38.—Profile of Juanalo component. Scale is in centimeters.

Drainage class: well drained
Ksat solum: 0.60 to 6.00 inches per hour (4.23 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.7 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Desert Shallow Sandy Loam (Shadscale)
Ecological site number: R035XY130UT
Present vegetation: shadscale saltbush, galleta, sixweeks fescue
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 37° 3' 51.90'' north, 111° 34' 5.60'' west

A—0 to 2 inches (0 to 5 cm); light olive brown (2.5Y 5/4) gravelly loam, olive brown (2.5Y 4/4), moist; 26 percent clay; weak thin platy structure; soft, very friable, moderately sticky and moderately plastic; common very fine roots throughout; many very fine dendritic tubular pores; 10 percent gravel and 10 percent channer; strongly effervescent; slightly alkaline, pH 7.6; clear wavy boundary.

By—2 to 10 inches (5 to 25 cm); light olive brown (2.5Y 5/4) gravelly loam, olive brown (2.5Y 4/4), moist; 22 percent clay; weak fine subangular blocky structure; soft, very friable, moderately sticky and slightly plastic; common very fine roots throughout; common very fine dendritic tubular pores; common fine gypsum masses; 15 percent

gravel and 10 percent channer; strongly effervescent, 1 percent gypsum; slightly alkaline, pH 7.6; gradual wavy boundary.

2Cy—10 to 18 inches (25 to 46 cm); light brownish gray (2.5Y 6/2) coarse sandy loam, light olive brown (2.5Y 5/3), moist; 15 percent clay; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots throughout; many very fine dendritic tubular pores; common fine gypsum masses and many medium gypsum crystals; 10 percent fine gravel; strongly effervescent, 14 percent calcium carbonate equivalent and 13 percent gypsum; slightly alkaline, pH 7.4; clear wavy boundary.

2R—18 inches (46 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Juanalo family differs from the official series because it has a cambic horizon, greater than 20 percent calcium carbonates, and less than 1 percent gypsum.

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Hue: 10YR, 2.5Y
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3 or 4, dry or moist

By horizon
- Hue: 10YR, 2.5Y
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 to 6, dry or moist
- Texture: loam, sandy loam
- Clay: 15 to 26 percent
- Rock fragments: 0 to 30 percent

Figure 39.—A close-up of the surface near the sample pit for Juanalo gravelly loam.

Cy horizon
Hue: 10YR, 2.5Y
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 6, dry or moist
Texture: coarse sandy loamy, sandy loam, loam
Clay: 12 to 18 percent
Rock fragments: 0 to 30 percent
Gypsum: 5 to 15 percent
Calcium carbonate equivalent: 5 to 15 percent

Rock outcrop
Slope: 8 to 28 percent

Rock outcrop consists of sandstone and areas of interbedded sandstone and shale. These exposures are typically along ledges and drainageways of the Dakota Formation. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

12—Kydestea-Rock outcrop complex, 15 to 60 percent slopes, very bouldery

Map Unit Setting

Landform(s): plateaus (fig. 40)
Elevation: 6,890 to 7,550 feet (2,100 to 2,300 meters)
Mean annual precipitation: 14 to 18 inches (350 to 450 millimeters)
Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)
Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)
Frost-free period: 120 to 150 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-6 Colorado Plateau Pinyon - Juniper - Sagebrush

Map Unit Composition

Kydestea and similar soils: 50 percent
Rock outcrop: 40 percent
Minor components: Soils with greater than 35 percent clay in the subsoil. Soils with less than 35 percent rock fragments throughout the soil profile.

Soil Properties and Qualities

Kydestea soils (fig. 41)
Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic Aridic Lithic Haplustepts
Geomorphic position: occurs on side slopes on bedrock controlled surfaces
Parent material: colluvium derived from sandstone and/or residuum weathered from sandstone
Slope: 15 to 60 percent
Biological crust
Cyanobacteria: 3 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent

Figure 40.—An area of Kydestea-Rock outcrop complex, 15 to 60 percent slopes, very bouldery.

Figure 41.—Profile of Kydestea component. Cambic horizon begins at 1 inch (3 cm). Scale is in centimeters.

Gypsum: 0 percent
Physical cover (fig. 42)
Canopy plant cover: 34 percent
Woody debris: 56 percent
Bare soil: 8 percent
Rock fragments
- gravel: 14 percent
- cobble: 7 percent
- stone: 5 percent
- boulder: 7 percent
- channer: 3 percent
- flagstone:1 percent

Depth to restrictive feature(s): 9 to 18 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.60 to 6.00 inches per hour (4.23 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.7 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Upland Stony Loam (Pinyon-Utah Juniper)
Ecological site number: R035XY321UT

Figure 42.—A close-up of the surface near the sample pit for Kydestea gravelly sandy loam.

Present vegetation: pinyon, Utah juniper, Utah serviceberry, Wyoming big sagebrush, dwarf lousewort
Land capability (non irrigated): 6c

Typical Profile

Location
Geographic Coordinate System: 37° 11' 47.60'' north, 111° 1' 58.10'' west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/3) gravelly sandy loam, dark brown (7.5YR 3/3), moist; 14 percent clay; weak thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine roots throughout; many very fine dendritic tubular pores; 10 percent gravel and 10 percent channer and 2 percent flagstone; slightly effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bw—1 inch to 9 inches (3 to 23 cm); yellowish brown (10YR 5/4) flaggy sandy clay loam, brown (10YR 4/3), moist; 26 percent clay; moderate fine subangular blocky structure; moderately hard, friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots throughout; many very fine dendritic tubular pores; 5 percent gravel and 10 percent channer and 15 percent flagstone; strongly effervescent; moderately alkaline, pH 8.0; gradual smooth boundary.

Bk—9 to 16 inches (23 to 41 cm); yellowish brown (10YR 5/4) very channery sandy clay loam, brown (10YR 4/3), moist; 32 percent clay; weak fine subangular blocky structure; moderately hard, friable, slightly sticky and moderately plastic; many very fine and fine roots throughout; many very fine dendritic tubular pores; common carbonate masses; 10 percent gravel and 20 percent channer and 15 percent flagstone; violently effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

R—16 inches (41 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Kydestea, as used in this survey, is a taxadjunct to the official series because it has a cambic horizon. The Kydestea series is a loamy-skeletal, mixed, superactive, calcareous, mesic Aridic Lithic Ustorthents. This does not affect use and management.

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3 or 4, dry or moist

Bw or Bk horizon
- Hue: 7.5YR, 10YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3 to 6, dry or moist
- Clay: 20 to 35 percent
- Rock fragments: 20 to 60 percent, averages more than 35 percent

Cambic horizon—the zone from 1 to 16 inches (3 to 41 cm) (Bw and Bk horizons)

Rock outcrop
Slope: 30 to 80 percent

Rock outcrop consists of interbedded sandstone and shale bedrock, typically exposed along ledges of the Straight Cliffs Formation. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

13—Moenkopie-Rock outcrop complex, 3 to 24 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 43)
Elevation: 3,670 to 5,840 feet (1,120 to 1,780 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Moenkopie and similar soils: 60 percent
Rock outcrop: 30 percent
Minor components: Moderately deep Pagina soils are on more stable areas. A few areas have soils with clay greater than 18 percent.

Soil Properties and Qualities

Moenkopie soils (fig. 44)
Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic Lithic Torriorthents
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches

Figure 43.—An area of Moenkopie-Rock outcrop complex, 3 to 24 percent slopes. Rock outcrop-Torriorthents complex, 20 to 65 percent slopes, extremely bouldery is in the background.

Figure 44.—Profile of the Moenkopie component. Scale is in centimeters.

Parent material: eolian sands derived from sandstone and/or residuum weathered from sandstone and shale
Slope: 3 to 24 percent
Biological crust
Cyanobacteria: 0 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 45)
Canopy plant cover: 10 percent
Woody debris: 27 percent
Bare soil: 36 percent
Rock fragments
- gravel: 30 percent
- cobble: 3 percent

Depth to restrictive feature(s): 4 to 14 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 0.60 to 6.00 inches per hour (4.23 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.8 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: D

Ecological site name: Desert Shallow Sandy Loam (Shadscale)
Ecological site number: R035XY130UT
Present vegetation: shadscale saltbush, blackbrush, pricklypear, Indian ricegrass, Cutler Mormon tea, galleta
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 37° 38' 29.20'' north, 110° 32' 16.30'' west

A—0 to 2 inches (0 to 5 cm); light reddish brown (5YR 6/4) loamy fine sand, reddish brown (5YR 4/4), moist; 7 percent clay; weak thin platy structure; loose, nonsticky and nonplastic; common very fine roots throughout; many very fine dendritic tubular pores; 7 percent gravel; strongly effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

C1—2 to 5 inches (5 to 13 cm); red (2.5YR 5/6) loam, dark red (2.5YR 3/6), moist; 17 percent clay; massive; soft, very friable, slightly sticky and nonplastic; many very fine roots throughout; many very fine dendritic tubular pores; 10 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—5 to 8 inches (13 to 20 cm); reddish brown (2.5YR 5/4) gravelly sandy loam, reddish brown (2.5YR 4/4), moist; 12 percent clay; massive; loose, nonsticky and nonplastic; many fine and common medium roots throughout; common very fine dendritic tubular pores; 30 percent gravel; strongly effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

R—8 inches (20 cm); unweathered, unfractured sandstone bedrock.

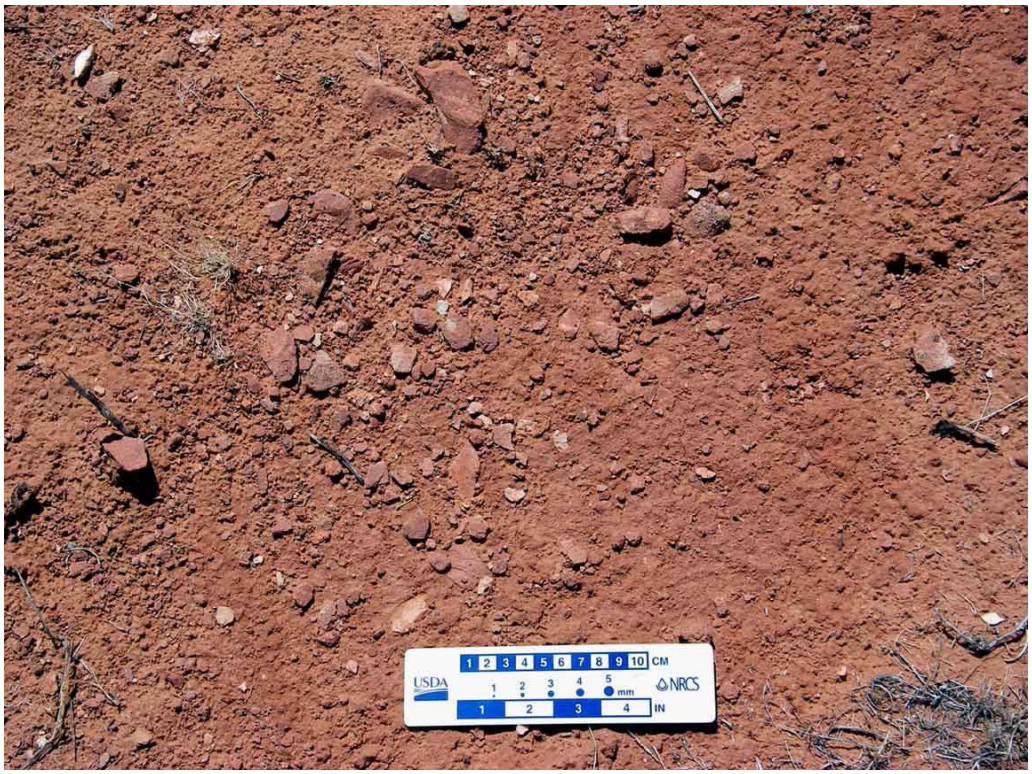

Figure 45.—A close-up of the surface near the sample pit for Moenkopie loamy fine sand.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly alkaline to moderately alkaline)

A horizon
- Hue: 7.5YR, 5YR, 2.5YR
- Value: 5 to 6 dry, 4 to 6 moist
- Chroma: 4 or 6, dry or moist

C horizon
- Hue: 5YR, 2.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 or 6, dry or moist
- Texture: loam, sandy loam, fine sandy loam
- Clay: 10 to 18 percent
- Rock fragments: 0 to 30 percent gravel

Rock outcrop
Slope: 3 to 24 percent

Rock outcrop consists of interbedded sandstone and shale bedrock, typically exposed along ledges and slick rock areas of the Kayenta or the Morrison Formations. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

14—Moepitz family-Moenkopie-Rock outcrop complex, 12 to 64 percent slopes, extremely bouldery

Map Unit Setting

Landform(s): plateaus (fig. 46)
Elevation: 3,870 to 5,310 feet (1,180 to 1,620 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Moepitz family and similar soils: 55 percent
Moenkopie and similar soils: 25 percent
Rock outcrop: 15 percent
Minor components: Some areas have soils that average greater than 35 percent rock fragments throughout the profile.

Soil Properties and Qualities

Moepitz family soils (fig. 47)
Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, mesic Typic Torriorthents
Geomorphic position: occurs on talus slopes
Parent material: sandy and gravelly colluvium derived from limestone, sandstone, and shale
Slope: 12 to 64 percent

Figure 46.—An area of Moepitz family-Moenkopie-Rock outcrop complex, 12 to 64 percent slopes, extremely bouldery. Rock outcrop-Torriorthents complex, 20 to 65 percent slopes, extremely bouldery is in the background.

Figure 47.—Profile of the Moepitz family component. Scale is in centimeters.

Figure 48.—A close-up of the surface near the sample pit for Moepitz family very gravelly fine sandy loam.

Biological crust
Cyanobacteria: 7 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 48)
Canopy plant cover: 17 percent
Woody debris: 25 percent
Bare soil: 27 percent
Rock fragments
- gravel: 25 percent
- cobble: 15 percent
- stone: 17 percent
- boulder: 13 percent
- channer: 2 percent

Depth to restrictive feature(s): 40 to 60 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 4.5 (low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: medium

Hydrologic group: A
Ecological site name: Desert Stony Loam (Blackbrush)
Ecological site number: R035XY139UT
Present vegetation: blackbrush, shadscale saltbush
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 37° 12' 39.00'' north, 109° 58' 17.60'' west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) very gravelly fine sandy loam, yellowish red (5YR 4/6), moist; 12 percent clay; weak thin platy structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; many very fine dendritic tubular pores; 30 percent gravel and 5 percent cobble; slightly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

Bw—1 inch to 6 inches (3 to 15 cm); yellowish red (5YR 5/6) very gravelly fine sandy loam, yellowish red (5YR 4/6), moist; 10 percent clay; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, and medium roots throughout; many very fine and fine dendritic tubular pores; 30 percent gravel and 5 percent cobble and 5 percent stone; strongly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

Ck1—6 to 19 inches (15 to 48 cm); red (2.5YR 5/6) gravelly fine sandy loam, red (2.5YR 4/6), moist; 12 percent clay; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; many very fine, fine, and common medium roots throughout; many very fine dendritic tubular pores; common carbonate masses; 20 percent gravel and 5 percent cobble; strongly effervescent, 37 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; gradual smooth boundary.

Ck2—19 to 31 inches (48 to 79 cm); light red (2.5YR 6/6) sandy loam, red (2.5YR 5/6), moist; 10 percent clay; moderate fine and medium subangular blocky structure; moderately hard, friable, slightly sticky and nonplastic; many very fine and fine roots throughout; many very fine dendritic tubular pores; common carbonate masses; 10 percent gravel; strongly effervescent, 32 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear smooth boundary.

Ck3—31 to 48 inches (79 to 122 cm); yellowish red (5YR 5/6) sandy loam, yellowish red (5YR 4/6), moist; 10 percent clay; moderate fine and medium subangular blocky structure; hard, firm, nonsticky and nonplastic; common fine roots throughout; common very fine dendritic tubular pores; many carbonate masses; 3 percent gravel; strongly effervescent, 35 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

R—48 inches (122 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Moepitz family differs from the official series because the series is less than 40 inches (102 cm) to lithic contact.

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 4 to 6, dry or moist

Bw horizon
Hue: 5YR, 7.5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 4 to 6, dry or moist
Texture: sandy loam, fine sandy loam
Clay: 8 to 15 percent
Rock fragments: 25 to 60 percent

Ck horizons
Hue: 2.5YR, 5YR, 7.5YR
Value: 4 to 6 dry, 3 to 6 moist
Chroma: 4 to 6, dry or moist
Texture: sandy loam, fine sandy loam
Clay: 8 to 15 percent
Calcium carbonate equivalent: 5 to 40 percent
Rock fragments: 0 to 35 percent

Moenkopie soils
Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic Lithic Torriorthents
Geomorphic position: occurs on talus slopes and structural benches
Parent material: sandy and gravelly colluvium and/or residuum weathered from limestone and sandstone
Slope: 12 to 64 percent
Biological crust
Cyanobacteria: 7 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 17 percent
Woody debris: 25 percent
Bare soil: 27 percent
Rock fragments
- gravel: 25 percent
- cobble: 15 percent
- stone: 17 percent
- boulder: 13 percent
- channer: 2 percent

Depth to restrictive feature(s): 4 to 12 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.4 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Desert Shallow Sandy Loam (Shadscale)
Ecological site number: R035XY130UT

Present vegetation: shadscale saltbush, blackbrush, Jones's pepperweed
Land capability (non irrigated): 7c

Typical Profile

Location
Geographic Coordinate System: 37° 12' 38.90'' north, 109° 58' 16.90'' west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) gravelly fine sandy loam, yellowish red (5YR 4/6), moist; 10 percent clay; weak thin platy structure; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; many very fine dendritic tubular pores; 20 percent gravel and 5 percent channer; strongly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

Ck—1 inch to 6 inches (3 to 15 cm); yellowish red (5YR 5/6) gravelly sandy loam, yellowish red (5YR 4/6), moist; 12 percent clay; massive; slightly hard, very friable, nonsticky and slightly plastic; common very fine and fine roots throughout; many very fine and fine dendritic tubular pores; common fine carbonate masses; 15 percent gravel and 5 percent channer; violently effervescent, 28 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

R—6 inches (15 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Value: 5 or 6 dry, 3 or 5 moist
- Chroma: 4 to 6, dry or moist

Ck horizon
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 4 or 5 dry, 3 to 6 moist
- Chroma: 4 to 6, dry or moist
- Texture: sandy loam, fine sandy loam
- Clay: 8 to 15 percent
- Calcium carbonate equivalent: 5 to 35 percent
- Rock fragments: 15 to 35 percent

Rock outcrop
Slope: 20 to 100 percent

Rock outcrop consists of interbedded sandstone and shale, and a few areas of limestone bedrock, typically exposed on ledges and cliff faces of the Honaker Trail or Halgaito Formations. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

15—Monue-Trail-Nepalto complex, 1 to 6 percent slopes

Map Unit Setting

Landform(s): flood plains (fig. 49)
Elevation: 3,870 to 4,760 feet (1,180 to 1,450 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Figure 49.—An area of Monue-Trail-Nepalto complex, 1 to 6 percent slopes.

Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Monue and similar soils: 30 percent
Trail and similar soils: 30 percent
Nepalto and similar soils: 25 percent
Minor components: Some areas have soil textures of loamy fine sand or coarser throughout the profile.

Soil Properties and Qualities

Monue soils (fig. 50)
Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Typic Haplocambids
Geomorphic position: occurs on stream terraces
Parent material: alluvium derived from sandstone
Slope: 1 to 6 percent
Biological crust
Cyanobacteria: 0 percent
Lichen: 0 percent
Moss: 7 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent

Figure 50.—Profile of the Monue component. Cambic horizon begins at 4.5 inches (11 cm). Scale is in centimeters.

Physical cover
Canopy plant cover: 55 percent
Woody debris: 3 percent
Bare soil: 35 percent
Rock fragments: 0 percent
Drainage class: well drained
Ksat solum: 0.60 to 99.92 inches per hour (4.23 to 705.00 micrometers per second)
Available water capacity total inches: 6.2 (moderate)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: very rare
Runoff class: very low
Hydrologic group: B
Ecological site name: Alkali Bottom (Greasewood)
Ecological site number: R035XY003UT
Present vegetation: sand dropseed, greasewood, seepweed, fourwing saltbush, Indian ricegrass, Russian thistle
Land capability (non irrigated): 7c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Location

Geographic Coordinate System: 38° 27' 1.40'' north, 110° 1' 18.20'' west

A—0 to 4.5 inches (0 to 11 cm); reddish brown (5YR 5/4) loamy very fine sand, reddish brown (5YR 4/4), moist; 5 percent clay; weak fine subangular blocky and moderate thick platy structure; slightly hard, very friable, nonsticky and nonplastic; few fine roots throughout; common very fine and few fine interstitial pores; slightly effervescent, 6 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

Bw—4.5 to 31.5 inches (11 to 80 cm); reddish brown (5YR 5/4) very fine sandy loam, reddish brown (5YR 4/4), moist; 13 percent clay; weak thick platy and weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine, fine, and few medium roots throughout; common very fine and few fine tubular pores; strongly effervescent, 14 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

C—31.5 to 60 inches (80 to 152 cm); reddish brown (5YR 4/4) gravelly sand, dark reddish brown (5YR 3/4), moist; 1 percent clay; massive; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots throughout; common very fine and few fine interstitial pores; 15 percent gravel; slightly effervescent, 16 percent calcium carbonate equivalent; moderately alkaline, pH 8.4.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly alkaline to moderately alkaline)

A horizon
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 to 6, dry or moist

Bw horizon
- Value: 4 or 5, dry or moist
- Chroma: 4 to 6, dry or moist
- Texture: very fine sandy loam, fine sandy loam
- Clay content: 10 to 15 percent
- Calcium carbonate equivalent: 10 to 15 percent
- Rock fragments: 0 to 10 percent

C horizons
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 to 6, dry or moist
- Texture: sand, loamy sand, loamy fine sand
- Clay content: 1 to 10 percent
- Calcium carbonate equivalent: 10 to 20 percent
- Rock fragments: 0 to 30 percent

Cambic horizon—the zone from 4.5 to 31.5 inches (11 to 80 cm) (Bw horizon)

Trail soils (fig. 51)
Taxonomic classification: Sandy, mixed, mesic Typic Torrifluvents
Geomorphic position: occurs on flood plain steps
Parent material: alluvium derived from sandstone and/or slope alluvium derived from sandstone
Slope: 1 to 6 percent

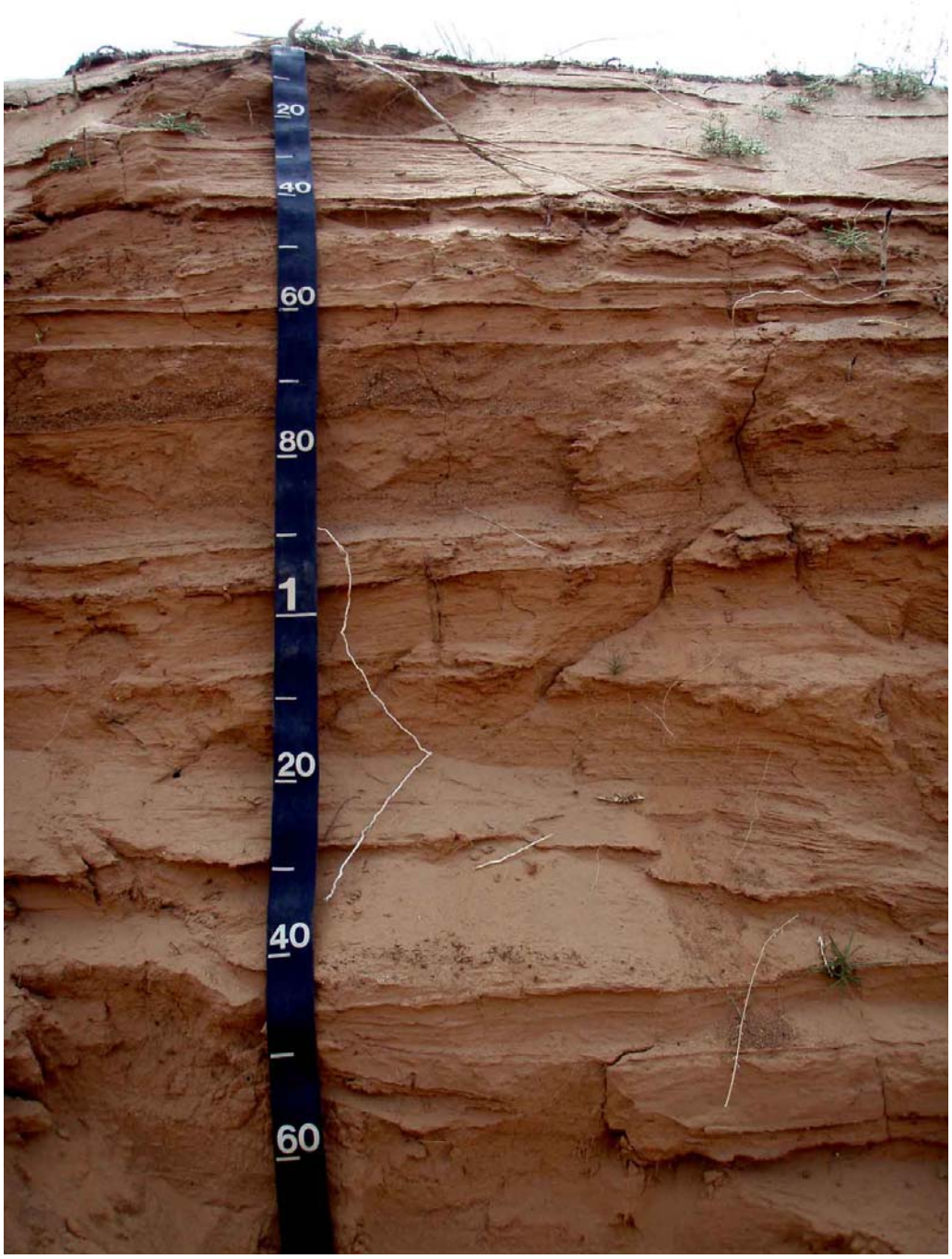

Figure 51.—Profile of the Trail component. Scale is in centimeters.

Biological crust
Cyanobacteria: 0 percent
Lichen: 0 percent
Moss: 7 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 52)

Figure 52.—A close-up of the surface near the sample pit for Trail loamy fine sand.

Canopy plant cover: 55 percent
Woody debris: 3 percent
Bare soil: 35 percent
Rock fragments: 0 percent

Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Available water capacity total inches: 7.1 (high)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: rare
Runoff class: very low
Hydrologic group: A
Ecological site name: Desert Sandy Loam (Fourwing Saltbush)
Ecological site number: R035XY118UT
Present vegetation: seepweed, fourwing saltbush, plains pricklypear, Russian thistle
Land capability (non irrigated): 7c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Location

Geographic Coordinate System: 38° 27' 3.00'' north, 110° 1' 19.00'' west

A—0 to 3 inches (0 to 7 cm); reddish brown (5YR 5/4) loamy fine sand, reddish brown (5YR 4/4), moist; 6 percent clay; moderate medium platy structure; soft, very

friable, nonsticky and nonplastic; common very fine roots throughout; common very fine irregular pores; strongly effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

Bw—3 to 15.5 inches (7 to 40 cm); reddish brown (5YR 5/4) loamy fine sand, reddish brown (5YR 4/4), moist; 7 percent clay; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; common very fine irregular pores; strongly effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

C1—15.5 to 43.5 inches (40 to 110 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots throughout; common very fine irregular pores; strongly effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

C2—43.5 to 71 inches (110 to 180 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots throughout; common very fine irregular pores; strongly effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.4.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly alkaline to moderately alkaline)

A horizon
- Value: 4 or 5 dry, 3 or 4 moist

Bw horizon
- Value: 4 or 5 dry, 3 or 4 moist
- Texture: loamy fine sand, loamy sand
- Clay content: 5 to 10 percent
- Calcium carbonate equivalent: 1 to 5 percent
- Rock fragments: 0 to 5 percent

C horizons
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 to 6, dry or moist
- Texture: stratified; coarse sand, sand, fine sand, loamy fine sand
- Clay content: 1 to 10 percent
- Calcium carbonate equivalent: 1 to 5 percent
- Rock fragments: 0 to 10 percent
- Bw is too coarse to qualify as a cambic horizon.

Nepalto soils (fig. 53)
Taxonomic classification: Sandy-skeletal, mixed, mesic Typic Torriorthents
Geomorphic position: occurs on flood plain steps
Parent material: slope alluvium derived from sandstone
Slope: 1 to 6 percent
- Biological crust
  - Cyanobacteria: 0 percent
- Lichen: 0 percent
  - Moss: 0 percent
- Chemical crust
  - Salt: 0 percent
  - Gypsum: 0 percent
- Physical cover (fig. 54)

Figure 53.—Profile of the Nepalto component. Scale is in centimeters.

Canopy plant cover: 35 percent
Woody debris: 6 percent
Bare soil: 50 percent
Rock fragments
- gravel: 15 percent
- cobble: 5 percent

Drainage class: excessively drained
Ksat solum: 20.00 to 99.92 inches per hour (141.14 to 705.00 micrometers per second)
Available water capacity total inches: 1.9 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: very rare
Runoff class: very low
Hydrologic group: A
Ecological site name: Desert Stony Loam (Shadscale-Bud Sagebrush)
Ecological site number: R035XY136UT
Present vegetation: sand sagebrush, shadscale saltbush, Indian ricegrass, sand dropseed, Torrey Mormon tea, galleta
Land capability (non irrigated): 7c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Location

Geographic Coordinate System: 38° 28' 35.70'' north, 110° 0' 22.30'' west

C1—0 to 3.5 inches (0 to 9 cm); reddish brown (5YR 5/4) sand, reddish brown (5YR 4/4), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; common very fine roots throughout; many very fine interstitial pores; 5 percent gravel; strongly effervescent, 6 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

C2—3.5 to 10 inches (9 to 25 cm); reddish brown (5YR 5/4) very gravelly sand, reddish brown (5YR 4/4), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; common very fine roots throughout; many very fine interstitial pores; 50 percent gravel; strongly effervescent, 6 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

C3—10 to 60 inches (25 to 152 cm); reddish brown (5YR 5/4) very gravelly sand, reddish brown (5YR 4/4), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; common very fine roots throughout; many very fine interstitial pores; 50 percent gravel; strongly effervescent, 6 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

Figure 54.—A close-up of the surface near the sample pit for Nepalto sand.

Figure 55.—An area of Myton very gravelly sandy loam, 5 to 18 percent slopes, very bouldery. Rock outcrop-Torriorthents complex, 20 to 65 percent slopes, extremely bouldery is in the background.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly alkaline to moderately alkaline)

A horizon (where present)
- Value: 4 or 5, dry or moist

C horizons
- Value: 4 or 5, dry or moist
- Texture: sand, loamy sand
- Clay content: 2 to 8 percent
- Calcium carbonate equivalent: 5 to 10 percent
- Rock fragments: 35 to 70 percent

16—Myton very gravelly sandy loam, 5 to 18 percent slopes, very bouldery

Map Unit Setting

Landform(s): plateaus (fig. 55)
Elevation: 3,150 to 4,000 feet (960 to 1,220 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau

Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Myton and similar soils: 95 percent
Minor components: Shallow Somorent family soils in a few areas. Some areas have slopes greater than 18 percent. A few areas have soils with textures finer than loam.

Soil Properties and Qualities

Myton soils (fig. 56)
Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic Typic Torriorthents
Geomorphic position: occurs on base slopes on fan remnants
Parent material: colluvium and/or slope alluvium derived from sandstone and shale
Slope: 5 to 18 percent
Biological crust
Cyanobacteria: 4 percent

Figure 56.—Profile of the Myton component. Scale is in centimeters.

Figure 57.—A close-up of the surface near the sample pit for Myton very gravelly sandy loam.

Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 57)
Canopy plant cover: 13 percent
Woody debris: 13 percent
Bare soil: 17 percent
Rock fragments
- gravel: 50 percent
- cobble: 5 percent
- stone: 1 percent
- boulder: 3 percent
- channer: 5 percent

Drainage class: somewhat excessively drained
Ksat solum: 0.60 to 20.00 inches per hour (4.23 to 141.14 micrometers per second)
Available water capacity total inches: 3.5 (low)
Shrink-swell potential: about 1.0 LEP (low)
Flooding hazard: none
Runoff class: low
Hydrologic group: A
Ecological site name: Desert Stony Loam (Shadscale-Bud Sagebrush)
Ecological site number: R035XY136UT
Present vegetation: shadscale saltbush, galleta, fluffgrass, gooseberryleaf globemallow

Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 36° 50' 56.20'' north, 111° 37' 47.70'' west

C1—0 to 2 inches (0 to 5 cm); reddish brown (5YR 5/4) very gravelly sandy loam, reddish brown (5YR 4/4), moist; 12 percent clay; massive; loose, nonsticky and nonplastic; common very fine and fine roots throughout; common very fine dendritic tubular pores; 35 percent gravel and 5 percent cobble; slightly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

C2—2 to 7 inches (5 to 18 cm); reddish brown (5YR 5/4) gravelly sandy loam, reddish brown (5YR 4/4), moist; 10 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots throughout; 20 percent gravel; slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

C3—7 to 30 inches (18 to 76 cm); reddish brown (5YR 5/4) extremely gravelly loamy sand, reddish brown (5YR 4/4), moist; 8 percent clay; massive; moderately hard, friable, nonsticky and nonplastic; 50 percent gravel and 15 percent cobble and 5 percent stone; strongly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

C4—30 to 47 inches (76 to 119 cm); reddish brown (5YR 5/4) very gravelly loamy coarse sand, reddish brown (5YR 4/4), moist; 7 percent clay; massive; hard, friable, nonsticky and nonplastic; 30 percent gravel and 5 percent cobble and 5 percent stone; strongly effervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

C5—47 to 60 inches (119 to 152 cm); reddish brown (5YR 5/4) very gravelly loam, reddish brown (5YR 4/4), moist; 16 percent clay; massive; slightly hard, very friable, slightly sticky and slightly plastic; 35 percent gravel and 5 percent cobble; slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

C6—60 to 64 inches (152 to 163 cm); reddish brown (5YR 5/4) very stony sandy loam, reddish brown (5YR 4/4), moist; 12 percent clay; massive; slightly hard, friable, nonsticky and nonplastic; 25 percent gravel and 5 percent cobble and 15 percent stone; slightly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

C horizons

- Hue: 5YR, 7.5YR
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 4 to 6, dry or moist
- Texture: sandy loam, loamy sand, loamy coarse sand, loam
- Clay: 4 to 18 percent
- Rock fragments: 20 to 75 percent, averages greater than 35 percent

17—Needle-Sheppard complex, 2 to 12 percent slopes, very rocky

Map Unit Setting

Landform(s): plateaus (fig. 58)
Elevation: 3,670 to 5,310 feet (1,120 to 1,620 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Figure 58.—An area of Needle-Sheppard complex, 2 to 12 percent slopes, very rocky.

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Needle and similar soils: 50 percent
Sheppard and similar soils: 40 percent
Minor components: Areas have rock outcrop. A few areas have soils that have rock fragments throughout the profile. Some areas have slopes greater than 12 percent.

Soil Properties and Qualities

Needle soils (fig. 59)
Taxonomic classification: Mixed, mesic Lithic Torripsamments
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches as sandsheets
Parent material: eolian sands and/or residuum weathered from sandstone
Slope: 2 to 12 percent
Biological crust
Cyanobacteria: 27 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent

Figure 59.—Profile of Needle component. Scale is in centimeters.

Physical cover
Canopy plant cover: 23 percent
Woody debris: 21 percent
Bare soil: 40 percent
Rock fragments: 0 percent
Depth to restrictive feature(s): 10 to 17 inches to bedrock, lithic
Drainage class: excessively drained
Ksat solum: 20.00 to 99.92 inches per hour (141.14 to 705.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.7 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Sandstone Rockland 6-10" p.z.
Ecological site number: R035XB255AZ
Present vegetation: mesa dropseed, sand verbena, sand sagebrush, Ephedra cutleri
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 36° 55' 46.20'' north, 111° 30' 22.10'' west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/8) sand, yellowish red (5YR 4/6), moist; 6 percent clay; weak thin platy structure; loose, nonsticky and nonplastic;

common fine roots throughout; common fine tubular pores; very slightly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

C—1 inch to 11 inches (3 to 28 cm); yellowish red (5YR 5/8) sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; loose, nonsticky and nonplastic; many fine roots throughout; common fine tubular pores; very slightly effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

R—11 inches (28 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Value: 5 or 6 dry, 3 to 6 moist
- Chroma: 4 to 8, dry or moist

C horizon
- Hue: 2.5YR, 5YR
- Value: 4 to 6 dry, 3 to 6 moist
- Chroma: 4 to 8, dry or moist
- Texture: sand, fine sand
- Clay: 2 to 7 percent
- Rock fragments: 0 to 3 percent

Sheppard soils (fig. 60)
Taxonomic classification: Mixed, mesic Typic Torripsamments
Geomorphic position: Occurs on interfluves on hills, mesas, and structural benches as dunes
Parent material: eolian sands derived from sandstone and/or alluvium derived from sandstone
Slope: 2 to 12 percent
- Biological crust
  - Cyanobacteria: 27 percent
- Lichen: 0 percent
  - Moss: 0 percent
- Chemical crust
  - Salt: 0 percent
  - Gypsum: 0 percent
- Physical cover (fig. 61)
  - Canopy plant cover: 23 percent
  - Woody debris: 21 percent
  - Bare soil: 40 percent
  - Rock fragments: 0 percent

Drainage class: excessively drained
Ksat solum: 20.00 to 99.92 inches per hour (141.14 to 705.00 micrometers per second)
Available water capacity total inches: 3.6 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: negligible
Hydrologic group: A
Ecological site name: Desert Sand (Sand Sagebrush)
Ecological site number: R035XY115UT
Present vegetation: mesa dropseed, sand verbena, sand sagebrush, Ephedra cutleri
Land capability (non irrigated): 7c

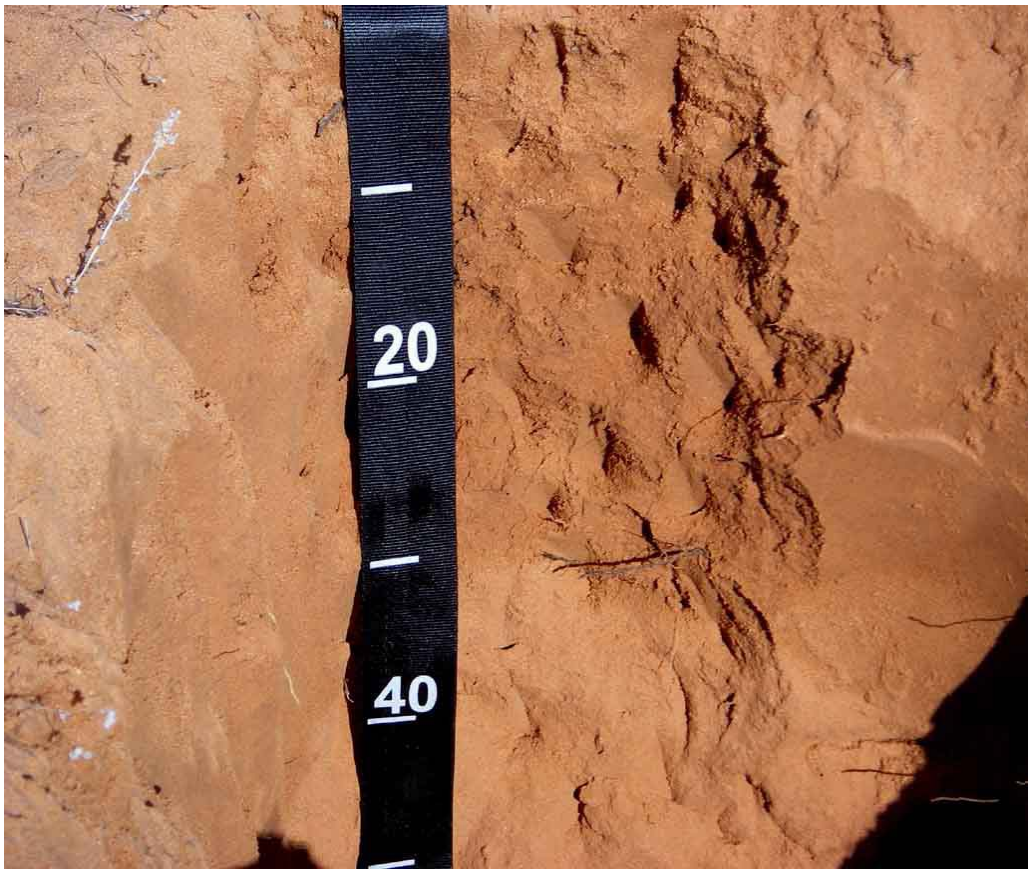

Figure 60.—Profile of Sheppard component. Scale is in centimeters.

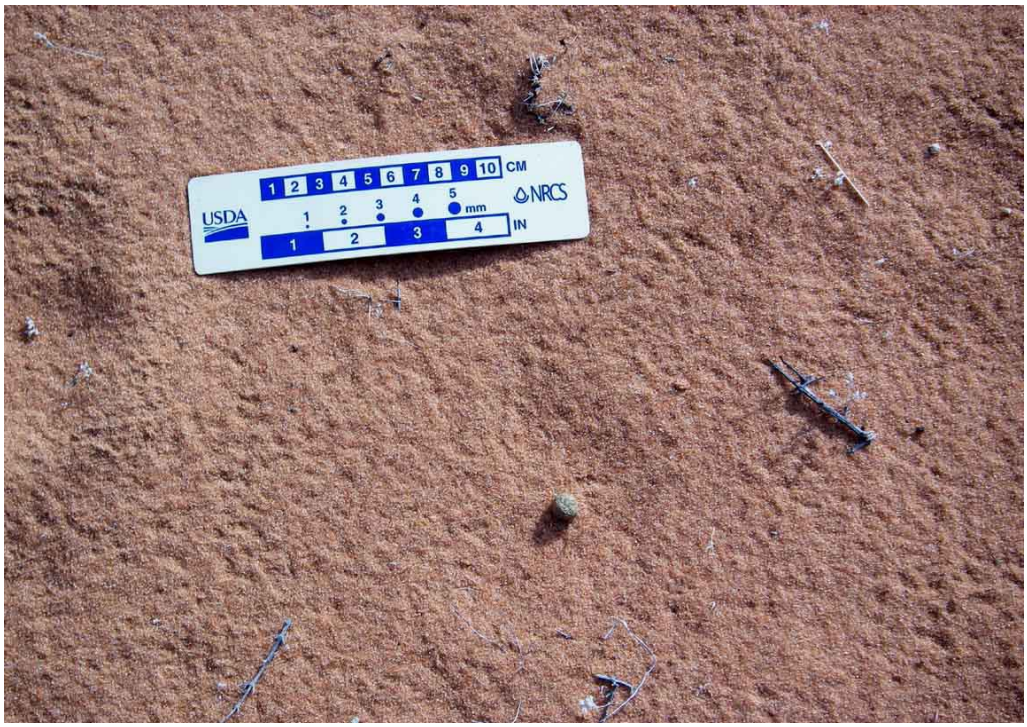

Figure 61.—A close-up of the surface near the sample pit for Sheppard sand.

Typical Profile

Location

Geographic Coordinate System: 36° 55' 50.50'' north, 111° 30' 19.50'' west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 6 percent clay; weak thin platy structure; loose, nonsticky and nonplastic; common fine roots throughout; common very fine tubular pores; noneffervescent; slightly alkaline, pH 7.8; clear smooth boundary.

C1—1 inch to 8 inches (3 to 20 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; soft, loose, nonsticky and nonplastic; common fine roots throughout; many fine tubular pores; noneffervescent; slightly alkaline, pH 7.8; gradual smooth boundary.

C2—8 to 21 inches (20 to 53 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots throughout; many fine tubular pores; noneffervescent; slightly alkaline, pH 7.8; gradual smooth boundary.

C3—21 to 60 inches (53 to 152 cm); yellowish red (5YR 5/8) sand, yellowish red (5YR 4/6), moist; 6 percent clay; single grain; loose, nonsticky and nonplastic; common fine roots throughout; common very fine tubular pores; very slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Value: 5 or 6 dry, 3 to 6 moist
- Chroma: 4 to 6, dry or moist

C horizons
- Hue: 2.5YR, 5YR
- Value: 4 to 6 dry, 3 to 6 moist
- Chroma: 4 to 8, dry or moist
- Texture: sand, fine sand, loamy sand
- Clay: 2 to 7 percent
- Rock fragments: 0 to 3 percent

18—Oxyaquic Torrifluvents, 1 to 4 percent slopes, occasionally flooded

Map Unit Setting

Landform(s): flood plains (fig. 62)
Elevation: 4,000 to 4,790 feet (1,220 to 1,460 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Map Unit Composition

Oxyaquic Torrifluvents and similar soils: 80 percent

Figure 62.—An area of Oxaquic Torrifluvents, 1 to 4 percent slopes, occasionally flooded. Reef-Rock outcrop complex, 30 to 60 percent slopes, extremely bouldery is in the background.

Minor components: Soils that have stratified layers of rock fragments. A few areas of Riverwash near stream channel.

Soil Properties and Qualities

Oxyaquic Torrifluvents soils (fig. 63)
Taxonomic classification: Oxyaquic Torrifluvents
Geomorphic position: occurs on flood plains
Parent material: alluvium
Slope: 1 to 4 percent
Biological crust
Cyanobacteria: 0 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 39 percent
Woody debris: 61 percent
Bare soil: 39 percent
Rock fragments: 0 percent
Drainage class: moderately well drained
Ksat solum: 0.60 to 20.00 inches per hour (4.23 to 141.14 micrometers per second)
Available water capacity total inches: 7.0 (moderate)
Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: occasional
Seasonal water table minimum depth: about 32 to 60 inches
Runoff class: low
Hydrologic group: C
Ecological site name: Semiwet Saline Streambank (Fremont Cottonwood)
Ecological site number: R035XY012UT
Present vegetation: cottonwood, willow, saltcedar tamarisk
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System: 37° 36' 45.30'' north, 111° 10' 45.80'' west

A—0 to 2 inches (0 to 5 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 6 percent clay; weak thin platy structure; loose, nonsticky and nonplastic; common very fine roots throughout; common fine dendritic tubular pores; very slightly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C1—2 to 8 inches (5 to 20 cm); light brown (7.5YR 6/4) very fine sandy loam, brown (7.5YR 4/4), moist; 12 percent clay; massive; soft, very friable, nonsticky and

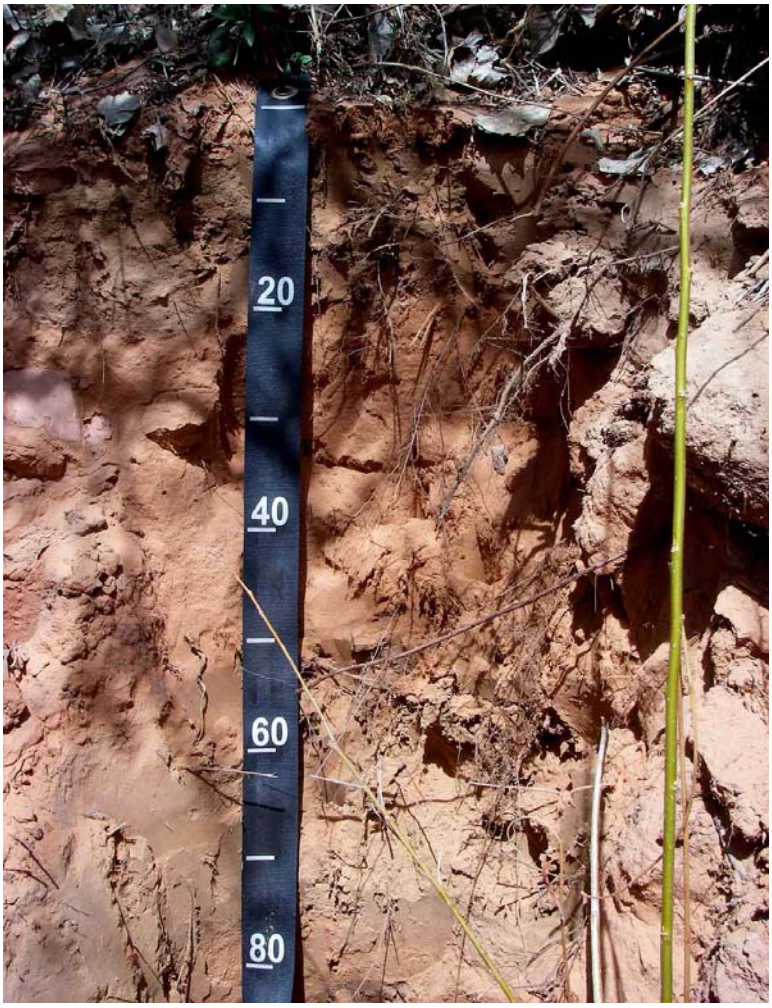

Figure 63.—Profile of Oxaquic Torrifluvents component. Scale is in centimeters.

nonplastic; many very fine, fine, and medium roots throughout; many fine dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—8 to 25 inches (20 to 64 cm); yellowish red (5YR 5/8) fine sand, yellowish red (5YR 4/6), moist; 4 percent clay; massive; loose, nonsticky and nonplastic; many very fine and fine roots throughout; common fine dendritic tubular pores; very slightly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

C3—25 to 32 inches (64 to 81 cm); reddish yellow (7.5YR 6/6) loamy fine sand, strong brown (7.5YR 4/6), moist; 6 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots throughout; many fine dendritic tubular pores; slightly effervescent, by; moderately alkaline, pH 8.2; abrupt smooth boundary.

C4—32 to 60 inches (81 to 152 cm); light brown (7.5YR 6/4) loam, brown (7.5YR 4/4), moist; 19 percent clay; moderate fine and medium subangular blocky structure; hard, friable, moderately sticky and slightly plastic; many fine and medium roots throughout; many fine dendritic tubular pores; 2 percent fine pale brown (10YR 6/3) iron depletions and 3 percent fine yellowish red (5YR 5/8) iron-manganese masses; strongly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Oxyaquic Torriorthents have soil properties that vary greater than family class limits.

Reaction: 7.4 to 8.4 (slightly alkaline or moderately alkaline)

A horizon
- Hue: 5YR, 7.5YR
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 4 to 8, dry or moist

C horizons
- Hue: 5YR, 7.5YR
- Value: 5 or 7 dry, 4 to 6 moist
- Chroma: 4 to 8, dry or moist
- Texture: fine sand, loamy fine sand, very fine sandy loam, loam
- Clay: 3 to 20 percent
- Rock fragments: 0 to 10 percent

Redoximorphic features—greater than 30 inches (76 cm)

19—Oxyaquic Torripsamments, 1 to 3 percent slopes, occasionally flooded

Map Unit Setting

Landform(s): flood plains (fig. 64)
Elevation: 3,770 to 4,490 feet (1,150 to 1,370 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Figure 64.—An area of Oxyaquic Torripsamments, 1 to 3 percent slopes, occasionally flooded.

Map Unit Composition

Oxyaquic Torripsamments and similar soils: 90 percent
Minor components: Soils that have stratified layers of rock fragments and/or textures finer than loamy sand. A few areas of Riverwash near stream channel.

Soil Properties and Qualities

Oxyaquic Torripsamments soils (fig. 65)
Taxonomic classification: Oxyaquic Torripsamments
Geomorphic position: occurs on flood plains
Parent material: sandy alluvium
Slope: 1 to 3 percent
Biological crust
Cyanobacteria: 8 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 66)
Canopy plant cover: 59 percent
Woody debris: 30 percent
Bare soil: 32 percent
Rock fragments: 0 percent
Drainage class: moderately well drained

Figure 65.—Profile of Oxyaquic Torripsamments component. Scale is in centimeters.

Ksat solum: 6.00 to 20.00 inches per hour (42.34 to 141.14 micrometers per second)
Available water capacity total inches: 3.9 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: occasional
Seasonal water table minimum depth: about 40 to 60 inches
Runoff class: very low
Hydrologic group: A
Ecological site name: Semiwet Saline Streambank (Fremont Cottonwood)
Ecological site number: R035XY012UT
Present vegetation: Fremont cottonwood, scouringrush horsetail, Gooding's willow
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 37° 43' 11.25'' north, 111° 11' 57.21'' west

A—0 to 1 inch (0 to 3 cm); reddish yellow (7.5YR 6/6) loamy sand, strong brown (7.5YR 4/6), moist; 4 percent clay; weak thin platy structure; loose, nonsticky and

nonplastic; common very fine roots throughout; common fine dendritic tubular pores; strongly effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

C1—1 inch to 11 inches (3 to 28 cm); reddish yellow (7.5YR 6/6) loamy sand, strong brown (7.5YR 4/6), moist; 4 percent clay; massive; loose, nonsticky and nonplastic; common very fine roots throughout; many fine dendritic tubular pores; strongly effervescent; slightly alkaline, pH 7.8; gradual smooth boundary.

C2—11 to 31 inches (28 to 79 cm); reddish yellow (7.5YR 6/6) loamy sand, strong brown (7.5YR 4/6), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine, fine, and common medium roots throughout; many fine dendritic tubular pores; strongly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

C3—31 to 52 inches (79 to 132 cm); very pale brown (10YR 7/4) loamy sand, brown (7.5YR 5/4), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine, fine, and common medium roots throughout; many fine dendritic tubular pores; strongly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

C4—52 to 65 inches (132 to 165 cm); light brown (7.5YR 6/4) and brown (7.5YR 5/4) loamy sand, very dark brown (10YR 2/2) and dark yellowish brown (10YR 4/6), moist; 6 percent clay; massive; slightly hard, friable, nonsticky and nonplastic; common very fine, fine, and medium roots throughout; many fine dendritic tubular pores; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Oxyaquic Torripsamments have soil properties that vary greater than family class limits.

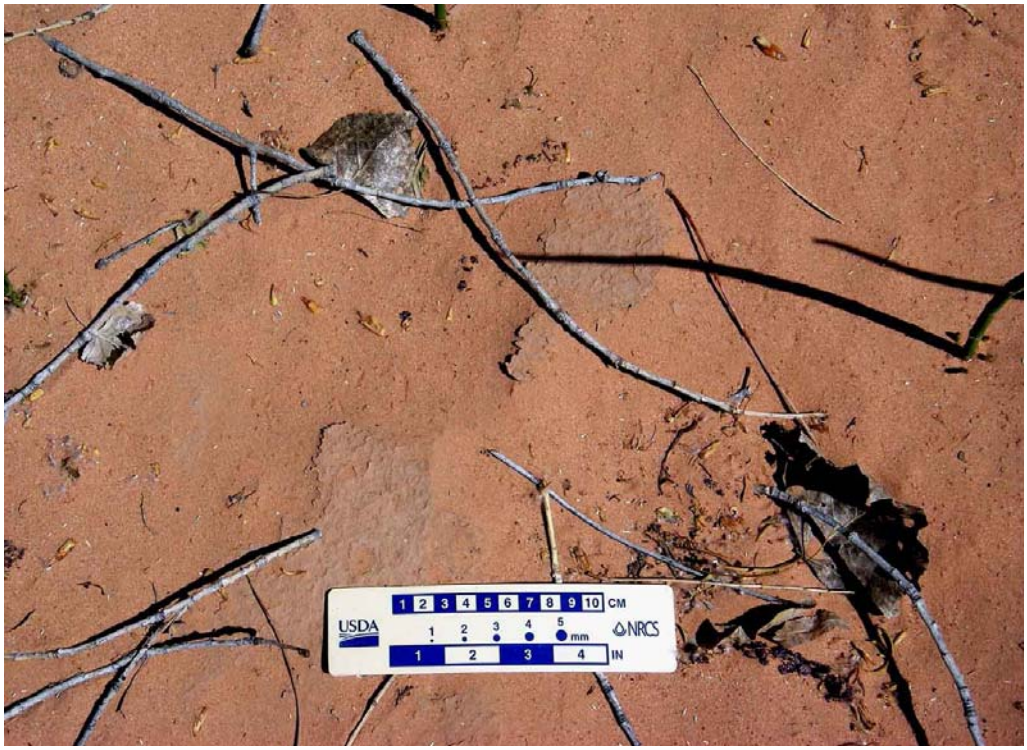

Figure 66.—A close-up of the surface near the sample pit for Oxaquic Torripsamments loamy sand.

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Hue: 7.5YR, 10YR
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 4 to 6, dry or moist

C horizons
- Hue: 7.5YR, 10YR
- Value: 5 or 7 dry, 2 to 6 moist
- Chroma: 2 to 6, dry or moist
- Texture: loamy sand, sand
- Clay: 3 to 10 percent
- Rock fragments: 0 to 12 percent

Redoximorphic features—greater than 40 inches (102 cm)

20—Pagina-Denazar complex, 2 to 14 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 67)
Elevation: 3,670 to 5,310 feet (1,120 to 1,620 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days

Figure 67.—An area of Pagina-Denazar complex, 2 to 14 percent slopes. Rock outcrop-Torriorthents complex, 20 to 65 percent slopes, extremely bouldery is in the background.

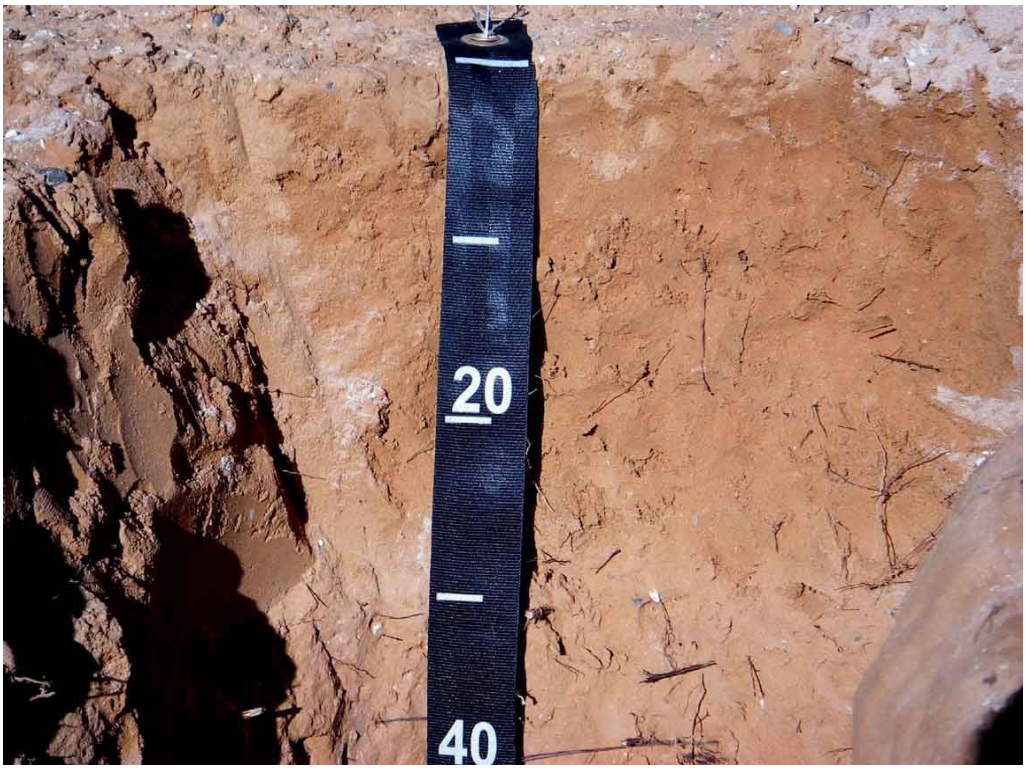

Figure 68.—Profile of Pagina component. Calcic horizon begins at 12 inches (30 cm). Scale is in centimeters.

Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Pagina and similar soils: 65 percent
Denazar and similar soils: 30 percent
Minor components: Some areas have soils that are less than 20 inches (51 cm) in depth. Small areas of rock outcrop occur on steeper side slopes. A few areas have slopes greater than 14 percent.

Soil Properties and Qualities

Pagina soils (fig. 68)
Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Typic Haplocalcids
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches
Parent material: eolian sands derived from sandstone and/or residuum weathered from sandstone and shale
Slope: 2 to 14 percent
Biological crust
Cyanobacteria: 7 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 69)

Canopy plant cover: 17 percent
Woody debris: 25 percent
Bare soil: 27 percent
Rock fragments
• gravel: 3 percent

Depth to restrictive feature(s): 26 to 38 inches to bedrock, paralithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 3.6 (low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: medium
Hydrologic group: B
Ecological site name: Desert Sandy Loam (Blackbrush)
Ecological site number: R035XY121UT
Present vegetation: blackbrush, broom snakeweed, mesa dropseed
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 36° 58' 41.60'' north, 111° 34' 17.20'' west

A—0 to 1 inch (0 to 3 cm); strong brown (7.5YR 5/6) loamy fine sand, strong brown (7.5YR 4/6), moist; 8 percent clay; weak thin platy structure; loose, nonsticky and nonplastic; common very fine roots throughout; common very fine dendritic tubular pores; 3 percent gravel; very slightly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

Bw—1 inch to 12 inches (3 to 30 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 10 percent clay; weak fine and medium subangular blocky structure; soft, loose, nonsticky and nonplastic; many very fine and fine roots throughout; many very fine dendritic tubular pores; 3 percent gravel; slightly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

Bk1—12 to 19 inches (30 to 48 cm); reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 4/6), moist; 12 percent clay; moderate medium and fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots throughout; many very fine dendritic tubular pores; common fine carbonate masses throughout; 3 percent gravel; strongly effervescent, 12 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; clear smooth boundary.

2Bk2—19 to 27 inches (48 to 69 cm); pink (5YR 8/3) fine sandy loam, pink (5YR 7/4), moist; 12 percent clay; massive; hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; many very fine dendritic tubular pores; many fine carbonate masses throughout; 10 percent gravel; violently effervescent, 19 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

2Ck—27 to 34 inches (69 to 86 cm); pinkish white (5YR 8/2) fine sandy loam, pinkish gray (5YR 7/2), moist; 12 percent clay; massive; hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; many very fine dendritic tubular pores; many fine carbonate masses throughout; 10 percent gravel; violently effervescent, 23 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

2Cr—34 inches (86 cm); weathered sandstone bedrock.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Hue: 5YR, 7.5YR
- Value: 5 or 6 dry, 3 to 5 moist
- Chroma: 3 to 6, dry or moist

Bw horizon
- Hue: 5YR, 7.5YR
- Value: 5 to 8 dry, 4 to 7 moist
- Chroma: 3 to 6, dry or moist
- Texture: loamy fine sand, fine sandy loam
- Clay: 2 to 15 percent
- Calcium carbonate equivalent: 0 to 2 percent
- Rock fragments: 0 to 10 percent

Bk horizons
- Hue: 5YR, 7.5YR
- Value: 5 to 8 dry, 4 to 7 moist
- Chroma: 3 to 6, dry or moist
- Texture: loamy fine sand, fine sandy loam, sandy loam
- Clay: 8 to 20 percent, averages less than 18 percent
- Calcium carbonate equivalent: 5 to 30 percent
- Rock fragments: 0 to 10 percent

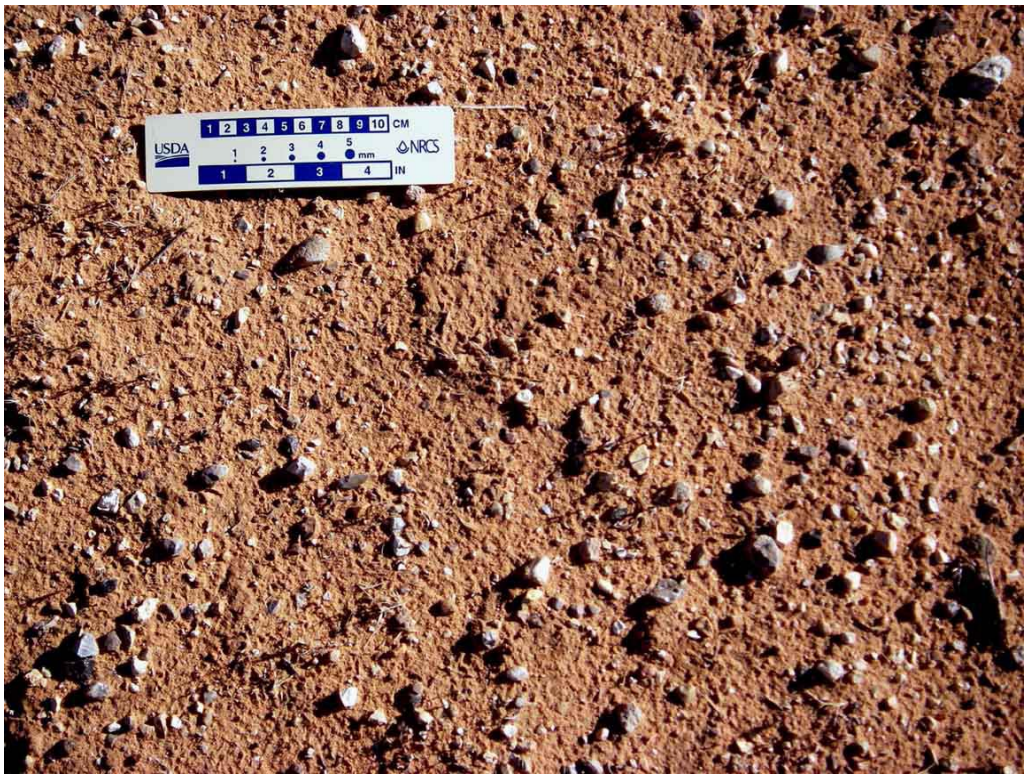

Figure 69.—A close-up of the surface near the sample pit for Pagina loamy fine sand.

Ck horizon
- Hue: 5YR, 7.5YR
- Value: 5 to 8 dry, 4 to 7 moist
- Chroma: 1 to 4, dry or moist
- Texture: fine sandy loam, loamy fine sand, sandy loam
- Clay: 8 to 20 percent
- Calcium carbonate equivalent: 15 to 30 percent
- Rock fragments: 0 to 12 percent

Calcic horizon—the zone from 12 to 27 inches (30 to 69 cm) (Bk horizons)

Denazar soils (fig. 70)
Taxonomic classification: Sandy, mixed, mesic Typic Haplocalcids
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches as coppice mounds and dunes
Parent material: eolian sands derived from sandstone and/or alluvium derived from sandstone
Slope: 2 to 14 percent

Figure 70.—Profile of Denazar component. Calcic horizon begins at 27 inches (69 cm). Scale is in centimeters.

Biological crust
Cyanobacteria: 41 percent
Lichen: 1 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 18 percent
Woody debris: 23 percent
Bare soil: 27 percent
Rock fragments
• gravel: 1 percent

Drainage class: somewhat excessively drained
Ksat solum: 6.00 to 99.92 inches per hour (42.34 to 705.00 micrometers per second)
Available water capacity total inches: 3.6 (low)
Shrink-swell potential: about 1.0 LEP (low)
Flooding hazard: none
Runoff class: negligible
Hydrologic group: A
Ecological site name: Desert Sand (Sand Sagebrush)
Ecological site number: R035XY115UT
Present vegetation: mesa dropseed, gooseberryleaf globemallow, Cutler Mormon tea
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 36° 58' 51.30'' north, 111° 34' 19.80'' west

A—0 to 1 inch (0 to 3 cm); brownish yellow (10YR 6/6) sand, dark yellowish brown (10YR 4/6), moist; 6 percent clay; weak thin platy and single grain structure; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; common very fine dendritic tubular pores; 2 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear smooth boundary.

Bw—1 inch to 21 inches (3 to 53 cm); reddish yellow (7.5YR 6/6) sand, strong brown (7.5YR 5/6), moist; 6 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots throughout; common very fine and fine dendritic tubular pores; 5 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; gradual smooth boundary.

Bk1—21 to 27 inches (53 to 69 cm); reddish yellow (7.5YR 6/6) sand, strong brown (7.5YR 4/6), moist; 7 percent clay; massive; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots throughout; common very fine and fine dendritic tubular pores; common fine carbonate masses; 5 percent gravel; slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bk2—27 to 41 inches (69 to 104 cm); yellowish red (5YR 5/6) loamy sand, 50 percent yellowish red (5YR 5/6) and 50 percent yellowish red (5YR 4/6), moist; 8 percent clay; massive; hard, friable, nonsticky and nonplastic; common very fine and fine roots throughout; many very fine and fine dendritic tubular pores; common fine carbonate masses; 12 percent gravel; strongly effervescent, 6 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; clear wavy boundary.

Ck—41 to 60 inches (104 to 152 cm); reddish yellow (7.5YR 6/6) loamy sand, strong brown (7.5YR 5/6), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine dendritic tubular pores; common fine carbonate masses; 5

percent gravel; strongly effervescent, 7 percent calcium carbonate equivalent; slightly alkaline, pH 7.8.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Hue: 5YR, 7.5YR, 10YR
- Value: 5 or 6 dry, 3 or 4 moist
- Chroma: 3 to 6, dry or moist

Bw horizon
- Hue: 5YR, 7.5YR
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 3 to 6, dry or moist
- Texture: sandy loam, sand
- Clay: 5 to 10 percent
- Calcium carbonate equivalent: 0 to 2 percent
- Rock fragments: 0 to 10 percent

Bk horizons
- Hue: 5YR, 7.5YR
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 3 to 6, dry or moist
- Texture: loamy sand, sand
- Clay: 5 to 15 percent
- Calcium carbonate equivalent: 5 to 20 percent
- Rock fragments: 0 to 12 percent

Ck horizon
- Hue: 5YR, 7.5YR
- Value: 5 to 8 dry, 4 to 7 moist
- Chroma: 1 to 6, dry or moist
- Texture: loamy sand, loamy fine sand, fine sandy loam
- Clay: 5 to 15 percent
- Calcium carbonate equivalent: 5 to 20 percent
- Rock fragments: 0 to 12 percent

Calcic horizon—the zone from 27 to 41 inches (69 to 104 cm) (Bk horizon)

21—Parkelei-Gladel complex, 2 to 12 percent slopes, rocky

Map Unit Setting

Landform(s): plateaus (fig. 71)
Elevation: 7,320 to 7,510 feet (2,230 to 2,290 meters)
Mean annual precipitation: 14 to 18 inches (350 to 450 millimeters)
Mean annual air temperature: 50 to 54 degrees F (10.0 to 12.0 degrees C)
Mean annual soil temperature: 52 to 56 degrees F (11.1 to 13.1 degrees C)
Frost-free period: 120 to 150 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-6 Colorado Plateau Pinyon – Juniper – Sagebrush

Map Unit Composition

Parkelei and similar soils: 65 percent

Figure 71.—An area of Parkelei-Gladel complex, 2 to 12 percent slopes, rocky. Gladel-Rock outcrop complex, 4 to 22 percent slopes, bouldery is in the background.

Gladel and similar soils: 25 percent
Minor components: Shallow Kydestea soils on shoulders. Areas that have rock outcrop.

Soil Properties and Qualities

Parkelei soils (fig. 72)
Taxonomic classification: Fine-loamy, mixed, superactive, mesic Aridic Haplustalfs
Geomorphic position: occurs on drainageways and swales between hills and mesas
Parent material: eolian deposits and/or slope alluvium derived from sandstone
Slope: 2 to 12 percent
Biological crust
Cyanobacteria: 2 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 73)
Canopy plant cover: 48 percent
Woody debris: 24 percent
Bare soil: 26 percent
Rock fragments: 0 percent
Drainage class: somewhat excessively drained
Ksat solum: 0.20 to 6.00 inches per hour (1.40 to 42.34 micrometers per second)
Available water capacity total inches: 8.2 (high)

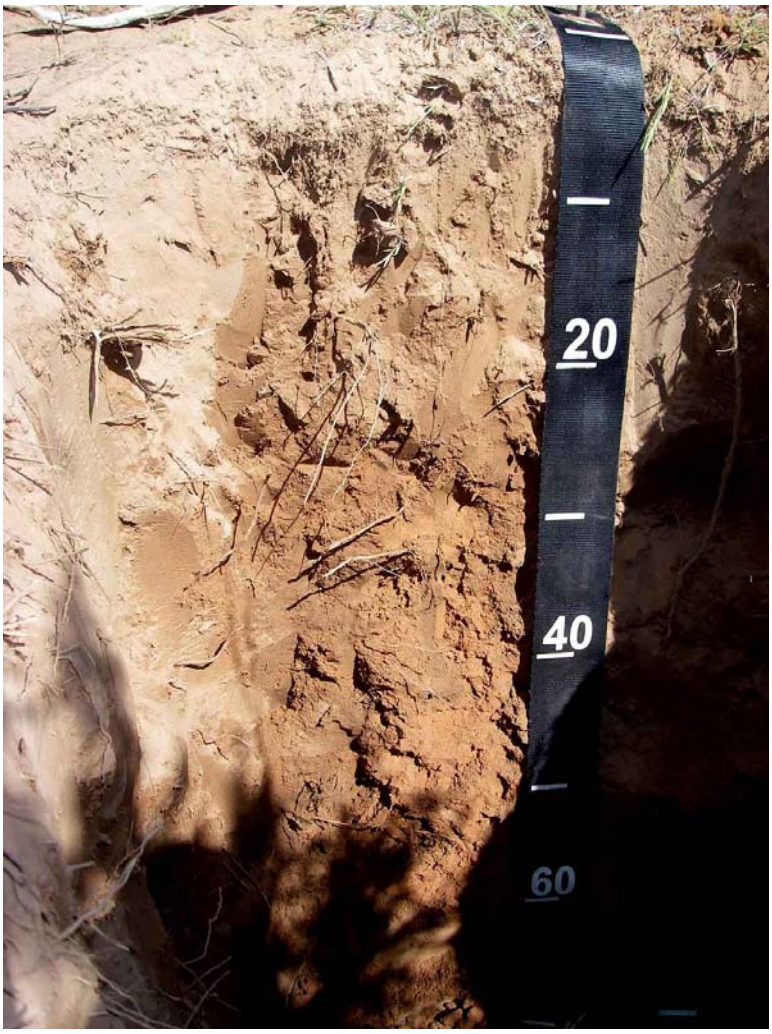

Figure 72.—Profile of Parkelei component. Argillic horizon is below 9 inches (23 cm). Scale is in centimeters.

Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: low
Hydrologic group: C
Ecological site name: Upland Loam (Basin Big Sagebrush)
Ecological site number: R035XY306UT
Present vegetation: Wyoming big sagebrush, muttongrass, pinyon, Utah juniper
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System: 37° 13' 51.50'' north, 111° 2' 37.30'' west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 3/4), moist; 10 percent clay; weak thin platy structure; loose, nonsticky and nonplastic; many fine and medium roots throughout; many fine dendritic tubular pores; 2 percent gravel; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

Bw—2 to 9 inches (5 to 23 cm); brown (7.5YR 4/4) sandy loam, dark brown (7.5YR 3/3), moist; 12 percent clay; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many fine and medium roots throughout; many fine dendritic tubular pores; 2 percent gravel; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

Bt1—9 to 17 inches (23 to 43 cm); strong brown (7.5YR 5/6) sandy loam, strong brown (7.5YR 4/6), moist; 16 percent clay; weak fine and medium subangular blocky structure; moderately hard, firm, slightly sticky and slightly plastic; many fine and medium roots throughout; many fine dendritic tubular pores; few distinct brown (7.5YR 5/4), dry, clay films on all faces of peds; 10 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear smooth boundary.

Bt2—17 to 28 inches (43 to 71 cm); strong brown (7.5YR 5/6) loam, strong brown (7.5YR 4/6), moist; 24 percent clay; moderate fine and medium subangular blocky structure; very hard, very firm, slightly sticky and moderately plastic; common fine and medium roots throughout; many fine dendritic tubular pores; common distinct strong brown (7.5YR 4/6), dry, clay films on all faces of peds; 10 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear smooth boundary.

Bt3—28 to 41 inches (71 to 104 cm); yellowish red (5YR 5/6) clay loam, yellowish red (5YR 4/6), moist; 28 percent clay; moderate fine subangular blocky structure; hard, firm, slightly sticky and moderately plastic; common fine roots throughout; many fine dendritic tubular pores; common distinct yellowish red (5YR 4/6), dry, clay films on all faces of peds; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear smooth boundary.

Bt4—41 to 62 inches (104 to 157 cm); yellowish red (5YR 5/6) loam, yellowish red (5YR 4/6), moist; 22 percent clay; weak fine subangular blocky structure; hard, firm,

Figure 73.—A close-up of the surface near the sample pit for Parkelei fine sandy loam.

slightly sticky and moderately plastic; common fine roots throughout; many fine dendritic tubular pores; few distinct yellowish red (5YR 4/6), dry, clay films on all faces of peds; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 to 6, dry or moist

Bw horizons
- Hue: 5YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3 to 6, dry or moist
- Texture: sandy loam, fine sandy loam
- Clay: 10 to 18 percent
- Rock fragments: 0 to 5 percent

Bt horizons
- Hue: 5YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 to 6, dry or moist
- Texture: loam, clay loam, sandy loam, fine sandy loam
- Clay: 16 to 30 percent averages more than 18 percent
- Rock fragments: 0 to 10 percent

Argillic horizon—the zone from 9 to 62 inches (23 to 157 cm) (Bt horizons)

Gladel soils (fig. 74)
Taxonomic classification: Loamy, mixed, superactive, mesic Aridic Lithic Haplustepts
Geomorphic position: occurs on drainageways and swales between hills and mesas
Parent material: slope alluvium and/or residuum weathered from sandstone
Slope: 2 to 12 percent
- Biological crust
  - Cyanobacteria: 2 percent
- Lichen: 0 percent
  - Moss: 0 percent
- Chemical crust
  - Salt: 0 percent
  - Gypsum: 0 percent
- Physical cover
  - Canopy plant cover: 48 percent
  - Woody debris: 24 percent
  - Bare soil: 26 percent
  - Rock fragments: 0 percent

Depth to restrictive feature(s): 12 to 18 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.8 (very low)
Shrink-swell potential: about 1.0 LEP (low)
Flooding hazard: none

Runoff class: high
Hydrologic group: D
Ecological site name: Upland Shallow Loam (Pinyon-Utah Juniper)
Ecological site number: R035XY315UT
Present vegetation: pinyon, Wyoming big sagebrush, Utah juniper, dwarf lousewort, Utah serviceberry, muttongrass
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System: 37° 13' 52.00'' north, 111° 2' 31.70'' west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4), moist; 10 percent clay; weak fine granular structure parting to single grain; loose, nonsticky and nonplastic; many very fine and fine roots throughout; many fine dendritic tubular pores; very slightly effervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

Bk—2 to 9 inches (5 to 23 cm); brown (7.5YR 4/4) sandy loam, dark brown (7.5YR 3/4), moist; 12 percent clay; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many fine and medium roots throughout; many fine dendritic tubular pores; common fine carbonate masses; very slightly effervescent; slightly alkaline, pH 7.6; clear smooth boundary.

Bw—9 to 17 inches (23 to 43 cm); brown (7.5YR 4/3) sandy loam, dark brown (7.5YR 3/3), moist; 12 percent clay; moderate fine and medium subangular blocky structure;

Figure 74.—Profile of Gladel component. Cambic horizon begins at 2 inches (5 cm). Scale is in centimeters.

slightly hard, friable, nonsticky and nonplastic; many fine and common medium roots throughout; many fine and medium dendritic tubular pores; 5 percent gravel; very slightly effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

R—17 inches (43 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 to 6, dry or moist

Bw or Bk horizons
- Hue: 5YR, 7.5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3 to 6, dry or moist
- Texture: fine sandy loamy, sandy loam
- Clay: 6 to 18 percent
- Rock fragments: 0 to 12 percent

Cambic horizon—the zone from 2 to 17 inches (5 to 43 cm) (Bw and Bk horizons)

22—Pennell cobbly loam, 3 to 10 percent slopes

Map Unit Setting

Landform(s): plateaus
Elevation: 3,120 to 3,610 feet (950 to 1,100 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Pennell and similar soils: 85 percent
Minor Components: Soils that are deeper than 20 inches (50 cm). Some areas have slopes that greater than 10 percent.

Soil Properties and Qualities

Pennell soils
Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Haplocalcids
Geomorphic position: occurs on interfluves on hills and structural benches
Parent material: slope alluvium and/or residuum weathered from limestone and sandstone
Slope: 3 to 10 percent
- Biological crust
  - Cyanobacteria: 3 percent
- Lichen: 1 percent
  - Moss: 0 percent
- Chemical crust
  - Salt: 0 percent
  - Gypsum: 0 percent

Physical cover
Canopy plant cover: 65 percent
Woody debris: 5 percent
Bare soil: 35 percent
Rock fragments
- gravel: 10 percent
- cobble: 20 percent
- stone: 1 percent

Depth to restrictive feature(s): 10 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.60 to 6.00 inches per hour (4.23 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.57 inches per hour (0.00 to 4.00 micrometers per second)
Available water capacity total inches: 1.6 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Desert Shallow Loam (Shadscale)
Ecological site number: R035XY122UT
Present vegetation: shadscale saltbush, Pleuraphis jamesii, Indian ricegrass
Land capability (non irrigated): 7c

Typical Profile

Location
Geographic Coordinate System: 36° 41' 25.50'' north, 111° 44' 49.80'' west

A—0 to 4 inches (0 to 10 cm); yellowish red (5YR 4/6) cobbly loam, reddish brown (5YR 4/4), moist; 15 percent clay; weak thin platy structure; soft, very friable; common very fine roots throughout; many medium irregular pores; 11 percent gravel and 19 percent cobble; slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

Bw—4 to 7 inches (10 to 18 cm); yellowish red (5YR 5/6) sandy loam, yellowish red (5YR 4/6), moist; 13 percent clay; weak fine subangular blocky structure; soft, very friable; common very fine roots throughout; many very fine tubular pores; 10 percent gravel and 2 percent cobble; strongly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

Bk1—7 to 14 inches (18 to 36 cm); yellowish red (5YR 5/6) very gravelly sandy loam, yellowish red (5YR 4/6), moist; 13 percent clay; weak fine subangular blocky structure; soft, very friable; common very fine roots throughout; many very fine tubular pores; common fine carbonate masses; 38 percent gravel and 2 percent cobble; violently effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

2Bk2—14 to 19 inches (36 to 48 cm); pink (5YR 7/4) sandy loam, light reddish brown (5YR 6/4), moist; 13 percent clay; massive; soft, very friable; common very fine roots throughout; many very fine tubular pores; common carbonate masses around rock fragments; 10 percent gravel and 2 percent cobble; violently effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

3R—19 inches (48 cm); unweathered, unfractured limestone bedrock.

Range in Characteristics

The National Park Service restricted any access to this area; therefore, no pedon could be excavated and described for the Glen Canyon National Recreation Area.

This description is of the joining typical pedon from the Soil Survey of Coconino County Area, Arizona, North Kaibab Part and adequately represents what is expected to be found in the park.

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Hue: 5YR, 7.5YR
- Value: 4 to 6, dry or moist
- Chroma: 3 to 6, dry or moist

Bw or Bk horizons
- Hue: 5YR, 7.5YR
- Value: 5 to 8 dry, 4 to 7 moist
- Chroma: 4 to 6, dry or moist
- Texture: sandy loam, fine sandy loam
- Clay: 10 to 15 percent
- Calcium carbonate equivalent: 5 to 30 percent
- Rock fragments: 5 to 45 percent, averages less than 35 percent

Calcic horizon—the zone from 7 to 19 inches (18 to 48 cm) (Bk1 and 2Bk2 horizons)

23—Razito-Riverwash complex, 1 to 4 percent slopes, rarely flooded

Map Unit Setting

Landform(s): flood plains (fig. 75)
Elevation: 3,150 to 4,460 feet (960 to 1,360 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Razito and similar soils: 55 percent
Riverwash: 40 percent
Minor components: Soils that have stratified layers of rock fragments and/or textures finer than fine sand.

Soil Properties and Qualities

Razito soils (fig. 76)
Taxonomic classification: Mixed, mesic Typic Torripsamments
Geomorphic position: occurs on flood plains
Parent material: sandy alluvium
Slope: 1 to 4 percent
Biological crust
Cyanobacteria: 15 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 4 percent

Figure 75.—An area of Razito-Riverwash complex. 1 to 4 percent slopes, rarely flooded.

Gypsum: 0 percent
Physical cover (fig. 77)
Canopy plant cover: 13 percent
Woody debris: 15 percent
Bare soil: 37 percent
Rock fragments
- gravel: 15 percent
- cobble: 11 percent
- stone: 1 percent
- boulder: 1 percent
- channer: 1 percent

Drainage class: excessively drained
Ksat solum: 6.00 to 99.92 inches per hour (42.34 to 705.00 micrometers per second)
Available water capacity total inches: 3.6 (low)
Shrink-swell potential: about 1.0 LEP (low)
Flooding hazard: rare
Runoff class: very low
Hydrologic group: A
Ecological site name: Sandy Wash 6-10" p.z.
Ecological site number: R035XB216AZ
Present vegetation: China tamarisk, rubber rabbitbrush
Land capability (non irrigated): 7c

Typical Profile

Location
Geographic Coordinate System: 37° 7' 41.20'' north, 111° 29' 21.40'' west

Figure 76.—Profile of Razito component. Scale is in centimeters.

A—0 to 1 inch (0 to 3 cm); light olive brown (2.5Y 5/3) sand, olive brown (2.5Y 4/3), moist; 3 percent clay; weak thin platy structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; many fine dendritic tubular pores; slightly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

C1—1 inch to 5 inches (3 to 13 cm); light yellowish brown (2.5Y 6/3) sand, olive brown (2.5Y 4/3), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots throughout; many fine dendritic tubular pores; slightly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—5 to 7 inches (13 to 18 cm); light olive brown (2.5Y 5/3) fine sand, olive brown (2.5Y 4/3), moist; 4 percent clay; massive; soft, very friable, nonsticky and nonplastic; common fine and medium roots throughout; many fine and medium dendritic tubular pores; 3 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C3—7 to 36 inches (18 to 91 cm); light yellowish brown (2.5Y 6/3) fine sand, olive brown (2.5Y 4/3), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; many fine and medium roots throughout; many fine and medium dendritic

tubular pores; 2 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

C4—36 to 40 inches (91 to 102 cm); light yellowish brown (2.5Y 6/3) fine sand, olive brown (2.5Y 4/3), moist; 3 percent clay; massive; moderately hard, friable, nonsticky and nonplastic; common fine and medium roots throughout; common fine and medium dendritic tubular pores; 3 percent gravel; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C5—40 to 60 inches (102 to 152 cm); light yellowish brown (2.5Y 6/3) sand, olive brown (2.5Y 4/3), moist; 2 percent clay; massive; moderately hard, friable, nonsticky and nonplastic; common fine roots throughout; common fine dendritic tubular pores; common fine carbonate masses along lamina or strata surfaces; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly to moderately alkaline)

A horizon
- Hue: 10YR, 2.5Y
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 3 or 4, dry or moist

C horizons
- Hue: 10YR, 2.5Y
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 3 or 4, dry or moist
- Texture: sand, fine sand, loamy sand

Figure 77.—A close-up of the surface near the sample pit for Razito sand.

Clay: 1 to 8 percent
Rock fragments: 0 to 25 percent

Riverwash
Slope: 1 to 4 percent

Riverwash is unstabilized sandy and/or gravelly sediment that is frequently flooded and washed, and is subject to shifting and scouring. This material does not support vegetation because it undergoes constant shifting and scouring.

24—Redhouse-Epikom families complex, 2 to 14 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 78)
Elevation: 4,200 to 5,410 feet (1,280 to 1,650 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Composition

Redhouse family and similar soils: 50 percent
Epikom family and similar soils: 35 percent

Figure 78.—An area of Redhouse-Epikom families complex, 2 to 14 percent slopes.

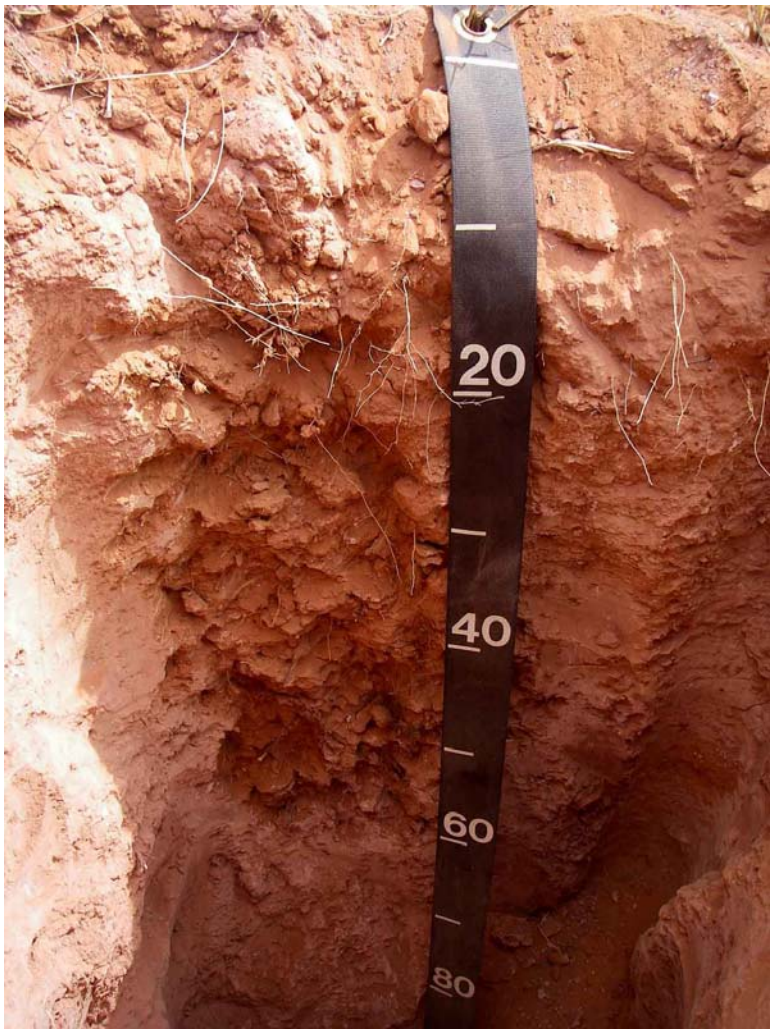

Figure 79.—Profile of Redhouse component. Calcic horizon begins at 9 inches (23 cm). Scale is in centimeters.

Minor components: Very deep Denazar soils in areas of deposition. Some areas have slopes greater than 14 percent.

Soil Properties and Qualities

Redhouse family soils (fig. 79)
Taxonomic classification: Fine-loamy, mixed, superactive, mesic Typic Haplocalcids
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches
Parent material: eolian deposits and/or slope alluvium over residuum weathered from sandstone and shale
Slope: 2 to 14 percent
Biological crust
Cyanobacteria: 42 percent
Lichen: 0 percent
Moss: 2 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent

Physical cover (fig. 80)
Canopy plant cover: 21 percent
Woody debris: 22 percent
Bare soil: 5 percent
Rock fragments
• gravel: 23 percent

Depth to restrictive feature(s): 41 to 60 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.20 to 2.00 inches per hour (1.40 to 14.11 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 9.7 (high)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: low
Hydrologic group: C
Ecological site name: Desert Sandy Loam (Blackbrush)
Ecological site number: R035XY121UT
Present vegetation: shadscale saltbush, broom snakeweed, blackbrush, galleta
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 37° 12' 58.00'' north, 109° 58' 0.70'' west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) loam, yellowish red (5YR 4/6), moist; 15 percent clay; moderate thin platy structure; soft, very friable, nonsticky and

Figure 80.—A close-up of the surface near the sample pit for Redhouse loam.

nonplastic; common very fine roots throughout; violently effervescent; moderately alkaline, pH 8.2; abrupt wavy boundary.

BA—1 inch to 9 inches (3 to 23 cm); reddish brown (5YR 5/4) loam, yellowish red (5YR 4/6), moist; 25 percent clay; moderate fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots throughout; 2 percent gravel; violently effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

Bk1—9 to 19 inches (23 to 48 cm); reddish brown (5YR 5/4) clay loam, yellowish red (5YR 4/6), moist; 33 percent clay; moderate fine subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; many very fine and common medium roots throughout; common fine carbonate masses in matrix; violently effervescent, 25 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; gradual wavy boundary.

Bk2—19 to 27 inches (48 to 69 cm); light reddish brown (5YR 6/4) clay loam, yellowish red (5YR 4/6), moist; 29 percent clay; moderate medium subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; common fine carbonate masses in matrix; violently effervescent, 22 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

Bk3—27 to 46 inches (69 to 117 cm); light reddish brown (5YR 6/3) loam, reddish brown (5YR 4/4), moist; 26 percent clay; moderate fine subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; many fine carbonate masses in matrix; 10 percent gravel; violently effervescent, 26 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

2Ck—46 to 57 inches (117 to 145 cm); light gray (5YR 7/1) clay loam, reddish brown (5YR 5/3), moist; 34 percent clay; massive; hard, firm, moderately sticky and moderately plastic; many fine carbonate masses in matrix; 5 percent gravel; violently effervescent, 34 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

2R—57 inches (145 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Redhouse family differs from the series because the series is greater than 60 inches (152 cm) to lithic contact

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Value: 5 or 6 dry, 3 to 6 moist
- Chroma: 3 to 6, dry or moist

BA horizons
- Hue: 5YR,7.5YR
- Value: 5 to 6 dry, 4 to 6 moist
- Chroma: 3 to 6, dry or moist
- Texture: loam, clay loam
- Clay: 18 to 27 percent
- Rock fragments: 0 to 5 percent

Bk horizons
- Hue: 5YR, 7.5YR
- Value: 5 to 6 dry, 4 to 6 moist
- Chroma: 3 to 6, dry or moist
- Texture: loam, clay loam, sandy clay loam

Clay: 23 to 35 percent
Calcium carbonate equivalent: 15 to 30 percent
Rock fragments: 0 to 10 percent

Ck horizons
Hue: 5YR, 7.5YR
Value: 5 to 7 dry, 4 to 6 moist
Chroma: 1 to 6, dry or moist
Texture: loam, clay loam
Clay: 23 to 35 percent
Calcium carbonate equivalent: 15 to 35 percent
Rock fragments: 0 to 10 percent

Calcic horizon – the zone from 19 to 46 inches (48 to 117 cm) (Bk horizons)

Some pedons do not have a BA horizon.

Epikom family soils (fig. 81)
Taxonomic classification: Loamy, mixed, superactive, mesic Lithic Haplocambids
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches
Parent material: eolian deposits and/or residuum weathered from sandstone and shale
Slope: 2 to 14 percent
Biological crust
Cyanobacteria: 42 percent
Lichen: 0 percent
Moss: 2 percent

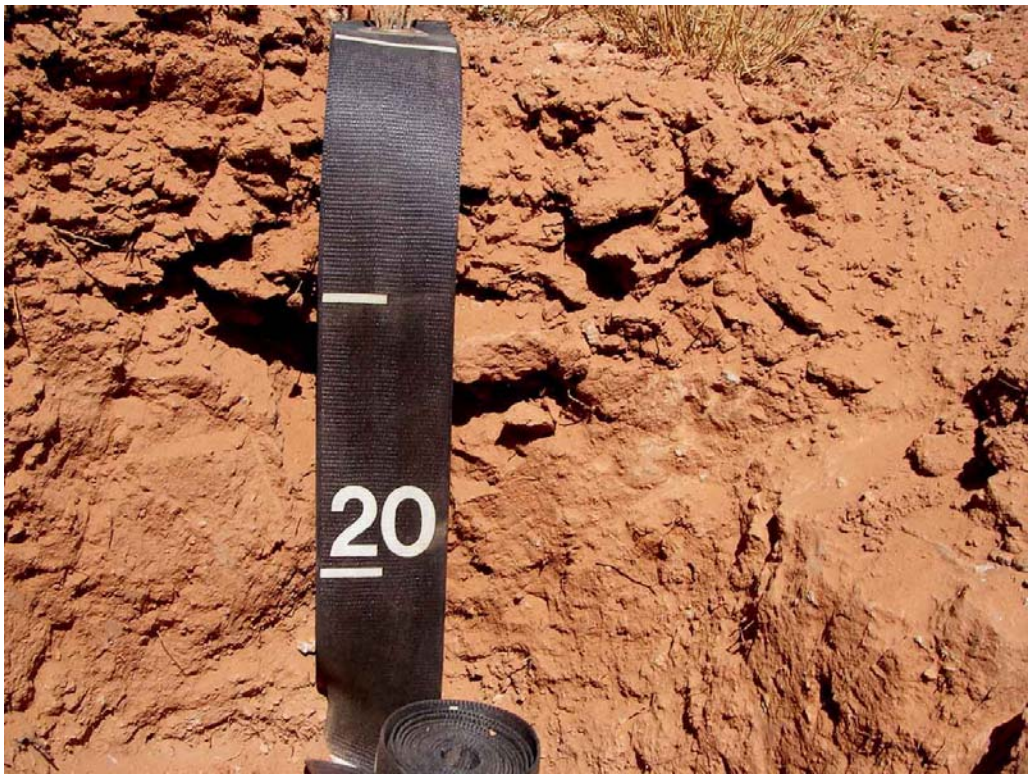

Figure 81.—Profile of Epikom component. Cambic horizon begins at 1 inch (3 cm). Scale is in centimeters.

Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 21 percent
Woody debris: 22 percent
Bare soil: 5 percent
Rock fragments
• gravel: 23 percent

Depth to restrictive feature(s): 3 to 18 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.60 to 2.00 inches per hour (4.23 to 14.11 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.6 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Desert Shallow Loam (Shadscale)
Ecological site number: R035XY122UT
Present vegetation: shadscale saltbush, broom snakeweed, blackbrush, galleta
Land capability (non irrigated): 7c

Typical Profile

Location
Geographic Coordinate System: 37° 12' 55.10'' north, 109° 57' 59.00'' west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) loam, yellowish red (5YR 4/6), moist; 16 percent clay; weak thin platy structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; common very fine tubular pores; 5 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

Bk—1 inch to 8 inches (3 to 20 cm); yellowish red (5YR 5/6) loam, yellowish red (5YR 4/6), moist; 23 percent clay; moderate fine subangular blocky structure; moderately hard, friable, moderately sticky and moderately plastic; common very fine roots throughout; common very fine and medium tubular pores; common carbonate masses in matrix; 2 percent gravel; violently effervescent, 12 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

Ck—8 to 11 inches (20 to 28 cm); yellowish red (5YR 5/6) loam, yellowish red (5YR 4/6), moist; 19 percent clay; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; common very fine tubular pores; common carbonate masses in matrix; 5 percent gravel; violently effervescent, 24 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

R—11 inches (28 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Epikom family differs from the series because the series averages less than 18 percent clay in the control section.

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
Value: 4 or 5 dry, 3 to 5 moist

Chroma: 4 to 6, dry or moist

Bk or Bw horizons
Hue: 5YR, 7.5YR
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 3 to 6, dry or moist
Texture: loam, very fine sandy loam
Clay: 18 to 27 percent
Calcium carbonate equivalent: 5 to 15 percent
Rock fragments: 0 to 10 percent

Ck horizon
Hue: 5YR, 7.5YR
Value: 5 or 6 dry, 4 or 5 moist
Chroma: 3 to 6, dry or moist
Texture: loam, very fine sandy loam
Clay: 18 to 27 percent
Calcium carbonate equivalent: 15 to 30 percent
Rock fragments: 0 to 10 percent

Cambic horizon—the zone from 1 inch to 8 inches (3 to 20 cm) (Bk horizons)

Some pedons do not have a Ck horizon.

25—Reef-Rock outcrop complex, 2 to 30 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 82)
Elevation: 4,890 to 5,970 feet (1,490 to 1,820 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Map Unit Composition

Reef and similar soils: 60 percent
Rock outcrop: 15 percent
Minor Components: Shallow Rizno soils. A few areas have soils greater than 20 inches (50 cm) deep.

Soil Properties and Qualities

Reef soils (fig. 83)
Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents
Geomorphic position: occurs on side slopes and interfluves on hills, mesas and structural benches
Parent material: residuum weathered from sandstone and shale
Slope: 2 to 30 percent
Biological crust
Cyanobacteria: 10 percent
Lichen: 15 percent
Moss: 6 percent

Figure 82.—An area of Reef-Rock outcrop complex, 2 to 30 percent slopes.

Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 27 percent
Woody debris: 6 percent
Bare soil: 7 percent
Rock fragments
- gravel: 10 percent
- channer: 30 percent

Depth to restrictive feature(s): 4 to 5 inches to bedrock, paralithic; 4 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.60 inches per hour (0.00 to 4.20 micrometers per second)
Available water capacity total inches: 0.2 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush)
Ecological site number: R035XY236UT
Present vegetation: blackbrush, Utah juniper, pinyon, roundleaf buffaloberry, galleta, rubber rabbitbrush
Land capability (non irrigated): 6c

Figure 83.—Profile of Reef component. Scale is in centimeters.

Typical Profile

Location

Geographic Coordinate System: 38° 10' 3.80'' north, 109° 58' 51.00'' west

C—0 to 4 inches (0 to 10 cm); light red (2.5YR 7/6) very gravelly coarse sandy loam, red (2.5YR 5/6), moist; 10 percent clay; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots throughout; common very fine interstitial pores; 50 percent gravel; strongly effervescent, 15 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

Cr—4 to 4.5 inches (10 to 12 cm); few very fine roots in cracks; weathered, fractured shale bedrock; abrupt wavy boundary.

R—4.5 inches (12 cm); few fine roots top of horizon; unweathered, unfractured shale bedrock.

Range in Characteristics

Reaction: 7.9 to 9.0 (moderately alkaline or strongly alkaline)

C horizon
Value: 4 to 7, dry, 4 or 5, moist
Chroma: 4 or 6, dry or moist
Texture: coarse sandy loam, sandy loam
Clay content: 9 to 14 percent
Rock fragments: 30 to 60 percent, averages greater than 35 percent

Rock outcrop
Slope: 8 to 100 percent

Rock outcrop consists of interbedded sandstone and shale bedrock, typically exposed along ledges and slick rock areas of the Moenkopi Formation or Organ Rock Shale. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

26—Reef-Rock outcrop complex, 30 to 60 percent slopes, extremely bouldery

Map Unit Setting

Landform(s): plateaus (fig. 84)
Elevation: 4,950 to 7,180 feet (1,510 to 2,190 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days

Figure 84.—An area of Reef-Rock outcrop complex, 30 to 60 percent slopes, extremely bouldery.

Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Map Unit Composition

Reef and similar soils: 65 percent
Rock outcrop: 30 percent
Minor Components: Shallow Rizno soils. Some areas have soils with textures coarser than fine sandy loam.

Soil Properties and Qualities

Reef soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents
Geomorphic position: occurs on talus slopes
Parent material: sandy and gravelly talus derived from sandstone and shale
Slope: 30 to 60 percent
Biological crust
Cyanobacteria: 1 percent
Lichen: 1 percent
Moss: 1 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 37 percent
Woody debris: 3 percent
Bare soil: 7 percent
Rock fragments
- gravel: 10 percent
- cobble: 5 percent
- stone: 10 percent
- boulder: 20 percent
- channer: 20 percent
- flagstone:15 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 0.60 to 2.00 inches per hour (4.23 to 14.11 micrometers per second)
Ksat restrictive layer: 0.00 to 1.98 inches per hour (0.00 to 14.00 micrometers per second)
Available water capacity total inches: 0.4 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper)
Ecological site number: R035XY263UT
Present vegetation: singleleaf ash, Utah juniper, Utah serviceberry, desert princesplume, sumac, desert needlegrass
Land capability (non irrigated): 6c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Location
Geographic Coordinate System: 38° 13' 57.00'' north, 110° 0' 46.70'' west

C—0 to 4 inches (0 to 10 cm); reddish brown (5YR 4/4) very channery loam, dark reddish brown (5YR 3/4), moist; 15 percent clay; massive; slightly hard, friable, moderately sticky and slightly plastic; common very fine and fine roots throughout; many very fine and common fine interstitial pores; 50 percent channer; slightly effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

R1—4 to 13 inches (10 to 33 cm); common fine roots in cracks; unweathered, fractured sandstone bedrock.

R2—13 inches (33 cm); common medium roots top of horizon; unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.9 to 8.4 (moderately alkaline)

C horizon
- Hue: 2.5YR, 5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3 or 4, dry or moist
- Texture: loam, fine sandy loam
- Clay content: 8 to 18 percent
- Rock fragments: 35 to 75 percent

Rock outcrop
Slope: 35 to 100 percent

Rock outcrop consists of sandstone bedrock, typically exposed on ledges and cliff faces of Moenkopi Formation or Wingate Sandstone. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

27—Remorris family-Rock outcrop complex, 4 to 35 percent slopes, gullied

Map Unit Setting

Landform(s): plateaus (fig. 85)
Elevation: 5,410 to 5,910 feet (1,650 to 1,800 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Map Unit Composition

Remorris family and similar soils: 75 percent
Rock outcrop: 10 percent
Minor components: Soils that have a clay subsoil texture. Soils that are greater than 20 inches deep on more stable, less sloping areas.

Figure 85.—An area of Remorris family-Rock outcrop complex, 4 to 35 percent slopes, gullied.

Soil Properties and Qualities

Remorris family soils (fig. 86)
Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic, shallow Ustic Torriorthents
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches
Parent material: residuum weathered from sandstone and shale
Slope: 4 to 35 percent
Biological crust
Cyanobacteria: 47 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 87)
Canopy plant cover: 14 percent
Woody debris: 13 percent
Bare soil: 20 percent
Rock fragments
- gravel: 15 percent

Depth to restrictive feature(s): 5 to 19 inches to densic material
Drainage class: somewhat excessively drained
Ksat solum: 0.20 to 6.00 inches per hour (1.40 to 42.34 micrometers per second)
Available water capacity total inches: 2.0 (very low)
Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush)
Ecological site number: R035XY236UT
Present vegetation: Utah juniper, galleta, narrowleaf yucca
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System: 37° 37' 6.20'' north, 111° 15' 25.70'' west

A—0 to 1 inch (0 to 3 cm); 30 percent light reddish gray (2.5YR 7/1) and 70 percent red (2.5YR 5/6) fine sandy loam, reddish brown (2.5YR 4/4), moist; 16 percent clay; weak thin platy and weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots throughout; common very fine tubular pores; violently effervescent, 20 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; abrupt wavy boundary.

C1—1 inch to 7 inches (3 to 18 cm); red (2.5YR 5/6) fine sandy loam, reddish brown (2.5YR 4/4), moist; 16 percent clay; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and common fine roots throughout; common very fine dendritic tubular pores; violently effervescent, 16 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—7 to 17 inches (18 to 43 cm); 30 percent light reddish gray (2.5YR 7/1) and 70 percent red (2.5YR 5/6) fine sandy loam, reddish brown (2.5YR 4/4), moist; 16

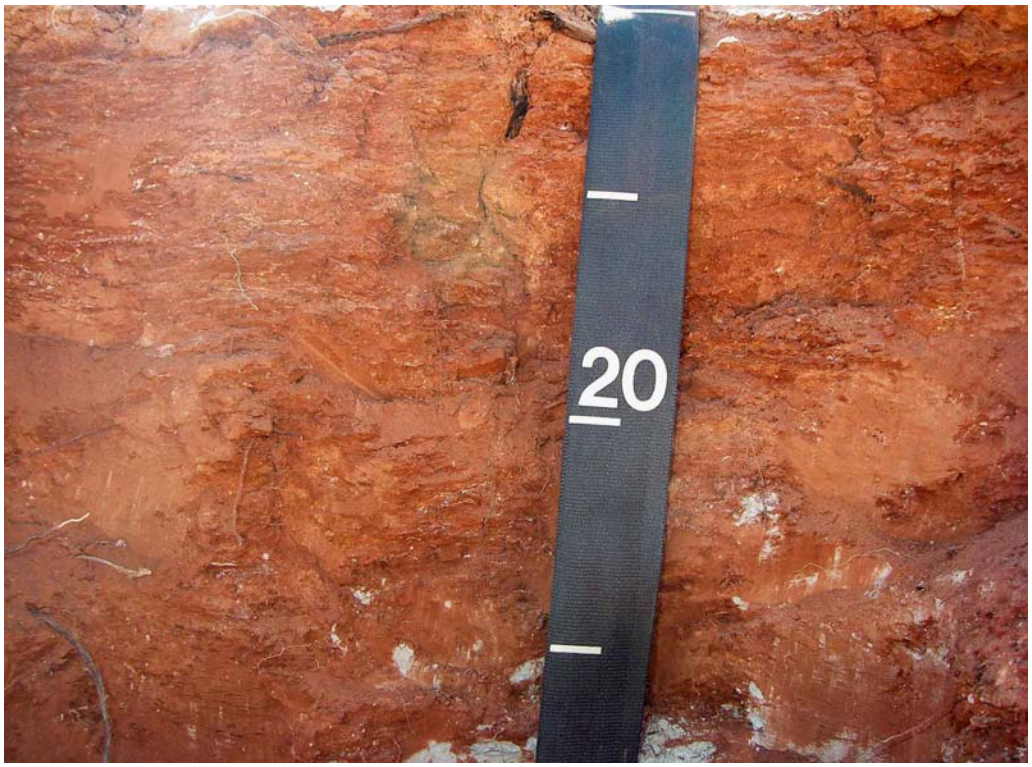

Figure 86.—Profile of Remorris family component. Scale is in centimeters.

percent clay; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and medium roots throughout; common very fine dendritic tubular pores; violently effervescent, 16 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear smooth boundary.

Cd—17 to 27 inches (43 to 68 cm); 30 percent light reddish gray (2.5YR 7/1) and 70 percent red (2.5YR 5/6) fine sandy loam, reddish brown (2.5YR 4/4), moist; 16 percent clay; slightly hard, friable, slightly sticky and slightly plastic; violently effervescent, 16 percent calcium carbonate equivalent; moderately alkaline, pH 8.2.

Range in Characteristics

Remorris family differs from the series because the series averages more than 18 percent clay in the control section.

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Value: 5 to 7 dry, 3 to 5 moist
- Chroma: 1 to 6, dry or moist

C horizons
- Hue: 2.5YR, 5YR
- Value: 4 to 7 dry, 3 to 5 moist
- Chroma: 1 to 6, dry or moist
- Texture: fine sandy loam, loam
- Clay: 12 to 18 percent
- Calcium carbonate equivalent: 1 to 20 percent
- Rock fragments: 0 to 25 percent

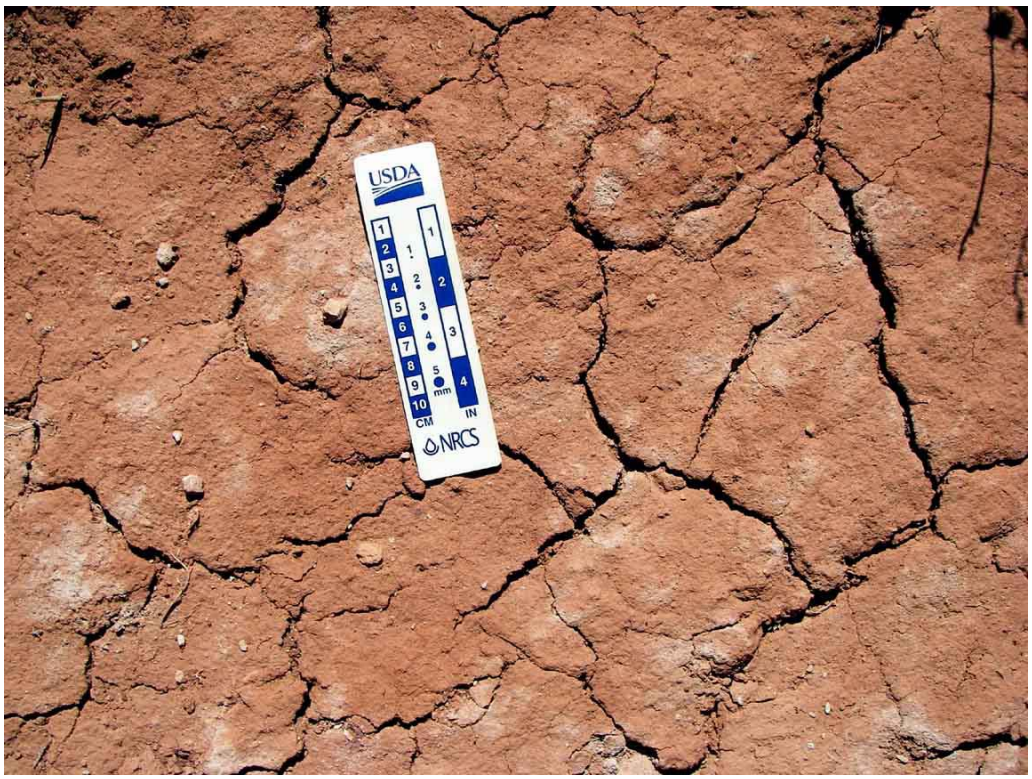

Figure 87.—Close-up of the surface near the sample pit for Remorris family fine sandy loam.

Figure 88.—An area of Rizno-Rock outcrop complex, 1 to 25 percent slopes.

Rock outcrop
Slope: 8 to 20 percent

Rock outcrop consists of interbedded sandstone and shale, typically exposed along ledges and drainageways in the Carmel Formation. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

28—Rizno-Rock outcrop complex, 1 to 25 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 88)
Elevation: 4,430 to 6,400 feet (1,350 to 1,950 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Map Unit Composition

Rizno and similar soils: 60 percent
Rock outcrop: 20 percent
Minor components: Moderately deep Anasazi soils are on more stable areas. Very deep Mido soils are on areas of deposition. A few areas have soils that are greater than 20 inches (50 cm).

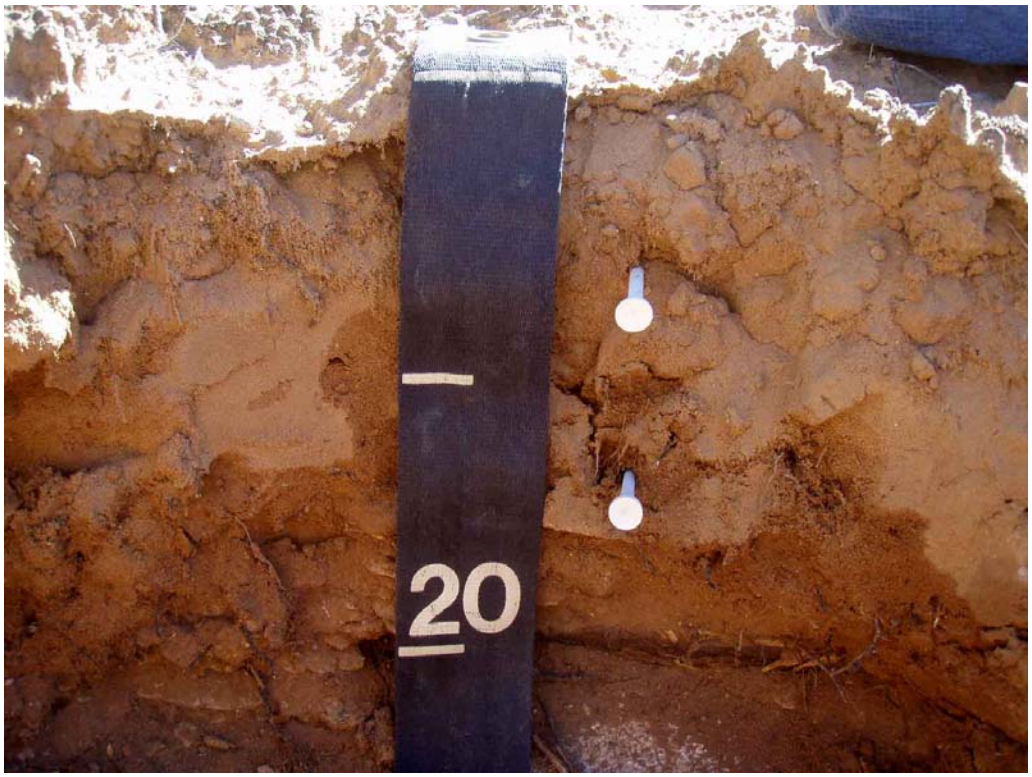

Figure 89.—Profile of Rizno component. Scale is in centimeters.

Soil Properties and Qualities

Rizno soils (fig. 89)
Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches
Parent material: residuum weathered from sandstone
Slope: 1 to 25 percent
Biological crust
Cyanobacteria: 12 percent
Lichen: 63 percent
Moss: 7 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 20 percent
Woody debris: 3 percent
Bare soil: 7 percent
Rock fragments
- gravel: 50 percent

Depth to restrictive feature(s): 4 to 10 inches to bedrock, paralithic; 5 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)

Ksat restrictive layer: 0.00 to 0.60 inches per hour (0.00 to 4.20 micrometers per second)
Available water capacity total inches: 0.3 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush)
Ecological site number: R035XY236UT
Present vegetation: blackbrush, Utah juniper, twoneedle pinyon, broom snakeweed, green Mormon tea, plains pricklypear
Land capability (non irrigated): 6c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Location
Geographic Coordinate System: 38° 29' 23.10'' north, 109° 49' 52.80'' west

A—0 to 2 inches (0 to 5 cm); yellowish red (5YR 5/6) gravelly sandy loam, yellowish red (5YR 4/6), moist; 10 percent clay; weak medium granular and fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common fine roots throughout; common fine irregular pores; 25 percent gravel; strongly effervescent, 3 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Bw—2 to 4 inches (5 to 10 cm); reddish yellow (5YR 6/6) channery sandy loam, yellowish red (5YR 4/6), moist; 16 percent clay; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common fine roots throughout; common fine irregular pores; carbonate, finely disseminated throughout; 15 percent channer; violently effervescent, 10 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

Cr—4 to 5.5 inches (10 to 14 cm); weathered, fractured sandstone bedrock; very abrupt wavy boundary.

R—5.5 inches (14 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
Hue: 2.5YR, 5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 4 or 6 moist or dry

Bw or C horizon
Hue: 2.5YR, 5YR
Value: 4 to 6 dry, 3 or 4 moist
Chroma: 4 or 6, dry or moist
Clay content: 10 to 18 percent
Calcium carbonate equivalent: 10 to 25 percent
Rock fragments: 10 to 30 percent gravel

Rock outcrop
Slope: 2 to 45 percent

Rock outcrop consists of interbedded sandstone and shale bedrock, typically exposed along ledges and slick rock areas of the Kayenta or the Morrison Formations. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

29—Rizno-Rock outcrop complex, 2 to 15 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 90)
Elevation: 5,150 to 6,990 feet (1,570 to 2,130 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Map Unit Composition

Rizno and similar soils: 40 percent
Rock outcrop: 25 percent
Minor components: Shallow Reef soils on shoulders. Some areas have soils that are greater than 20 inches (50 cm) deep.

Figure 90.—An area of Rizno-Rock outcrop complex, 2 to 15 percent slopes.

Soil Properties and Qualities

Rizno soils

Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches
Parent material: residuum weathered from sandstone and/or slope alluvium derived from sandstone
Slope: 2 to 15 percent
Biological crust
Cyanobacteria: 12 percent
Lichen: 63 percent
Moss: 7 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 20 percent
Woody debris: 3 percent
Bare soil: 7 percent
Rock fragments: 0 percent
Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.7 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush)
Ecological site number: R035XY236UT
Present vegetation: Utah juniper, twoneedle pinyon, broom snakeweed, fourwing saltbush, Mormon tea, cliffrose, plains pricklypear
Land capability (non irrigated): 6c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Location

Geographic Coordinate System: 38° 10' 3.80'' north, 110° 3' 0.30'' west

A—0 to 1 inch (0 to 3 cm); reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4), moist; 12 percent clay; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; many very fine roots throughout; many very fine irregular pores; slightly effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

Bw—1 inch to 5.5 inches (3 to 14 cm); reddish brown (5YR 5/4) fine sandy loam, reddish brown (5YR 4/4), moist; 14 percent clay; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine roots

throughout; many very fine irregular pores; strongly effervescent, 3 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

R—5.5 inches (14 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.4 to 8.4 (moderately alkaline)

A horizon
- Value: 4 or 5, dry or moist
- Clay content: 8 to 12 percent
- Calcium carbonate equivalent: 1 to 5 percent
- Rock fragments: 0 to 5 percent gravel

Bw horizon
- Value: 5 or 6 dry, 4 moist
- Texture: sandy loam, fine sandy loam, very fine sandy loam
- Clay content: 10 to 15 percent
- Calcium carbonate equivalent: 3 to 5 percent
- Rock fragments: 0 to 5 percent gravel

Rock outcrop
Slope: 2 to 15 percent

Rock outcrop consists of sandstone bedrock, typically exposed on ledges of the Moenkopi Formation and the Shinarump member of the Chinle Formation. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

30—Rock outcrop-Arches complex, 2 to 60 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 91)
Elevation: 4,590 to 5,580 feet (1,400 to 1,700 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Map Unit Composition

Rock outcrop: 60 percent
Arches and similar soils: 30 percent
Minor components: Some areas have soils that have rock fragments throughout the profile. A few areas have soil profiles greater than 20 inches deep.

Soil Properties and Qualities

Rock outcrop
Slope: 6 to 60 percent

Rock outcrop consists of sandstone bedrock, typically exposed along ledges and

Figure 91.—An area of Rock outcrop-Arches complex, 2 to 60 percent slopes.

slick rock areas of the Navajo or Cedar Mesa Sandstone. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

Arches soils

Taxonomic classification: Mixed, mesic Lithic Torripsamments
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches as sandsheets
Parent material: eolian sands and/or residuum weathered from sandstone
Slope: 2 to 60 percent

Biological crust
Cyanobacteria: 4 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 3 percent
Woody debris: 5 percent
Bare soil: 17 percent
Rock fragments
- gravel: 14 percent
- cobble: 2 percent

Depth to restrictive feature(s): 4 to 11 inches to bedrock, lithic
Drainage class: excessively drained
Ksat solum: 5.95 to 19.98 inches per hour (42.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.7 (very low)
Shrink-swell potential: about 1.0 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Semidesert Shallow Sand (Utah Juniper-Pinyon)
Ecological site number: R035XY227UT
Present vegetation: mesa dropseed, Utah juniper, Cutler Mormon tea, crispleaf buckwheat
Land capability (non irrigated): 6c

Typical Profile

Location
Geographic Coordinate System: 37° 35' 28.60'' north, 111° 12' 7.10'' west

C1—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) fine sand, reddish brown (5YR 4/4), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; many very fine and fine roots throughout; common fine tubular pores; 5 percent fine gravel; very slightly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

C2—1 inch to 11 inches (3 to 28 cm); yellowish red (5YR 5/6) fine sand, reddish brown (5YR 4/4), moist; 5 percent clay; massive; loose, nonsticky and nonplastic; many very fine and fine roots throughout; common fine tubular pores; 2 percent fine gravel; noneffervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

R—11 inches (28 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.4 to 7.8 (slightly alkaline)

C horizons
Hue: 5YR, 7.5YR
Value: 4 or 5 dry, 3 to 5 moist
Chroma: 4 to 8, dry or moist
Texture: sand, fine sand, loamy fine sand
Clay: 3 to 6 percent
Rock fragments: 0 to 5 percent

31—Rock outcrop-Atchee complex, 24 to 60 percent slopes, extremely bouldery

Map Unit Setting

Landform(s): plateaus (fig. 92)
Elevation: 5,410 to 7,550 feet (1,650 to 2,300 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Figure 92.—An area of Rock outcrop-Atchee complex, 24 to 60 percent slopes, extremely bouldery.

Map Unit Composition

Rock outcrop: 55 percent
Atchee and similar soils: 35 percent
Minor components: Soils that are greater than 20 inches deep on more stable, less sloping areas. Soils with less than 35 percent rock fragments throughout the soil profile.

Soil Properties and Qualities

Rock outcrop
Slope: 30 to 80 percent

Rock outcrop consists of interbedded sandstone and shale bedrock, typically exposed along ledges and cliff faces of the Straight Cliffs Formation. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

Atchee soils (fig. 93)
Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents
Geomorphic position: occurs on talus slopes and ledges on escarpments
Parent material: gravelly talus derived from sandstone
Slope: 24 to 60 percent
Biological crust
Cyanobacteria: 3 percent
Lichen: 0 percent

Figure 93.—Profile of Atchee component. Scale is in centimeters.

Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 94)
Canopy plant cover: 26 percent
Woody debris: 42 percent
Bare soil: 11 percent
Rock fragments
- gravel: 11 percent
- cobble: 8 percent
- stone: 8 percent
- boulder: 13 percent
- channer: 3 percent
- flagstone:1 percent

Depth to restrictive feature(s): 4 to 17 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.8 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper)
Ecological site number: R035XY263UT

Present vegetation: Utah serviceberry, Wyoming big sagebrush, bluebunch wheatgrass, alderleaf mountain-mahogany, muttongrass
Land capability (non irrigated): 6c

Typical Profile

Location
Geographic Coordinate System: 37° 22' 20.60'' north, 111° 1' 30.20'' west

A—0 to 1 inch (0 to 3 cm); yellowish brown (10YR 5/4) very channery sandy loam, brown (10YR 4/3), moist; 10 percent clay; weak thin platy structure; loose, nonsticky and nonplastic; many very fine and fine roots throughout; many fine dendritic tubular pores; 10 percent gravel and 20 percent channer and 5 percent flagstone; slightly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

Ck—1 inch to 16 inches (3 to 41 cm); light yellowish brown (10YR 6/4) very cobbly sandy loam, yellowish brown (10YR 5/4), moist; 10 percent clay; moderate fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many fine and common medium roots throughout; many fine dendritic tubular pores; common carbonate masses; 10 percent gravel, 30 percent cobble, and 10 percent flagstone; violently effervescent, 22 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

R—16 inches (41 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Atchee, as used in this survey, is a taxadjunct to the official series because it has a superactive activity class. The Atchee series is loamy-skeletal, mixed, active, calcareous, mesic Lithic Ustic Torriorthents. This does not affect use and management.

Figure 94.—A close-up of the surface near the sample pit for Atchee very channery sandy loam.

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 3 to 6 dry or moist

Ck horizon
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 4 to 6, dry or moist
- Clay: 8 to 12 percent
- Rock fragments: 35 to 60 percent
- Calcium carbonate equivalent: 5 to 25 percent

32—Rock outcrop-Needle complex, 2 to 30 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 95)
Elevation: 3,670 to 5,310 feet (1,120 to 1,620 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Figure 95.—An area of Rock outcrop-Needle complex, 2 to 30 percent slopes.

Map Unit Composition

Rock outcrop: 60 percent
Needle and similar soils: 35 percent
Minor components: Some areas have soils that have rock fragments throughout the profile. A few areas have soil profiles greater than 20 inches deep.

Soil Properties and Qualities

Rock outcrop
Slope: 4 to 30 percent

Rock outcrop consists of sandstone bedrock, typically exposed along ledges and slick rock areas of the Navajo, Wingate, or Cedar Mesa Sandstone. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

Needle soils
Taxonomic classification: Mixed, mesic Lithic Torripsamments
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches as sandsheets
Parent material: eolian sands derived from sandstone
Slope: 2 to 30 percent
Biological crust
Cyanobacteria: 3 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 7 percent
Woody debris: 8 percent
Bare soil: 19 percent
Rock fragments
- gravel: 7 percent
- channer: 5 percent

Depth to restrictive feature(s): 4 to 12 inches to bedrock, lithic
Drainage class: excessively drained
Ksat solum: 20.00 to 99.92 inches per hour (141.14 to 705.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.7 (very low)
Shrink-swell potential: about 5.0 LEP (moderate)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Sandstone Rockland 6-10" p.z.
Ecological site number: R035XB255AZ
Present vegetation: blackbrush, broom snakeweed, black grama
Land capability (non irrigated): 7c

Typical Profile

Location
Geographic Coordinate System: 36° 55' 19.30'' north, 111° 30' 40.70'' west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 6 percent clay; weak thin platy structure; soft, loose, nonsticky and nonplastic; many fine roots throughout; common fine tubular pores; very slightly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

C—1 inch to 11 inches (3 to 28 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; soft, loose, nonsticky and nonplastic; many very fine and fine roots throughout; many fine tubular pores; very slightly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

R—11 inches (28 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Value: 5 or 6 dry, 3 to 6 moist
- Chroma: 4 to 6, dry or moist

C horizon
- Hue: 2.5YR, 5YR
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 4 to 6, dry or moist
- Texture: sand, fine sand
- Clay: 2 to 7 percent
- Rock fragments: 0 to 3 percent

33—Rock outcrop-Torriorthents complex, 20 to 65 percent slopes, extremely bouldery

Map Unit Setting

Landform(s): plateaus (fig. 96)
Elevation: 3,120 to 4,200 feet (950 to 1,280 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Rock outcrop: 60 percent
Torriorthents and similar soils: 40 percent

Soil Properties and Qualities

Rock outcrop
Slope: 30 to 100 percent

Rock outcrop consists of sandstone bedrock, typically exposed on ledges and cliff faces of Wingate, Navajo, or Entrada Sandstone. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

Torriorthents soils (fig. 97)
Taxonomic classification: Torriorthents

Figure 96.—An area of Rock outcrop-Torriorthents complex, 20 to 65 percent slopes, extremely bouldery.

Figure 97.—Profile of Torriorthents component. Scale on the right is in centimeters.

Figure 98.—A close-up of the surface near the sample pit for Torriorthents.

Geomorphic position: occurs on talus slopes
Parent material: sandy and gravelly talus derived from sandstone and shale
Slope: 20 to 65 percent
Biological crust
Cyanobacteria: 2 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 98)
Canopy plant cover: 4 percent
Woody debris: 2 percent
Bare soil: 27 percent
Rock fragments
- gravel: 13 percent
- cobble: 7 percent
- stone: 3 percent
- boulder: 12 percent
- channer: 28 percent
- flagstone:1 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, paralithic
Drainage class: somewhat excessively drained
Ksat solum: 0.60 to 6.00 inches per hour (4.23 to 42.34 micrometers per second)

Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.4 (very low)
Shrink-swell potential: about 1.0 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Talus Slope (Blackbrush-Shadscale)
Ecological site number: R035XY018UT
Present vegetation: fourwing saltbush, galleta, skeletonweed buckwheat, Torrey Mormon tea
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 36° 50' 21.80'' north, 111° 38' 32.90'' west

A—0 to 2 inches (0 to 5 cm); reddish brown (2.5YR 5/4) channery loam, dark reddish brown (2.5YR 3/4), moist; 18 percent clay; moderate fine granular structure; soft, very friable, slightly sticky and nonplastic; common very fine roots throughout; common very fine tubular pores; 5 percent parachanner and 25 percent channer; slightly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

C1—2 to 10 inches (5 to 25 cm); reddish brown (5YR 5/4) very channery coarse sandy loam, dark reddish brown (5YR 3/4), moist; 10 percent clay; massive; loose, nonsticky and nonplastic; common very fine and fine roots throughout; 10 percent channer and 20 percent parachanner and 20 percent flagstone; slightly effervescent; slightly alkaline, pH 7.6; clear irregular boundary.

C2—10 to 17 inches (25 to 43 cm); reddish brown (2.5YR 4/4) extremely parachannery coarse sandy loam, dark reddish brown (2.5YR 3/4), moist; 10 percent clay; massive; loose, nonsticky and nonplastic; many very fine roots throughout and common fine roots throughout; 60 percent parachanner; strongly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

Cr—17 inches (43 cm); weathered sandstone bedrock.

Range in Characteristics

Torriorthents have soil properties that vary greater than family class limits.

Reaction: 7.4 to 8.4 (slightly alkaline to moderately alkaline)

A horizon
- Hue: 2.5YR, 5YR, 7.5YR, 10YR
- Value: 5 to 7 dry, 3 to 6 moist
- Chroma: 3 or 4, dry or moist

C horizon
- Hue: 2.5YR, 5YR, 7.5YR, 10YR
- Value: 4 to 7 dry, 3 to 6 moist
- Chroma: 4 or 6, dry or moist
- Texture: coarse sandy loam, sandy loam
- Clay: 8 to 12 percent
- Rock fragments: 0 to 65 percent

Figure 99.—An area of Rock outcrop-Tsaya complex, 15 to 60 percent slopes, extremely bouldery.

34—Rock outcrop-Tsaya complex, 15 to 60 percent slopes, extremely bouldery

Map Unit Setting

Landform(s): plateaus (fig. 99)
Elevation: 4,170 to 5,580 feet (1,270 to 1,700 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Rock outcrop: 50 percent
Tsaya and similar soils: 40 percent
Minor components: Very deep Dient soils are on stable, less sloping areas. Some areas have clay percentages greater than 35 percent. A few areas have sandy textured soils in drainageways.

Soil Properties and Qualities

Rock outcrop
Slope: 15 to 80 percent

Rock outcrop consists of interbedded sandstone and shale bedrock, typically

exposed along ledges and cliff faces of the Straight Cliffs Formation. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

Tsaya soils (fig. 100)
Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic Lithic Torriorthents
Geomorphic position: occurs on talus slopes and ledges on escarpments
Parent material: gravelly talus derived from sandstone and shale
Slope: 15 to 60 percent
Biological crust
Cyanobacteria: 0 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 101)
Canopy plant cover: 12 percent
Woody debris: 16 percent
Bare soil: 6 percent
Rock fragments
- gravel: 33 percent
- cobble: 17 percent
- stone: 4 percent
- boulder: 15 percent
- channer: 7 percent

Depth to restrictive feature(s): 11 to 20 inches to bedrock, lithic

Figure 100.—Profile of Tsaya component. Scale is in centimeters.

Figure 101.—A close-up of the surface near the sample pit for Tsaya gravelly loam.

Drainage class: well drained
Ksat solum: 0.20 to 2.00 inches per hour (1.40 to 14.11 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.3 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Desert Very Steep Stony Loam (Shadscale)
Ecological site number: R035XY146UT
Present vegetation: shadscale saltbush, rayless goldenhead, rubber rabbitbrush, bottlebrush squirreltail
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 37° 8' 9.90'' north, 111° 20' 26.40'' west

A—0 to 2 inches (0 to 5 cm); brown (10YR 5/3) gravelly loam, dark grayish brown (10YR 4/2), moist; 24 percent clay; weak thin platy structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots throughout; many fine dendritic tubular pores; 25 percent gravel and 5 percent channer; slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C1—2 to 7 inches (5 to 18 cm); grayish brown (10YR 5/2) very gravelly clay loam, dark grayish brown (10YR 4/2), moist; 30 percent clay; weak fine subangular blocky structure; moderately hard, friable, slightly sticky and moderately plastic; many very

fine and fine roots throughout; many fine dendritic tubular pores; 35 percent gravel and 10 percent channer; slightly effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C2—7 to 13 inches (18 to 33 cm); light brownish gray (10YR 6/2) extremely gravelly loam, dark grayish brown (10YR 4/2), moist; 22 percent clay; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots throughout; many very fine dendritic tubular pores; 60 percent gravel and 5 percent cobble and 5 percent channer; slightly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

R—13 inches (33 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Hue: 10YR, 2.5Y
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 2 to 4, dry or moist

C horizons
- Hue: 10YR, 2.5Y
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 2 to 6, dry or moist
- Texture: loam, clay loam
- Clay: 18 to 32 percent
- Calcium carbonate equivalent: 0 to 2 percent
- Rock fragments: 35 to 80 percent

35—Sazi-Rizno complex, 2 to 15 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 102)
Elevation: 4,150 to 6,270 feet (1,265 to 1,910 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Map Unit Composition

Sazi and similar soils: 50 percent
Rizno and similar soils: 30 percent
Minor Components: Shallow Rizno soils on shoulders. Very deep Earlweed soils are on more stable positions. Some areas have rock fragments that average greater than 35 percent. A few places have rock outcrop.

Soil Properties and Qualities

Sazi soils (fig. 103)
Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Ustic Haplocalcids
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches

Figure 102.—An area of Sazi-Rizno complex, 2 to 15 percent slopes.

Parent material: eolian deposits
Slope: 2 to 15 percent
Biological crust
Cyanobacteria: 15 percent
Lichen: 1 percent
Moss: 1 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 104)
Canopy plant cover: 23 percent
Woody debris: 3 percent
Bare soil: 3 percent
Rock fragments
- gravel: 15 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic; 20 to 30 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.60 inches per hour (0.00 to 4.20 micrometers per second)
Available water capacity total inches: 3.0 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: C

Ecological site name: Semidesert Sandy Loam (Blackbrush)
Ecological site number: R035XY218UT
Present vegetation: blackbrush, galleta, desert princesplume, scarlet globemallow, shadscale saltbush, Indian ricegrass, broom snakeweed
Land capability (non irrigated): 6c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Location

Geographic Coordinate System: 38° 14' 18.70'' north, 110° 0' 41.60'' west

A—0 to 3.5 inches (0 to 9 cm); reddish brown (5YR 4/4) fine sandy loam, dark reddish brown (5YR 3/4), moist; 10 percent clay; moderate very thick platy structure; soft, very friable, slightly sticky and nonplastic; common very fine and fine roots throughout; many very fine and common fine interstitial pores; common fine irregular carbonate masses in matrix; strongly effervescent, 8 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

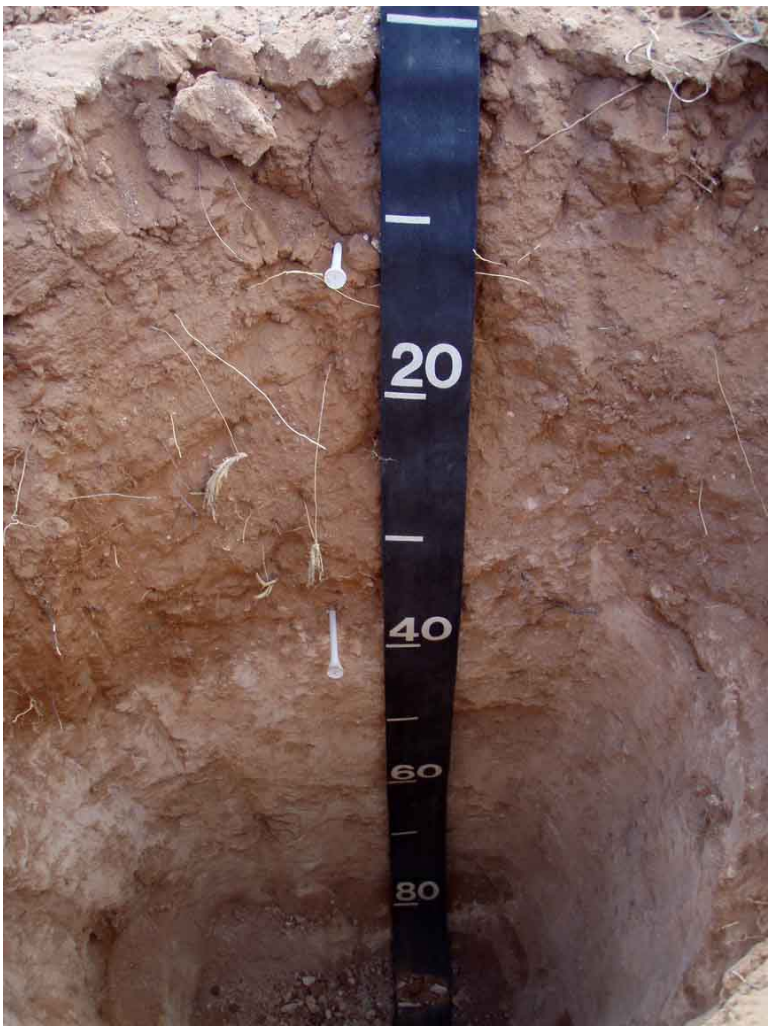

Figure 103.—Profile of Sazi component. Calcic horizon begins at 3.5 inches (9 cm). Scale is in centimeters.

Figure 104.—A close-up of the surface near the sample pit for Sazi fine sandy loam.

Bk1—3.5 to 10.5 inches (9 to 27 cm); yellowish red (5YR 5/6) fine sandy loam, yellowish red (5YR 4/6), moist; 10 percent clay; moderate coarse subangular blocky and moderate very thick platy structure; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine roots throughout; many very fine and common fine interstitial pores; many medium irregular carbonate masses in matrix; violently effervescent, 11 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

Bk2—10.5 to 27.5 inches (27 to 70 cm); light reddish brown (5YR 6/4) sandy loam, yellowish red (5YR 5/6), moist; 15 percent clay; moderate fine and medium subangular blocky structure; extremely hard, slightly rigid, slightly sticky and nonplastic; common very fine, fine, and medium roots in cracks; common very fine and fine interstitial pores; violently effervescent, 36 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

2Cr—27.5 to 29.5 inches (70 to 75 cm); weathered, fractured sandstone bedrock; abrupt wavy boundary.

2R—29.5 inches (75 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.9 to 9.0 (moderately alkaline or strongly alkaline)

Bk horizon
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 4 or 6, dry or moist
- Texture: fine sandy loam, sandy loam, fine sand
- Clay content: 5 to 15 percent
- Calcium carbonate equivalent: 5 to 40 percent
- Rock fragments: 0 to 5 percent

Calcic horizon—the zone from 3.5 to 27.5 inches (9 to 70 cm) (Bk horizons)

Rizno soils

Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches
Parent material: eolian deposits and/or residuum weathered from sandstone
Slope: 2 to 6 percent

Biological crust
Cyanobacteria: 15 percent
Lichen: 1 percent
Moss: 1 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 23 percent
Woody debris: 3 percent
Bare soil: 3 percent
Rock fragments
- gravel: 20 percent
- channer: 50 percent
- flagstone:1 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 20.00 inches per hour (14.11 to 141.14 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.9 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Semidesert Shallow Sandy Loam (Blackbrush)
Ecological site number: R035XY233UT
Present vegetation: blackbrush, desert princesplume, galleta, shadscale saltbush, Torrey's jointfir, Indian ricegrass
Land capability (non irrigated): 6c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Location

Geographic Coordinate System: 38° 14' 12.50'' north, 110° 0' 19.20'' west

A—0 to 3 inches (0 to 8 cm); reddish brown (5YR 4/4) gravelly loamy coarse sand, dark reddish brown (5YR 3/4), moist; 2 percent clay; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; common very fine and fine tubular pores; 20 percent gravel; strongly effervescent, 2 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C—3 to 10 inches (8 to 25 cm); reddish brown (5YR 4/4) sandy loam, dark reddish brown (5YR 3/4), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; common very fine and fine

tubular pores; 10 percent gravel; violently effervescent, 5 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt smooth boundary.

R—10 inches (25 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.9 to 9.0 (moderately alkaline or strongly alkaline)

A horizon
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3 or 4 dry

C horizon
- Value: 4 or 5 dry, 3 or 4 moist
- Clay content: 8 to 15 percent
- Calcium carbonate equivalent: 1 to 5 percent
- Rock fragments: 10 to 35 percent

36—Seeg gravelly loam, 4 to 24 percent slopes, bouldery

Map Unit Setting

Landform(s): plateaus (fig. 105)
Elevation: 3,840 to 4,590 feet (1,170 to 1,400 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)

Figure 105.—An area of Seeg gravelly loam, 4 to 24 percent slopes, bouldery. Claysprings-Badland complex, 2 to 40 percent slopes is in the background.

Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Seeg and similar soils: 95 percent
Minor components: Shallow Claysprings soils near gully areas. A few areas of Riverwash are in drainageways.

Soil Properties and Qualities

Seeg soils (fig. 106)
Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Typic Haplocalcids
Geomorphic position: occurs on base slopes on fan remnants
Parent material: colluvium and/or slope alluvium derived from sandstone and shale
Slope: 4 to 24 percent
Biological crust
Cyanobacteria: 2 percent
Lichen: 1 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 107)
Canopy plant cover: 13 percent
Woody debris: 20 percent
Bare soil: 15 percent
Rock fragments
- gravel: 26 percent
- cobble: 2 percent
- boulder: 2 percent
- channer: 30 percent

Drainage class: well drained
Ksat solum: 0.60 to 6.00 inches per hour (4.23 to 42.34 micrometers per second)
Available water capacity total inches: 4.1 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: medium
Hydrologic group: B
Ecological site name: Desert Stony Loam (Shadscale-Bud Sagebrush)
Ecological site number: R035XY136UT
Present vegetation: galleta, shadscale saltbush, rayless goldenhead
Land capability (non irrigated): 7c

Typical Profile

Location
Geographic Coordinate System: 37° 8' 6.30'' north, 111° 24' 15.40'' west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/4) gravelly loam, brown (7.5YR 4/4), moist; 26 percent clay; weak thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots throughout; many fine dendritic tubular pores; 15 percent gravel and 2 percent cobble and 10 percent channer; strongly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

Figure 106.—Profile of Seeg component. Calcic horizon begins at 11 inches (28 cm). Scale is in centimeters.

Figure 107.—A close-up of the surface near the sample pit for Seeg gravelly loam.

Bw—2 to 11 inches (5 to 28 cm); brown (7.5YR 5/4) very channery loam, brown (7.5YR 4/4), moist; 24 percent clay; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots throughout; many very fine and fine dendritic tubular pores; 20 percent gravel and 5 percent cobble and 30 percent channer; strongly effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

Bk—11 to 29 inches (28 to 74 cm); light yellowish brown (10YR 6/4) extremely gravelly loam, yellowish brown (10YR 5/6), moist; 16 percent clay; massive; soft, loose, slightly sticky and nonplastic; many fine roots throughout; many very fine, fine, and medium dendritic tubular pores; many fine carbonate masses throughout; 35 percent gravel and 10 percent cobble and 5 percent stone and 20 percent channer; strongly effervescent, 10 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt smooth boundary.

Ck—29 to 34 inches (74 to 86 cm); brown (7.5YR 5/4) gravelly sandy loam, brown (7.5YR 4/4), moist; 14 percent clay; massive; soft, loose, slightly sticky and nonplastic; many fine roots throughout; many very fine and fine dendritic tubular pores; common fine carbonate masses throughout; 20 percent gravel and 10 percent channer; strongly effervescent, 13 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; clear smooth boundary.

Cky—34 to 60 inches (86 to 152 cm); brown (7.5YR 5/4) extremely gravelly sandy loam, brown (7.5YR 4/4), moist; 14 percent clay; massive; soft, loose, slightly sticky and nonplastic; many fine dendritic tubular pores; common fine carbonate masses and common fine gypsum crystals around rock fragments; 45 percent gravel and 10 percent cobble and 5 percent stone and 20 percent channer; strongly effervescent, 9 percent calcium carbonate equivalent; slightly alkaline, pH 7.8.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Hue: 10YR, 7.5YR
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 3 or 4, dry or moist

Bw horizon
- Hue: 10YR, 7.5YR
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 4 to 6, dry or moist
- Texture: sandy loam, loam
- Clay: 15 to 25 percent
- Calcium carbonate equivalent: 0 to 5 percent
- Rock fragments: 25 to 70 percent

Bk horizon
- Hue: 10YR, 7.5YR
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 4 to 6, dry or moist
- Texture: sandy loam, loam
- Clay: 12 to 20 percent
- Calcium carbonate equivalent: 5 to 20 percent
- Rock fragments: 35 to 80 percent

Ck or Cky horizons
- Hue: 7.5YR, 10YR, 2.5Y

Figure 108.—An area of Sheppard sand, 2 to 15 percent slopes.

Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 6, dry or moist
Texture: sandy loam, loam
Clay: 12 to 20 percent
Calcium carbonate equivalent: 5 to 20 percent
Gypsum: 0 to 5 percent
Rock fragments: 30 to 85 percent

Calcic horizon – zone from 11 to 29 inches (28 to 74 cm) (Bk horizon)

37—Sheppard sand, 2 to 15 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 108)
Elevation: 3,670 to 5,310 feet (1,120 to 1,620 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Sheppard and similar soils: 85 percent
Minor components: Some areas have slopes greater than 15 percent. Some soils

have calcic horizon. A few areas have soils that have rock fragments throughout the profile.

Soil Properties and Qualities

Sheppard soils

Taxonomic classification: Mixed, mesic Typic Torripsamments
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches as dunes
Parent material: eolian sands derived from sandstone and/or alluvium derived from sandstone
Slope: 2 to 15 percent

Biological crust
Cyanobacteria: 18 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 21 percent
Woody debris: 16 percent
Bare soil: 55 percent
Rock fragments: 0 percent

Drainage class: excessively drained
Ksat solum: 6.00 to 99.92 inches per hour (42.34 to 705.00 micrometers per second)
Available water capacity total inches: 3.6 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very low
Hydrologic group: A
Ecological site name: Desert Sand (Sand Sagebrush)
Ecological site number: R035XY115UT
Present vegetation: alkali jimmyweed, sand sagebrush, scurfpea
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 36° 56' 15.00'' north, 111° 31' 17.60'' west

A—0 to 1 inch (0 to 3 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 6 percent clay; weak thin platy structure; soft, loose, nonsticky and nonplastic; common fine roots throughout; many fine tubular pores; slightly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

C1—1 inch to 9 inches (3 to 23 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; soft, loose, nonsticky and nonplastic; common fine roots throughout; many fine tubular pores; slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

C2—9 to 39 inches (23 to 99 cm); yellowish red (5YR 5/6) sand, yellowish red (5YR 4/6), moist; 6 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots throughout; many fine tubular pores; very slightly effervescent; slightly alkaline, pH 7.8; diffuse wavy boundary.

C3—39 to 60 inches (99 to 152 cm); yellowish red (5YR 5/8) loamy sand, yellowish red (5YR 4/6), moist; 8 percent clay; massive; slightly hard, very friable, nonsticky

and nonplastic; common fine roots throughout; common fine tubular pores; slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 4 to 6, dry or moist

C horizons
- Hue: 2.5YR, 5YR
- Value: 5 or 6 dry, 4 to 6 moist
- Chroma: 4 to 8, dry or moist
- Texture: sand, fine sand, loamy sand
- Clay: 2 to 8 percent
- Rock fragments: 0 to 3 percent

38—Sheppard-Tsaya-Bluechief families complex, 2 to 15 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 109)
Elevation: 3,970 to 5,220 feet (1,210 to 1,590 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)

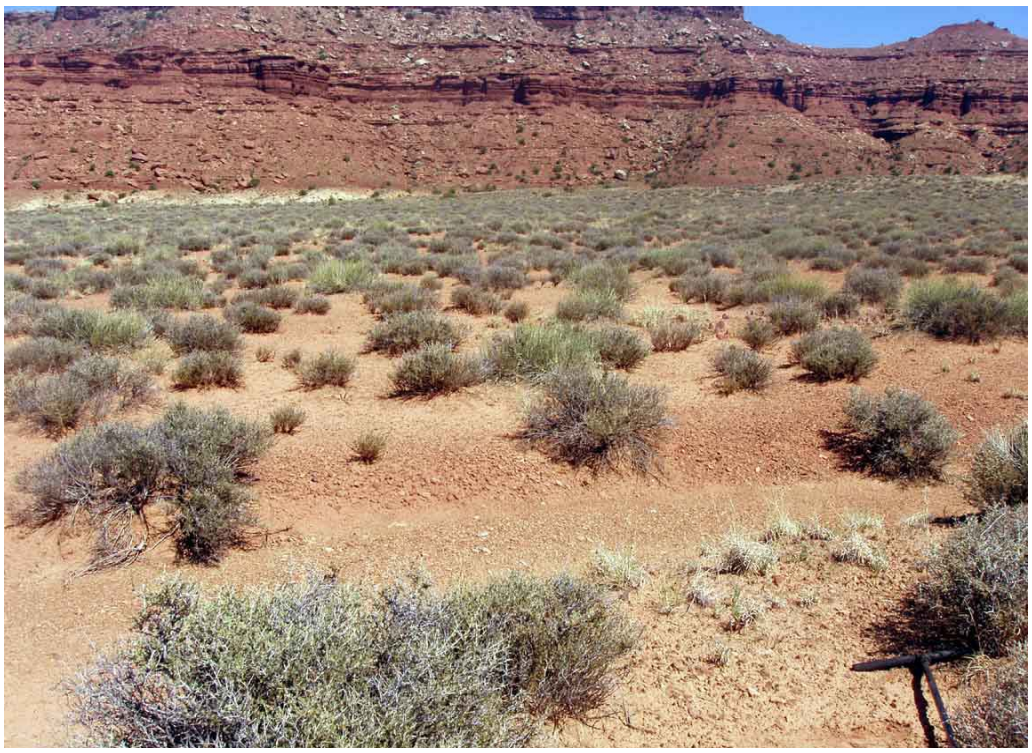

Figure 109.—An area of Sheppard-Tsaya-Bluechief families complex, 2 to 15 percent slopes. Reef-Rock outcrop complex, 30 to 60 percent slopes, extremely bouldery is in the background.

Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Sheppard family and similar soils: 30 percent
Tsaya family and similar soils: 30 percent
Bluechief family and similar soils: 20 percent
Minor components: Shallow Goblin soils. A few areas of Rock outcrop.

Soil Properties and Qualities

Sheppard family soils
Taxonomic classification: Mixed, mesic Typic Torripsamments
Geomorphic position: occurs on side slopes on structural benches
Parent material: eolian sands derived from sandstone
Slope: 2 to 15 percent
Biological crust
Cyanobacteria: 25 percent
Lichen: 8 percent
Moss: 3 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 45 percent
Woody debris: 3 percent
Bare soil: 23 percent
Rock fragments
• gravel: 1 percent
Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 20.00 inches per hour (14.11 to 141.14 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 2.7 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: B
Ecological site name: Desert Sandy Loam (Blackbrush)
Ecological site number: R035XY121UT
Present vegetation: blackbrush, Indian ricegrass, shadscale saltbush, Torrey Mormon tea, desert trumpet buckwheat, galleta
Land capability (non irrigated): 7c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Location
Geographic Coordinate System: 38° 13' 55.50'' north, 110° 1' 52.00'' west

A—0 to 3.5 inches (0 to 9 cm); reddish brown (5YR 5/4) fine sand, reddish brown

(5YR 4/4), moist; 1 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; many very fine and common fine interstitial pores; slightly effervescent, 20 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; gradual wavy boundary.

Bk1—3.5 to 19.5 inches (9 to 50 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 7 percent clay; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots throughout; many very fine and common fine interstitial pores; common medium irregular carbonate masses in matrix; 3 percent gravel; strongly effervescent, 20 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

Bk2—19.5 to 29.5 inches (50 to 75 cm); yellowish red (5YR 5/6) loamy fine sand, yellowish red (5YR 4/6), moist; 9 percent clay; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine roots throughout; common very fine and fine interstitial pores; common medium irregular carbonate masses in matrix; 10 percent gravel; violently effervescent, 20 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

2R—29.5 inches (75 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Sheppard family differs from the series because the depth to hard bedrock ranges from 20 to 40 inches.

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Hue: 5YR, 7.5YR
- Value: 4 or 5, dry or moist
- Chroma: 4 to 6, dry or moist

Bk horizon
- Hue: 5YR, 7.5YR, 10YR
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 4 to 6, dry or moist
- Texture: loamy fine sand, fine sand
- Clay content: 2 to 10 percent
- Calcium carbonate equivalent: 5 to 25 percent
- Rock fragments: 0 to 12 percent gravel

2C horizon (where present)
- Hue: 7.5YR, 10YR
- Value: 5 or 6 dry, 4 or 5 moist
- Chroma: 4 to 6, dry or moist
- Texture: loamy fine sand, fine sand, sand
- Clay content: 2 to 10 percent
- Calcium carbonate equivalent: 5 to 25 percent
- Rock fragments: 10 to 20 percent

The Bk horizon lacks sufficient secondary carbonate accumulation to qualify as a calcic.

Tsaya family soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic Lithic Torriorthents

Geomorphic position: occurs on side slopes on structural benches
Parent material: residuum weathered from sandstone
Slope: 2 to 15 percent
Biological crust
Cyanobacteria: 12 percent
Lichen: 3 percent
Moss: 3 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 40 percent
Woody debris: 3 percent
Bare soil: 25 percent
Rock fragments
- gravel: 40 percent
- channer: 10 percent
- flagstone:5 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.9 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Desert Shallow Sandy Loam (Blackbrush)
Ecological site number: R035XY133UT
Present vegetation: blackbrush, Torrey Mormon tea, galleta, Brenda's yellow cryptantha, broom snakeweed, rubber rabbitbrush
Land capability (non irrigated): 7c

Typical Profile

Location
Geographic Coordinate System: 38° 13' 53.50'' north, 110° 1' 49.20'' west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 5/4) fine sandy loam, strong brown (7.5YR 4/6), moist; 11 percent clay; weak fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine roots throughout; common very fine irregular pores; 5 percent gravel; violently effervescent, 10 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

C—3 to 10 inches (8 to 25 cm); strong brown (7.5YR 5/6) very gravelly fine sandy loam, strong brown (7.5YR 4/6), moist; 9 percent clay; massive; slightly hard, friable, slightly sticky and nonplastic; common very fine roots throughout; common very fine irregular pores; common fine irregular gypsum crystals in matrix; 55 percent gravel; violently effervescent, 10 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

R—10 inches (25 cm); unweathered sandstone bedrock.

Range in Characteristics

Tsaya family differs from the series because it contains less than 18 percent clay and more than 5 percent calcium carbonate in the particle size control section.

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
Hue: 5YR, 7.5YR
Value: 4 or 5, dry or moist
Chroma: 4 to 6, dry or moist

C horizon
Hue: 5YR, 10YR
Value: 4 or 5, dry or moist
Chroma: 4 to 6, dry or moist
Texture: sandy loam, fine sandy loam
Clay content: 8 to 15 percent
Calcium carbonate equivalent: 5 to 15 percent
Gypsum: 0 to 3 percent
Rock fragments: 40 to 65 percent

Bluechief family soils
Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Typic Haplocalcids
Geomorphic position: occurs on side slopes on structural benches
Parent material: residuum weathered from sandstone
Slope: 2 to 8 percent
Biological crust
Cyanobacteria: 25 percent
Lichen: 7 percent
Moss: 3 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 45 percent
Woody debris: 3 percent
Bare soil: 23 percent
Rock fragments
- gravel: 40 percent
- channer: 10 percent
- flagstone:5 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.8 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: B
Ecological site name: Desert Shallow Sandy Loam (Blackbrush)
Ecological site number: R035XY133UT
Present vegetation: blackbrush, Torrey Mormon tea, galleta, Brenda's yellow cryptantha, broom snakeweed, rubber rabbitbrush
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 38° 27' 3.00'' north, 110° 1' 18.60'' west

A—0 to 4 inches (0 to 10 cm); reddish brown (5YR 5/4) gravelly sandy loam, reddish brown (5YR 4/4), moist; 15 percent clay; moderate fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and fine roots throughout; common very fine tubular pores; 30 percent gravel; violently effervescent, 7 percent calcium carbonate equivalent and 3 percent gypsum; moderately alkaline, pH 8.0; abrupt wavy boundary.

Bk—4 to 22 inches (10 to 56 cm); reddish brown (5YR 5/4) channery sandy loam, reddish brown (5YR 4/4), moist; 13 percent clay; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine roots throughout; common very fine tubular pores; few fine irregular gypsum crystals in matrix and common medium irregular carbonate masses in matrix; 30 percent channer; violently effervescent, 12 percent calcium carbonate equivalent and 3 percent gypsum; moderately alkaline, pH 8.4; abrupt wavy boundary.

R—22 inches (56 cm); unweathered, sandstone bedrock.

Range in Characteristics

Bluechief family differs from the series because it contains greater than 20 percent coarse fragments in the Bk and C horizons.

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Value: 4 or 5, dry or moist

Bk horizon
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 3 or 4, dry or moist
- Clay content: 8 to 15 percent
- Calcium carbonate equivalent: 5 to 15 percent
- Gypsum: 1 to 4 percent
- Rock fragments: 20 to 30 percent

C horizon (where present)
- Hue: 5YR, 7.5YR, 10YR
- Value: 5 to 7 dry, 4 or 5 moist
- Clay content: 10 to 15 percent
- Calcium carbonate equivalent: 10 to 15 percent
- Gypsum: 1 to 4 percent
- Rock fragments: 25 to 40 percent

Calcic horizon—the zone from 4 to 22 inches (10 to 56 cm) (Bk horizons)

39—Somorent family-Rock outcrop complex, 5 to 12 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 110)
Elevation: 3,120 to 4,000 feet (950 to 1,220 meters)

Figure 110.—An area of Somorent family-Rock outcrop complex, 5 to 12 percent slopes.

Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Somorent family and similar soils: 85 percent
Rock outcrop: 10 percent
Minor components: Soils greater than 20 inches deep. Soils that have more than 35 percent rock fragments throughout the profile. Soils that have lithic contact within 20 inches.

Soil Properties and Qualities

Somorent family soils (fig. 111)
Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic, shallow Typic Torriorthents
Geomorphic position: occurs on interfluves on hills, mesas, structural benches
Parent material: eolian sands and/or residuum weathered from sandstone and shale
Slope: 5 to 12 percent
Biological crust
Cyanobacteria: 10 percent
Lichen: 0 percent
Moss: 0 percent

Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 112)
Canopy plant cover: 6 percent
Woody debris: 3 percent
Bare soil: 25 percent
Rock fragments
- gravel: 22 percent
- channer: 38 percent
- flagstone:1 percent

Depth to restrictive feature(s): 7 to 15 inches to bedrock, paralithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.7 (very low)
Shrink-swell potential: about 1.0 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Desert Shallow Sandy Loam (Shadscale)
Ecological site number: R035XY130UT
Present vegetation: skeletonweed buckwheat, shadscale saltbush, crispleaf buckwheat
Land capability (non irrigated): 7c

Figure 111.—Profile of Somorent family component. Scale is in centimeters.

Typical Profile

Location

Geographic Coordinate System: 36° 51' 18.00'' north, 111° 37' 2.20'' west

A—0 to 2 inches (0 to 5 cm); reddish brown (2.5YR 4/4) channery sandy loam, dark reddish brown (2.5YR 3/4), moist; 17 percent clay; weak thin platy structure; loose, slightly sticky and slightly plastic; 25 percent channer; slightly effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Cy—2 to 7 inches (5 to 18 cm); red (2.5YR 4/6) parachannery sandy loam, dark red (2.5YR 3/6), moist; 15 percent clay; massive; soft, very friable, slightly sticky and slightly plastic; common very fine roots throughout; many very fine dendritic tubular pores; common gypsum nests; 5 percent gravel and 20 percent parachanner; strongly effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Cr—7 inches (18 cm); weathered sandstone bedrock.

Range in Characteristics

Somorent family differs from the series because the series has hue color yellower than 5YR.

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon

Hue: 2.5YR, 5YR, 7.5YR
Value: 4 to 6 dry, 3 or 5 moist
Chroma: 4 or 6, dry or moist

Figure 112.—A close-up of the surface near the sample pit for Somorent family channery sandy loam.

Cy horizon
Hue: 2.5YR, 5YR, 7.5YR
Value: 4 or 5 dry, 3 to 6 moist
Chroma: 4 to 6, dry or moist
Texture: sandy loam, loam
Clay: 12 to 28 percent
Rock fragments: 0 to 12

Rock outcrop
Slope: 5 to 12 percent

Rock outcrop consists of interbedded sandstone and shale bedrock, typically exposed along ledges and slick rock areas of the Moenkopi Formation or Organ Rock Shale. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

40—Torriorthents-Rock outcrop complex, 35 to 70 percent slopes, extremely bouldery

Map Unit Setting

Landform(s): plateaus (fig. 113)
Elevation: 3,740 to 5,580 feet (1,140 to 1,700 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Torriorthents and similar soils: 50 percent
Rock outcrop: 40 percent
Minor Components: Areas that have 10 to 14 inches (250 to 350mm) of annual precipitation.

Soil Properties and Qualities

Torriorthents soils
Taxonomic classification: Torriorthents
Geomorphic position: occurs on talus slopes
Parent material: sandy and gravelly colluvium derived from limestone, sandstone, and shale
Slope: 35 to 70 percent
Biological crust
Cyanobacteria: 7 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 17 percent

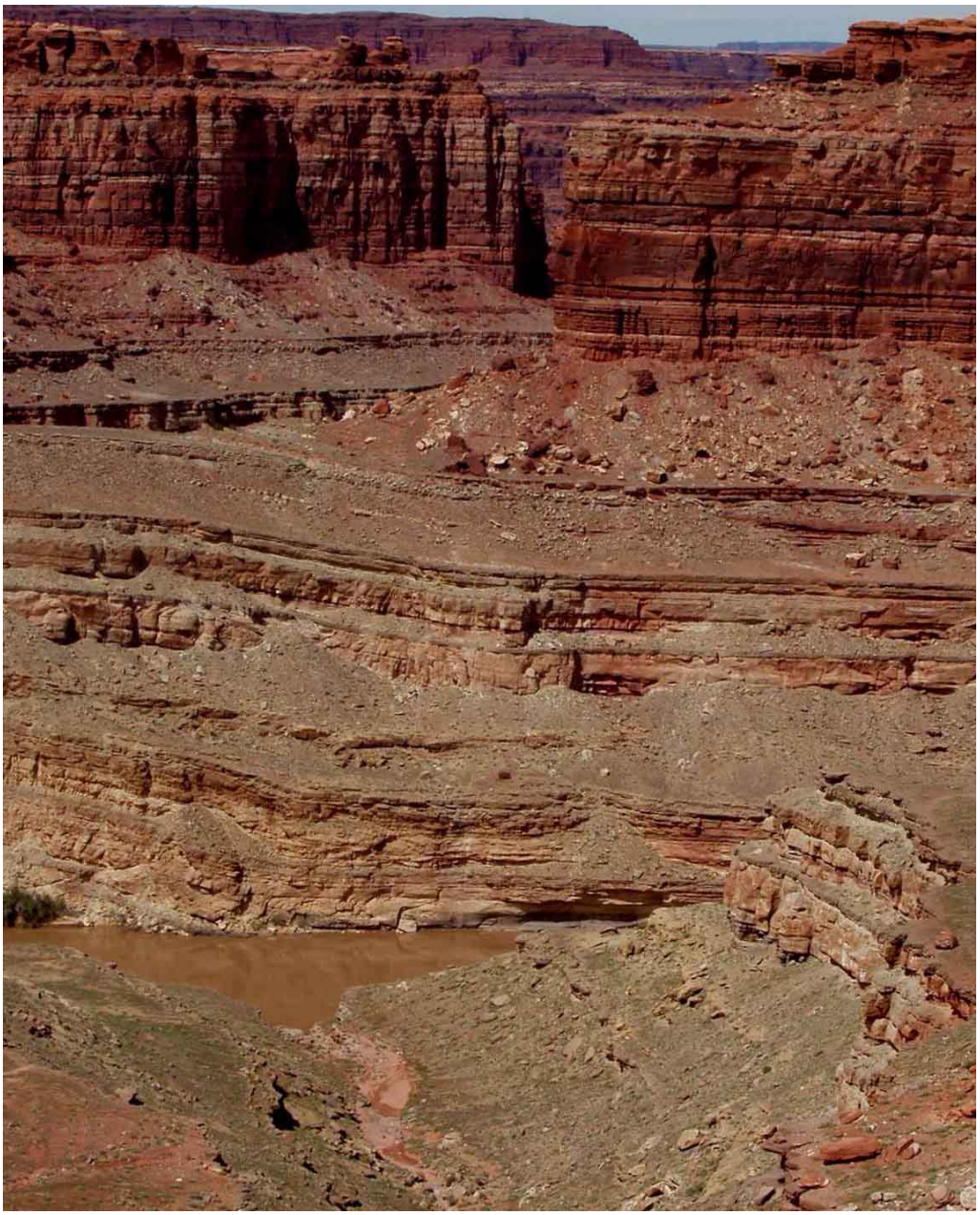

Figure 113.—An area of Torriorthents-Rock outcrop complex, 35 to 70 percent slopes, extremely bouldery.

Woody debris: 25 percent
Bare soil: 27 percent
Rock fragments
- gravel: 10 percent
- stone: 10 percent
- boulder: 10 percent
- channer: 25 percent

Depth to restrictive feature(s): 4 to 40 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)

Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 3.2 (low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: B
Ecological site name: Desert Very Steep Stony Loam (Shadscale)
Ecological site number: R035XY146UT
Present vegetation: needle and thread, galleta, mat saltbush, roundleaf buffaloberry, green Mormon tea, Utah juniper, fourwing saltbush
Land capability (non irrigated): 7c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Location

Geographic Coordinate System: 38° 9' 19.20'' north, 109° 54' 14.70'' west

A—0 to 4.5 inches (0 to 11 cm); reddish yellow (5YR 6/6) fine sandy loam, yellowish red (5YR 5/6), moist; 14 percent clay; weak very fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine roots throughout; common very fine irregular pores; strongly effervescent, 15 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

2C1—4.5 to 15.5 inches (11 to 40 cm); brown (7.5YR 4/4) fine sandy loam, strong brown (7.5YR 5/6), moist; 17 percent clay; massive; hard, firm, slightly sticky and slightly plastic; common fine roots throughout; common fine irregular pores; 4 percent gravel and 10 percent channer; violently effervescent, 20 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; gradual wavy boundary.

2C2—15.5 to 33 inches (40 to 84 cm); reddish yellow (7.5YR 7/6) gravelly fine sandy loam, strong brown (7.5YR 5/6), moist; 19 percent clay; massive; hard, firm, slightly sticky and slightly plastic; common fine roots throughout; common very fine irregular pores; 20 percent gravel and 2 percent stone; violently effervescent, 20 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear wavy boundary.

2R—33 inches (84 cm); unweathered, unfractured limestone bedrock.

Range in Characteristics

Torriorthents have soil properties that vary greater than family class limits.

Reaction: moderately alkaline or strongly alkaline (pH 7.9 to 9.0)

A or surface C horizon
- Hue: 5YR, 7.5YR
- Value: 5 to 7 dry, 4 or 5 moist
- Chroma: 4 or 6, dry or moist

C horizon
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 4 to 7 dry, 3 to 5 moist
- Chroma: 4 or 6, dry or moist
- Texture: fine sandy loam, sandy loam, sandy clay loam, loamy sand, loamy coarse sand
- Clay content: 10 to 35 percent
- Calcium carbonate equivalent: 10 to 25 percent
- Rock fragments: 0 to 60 percent

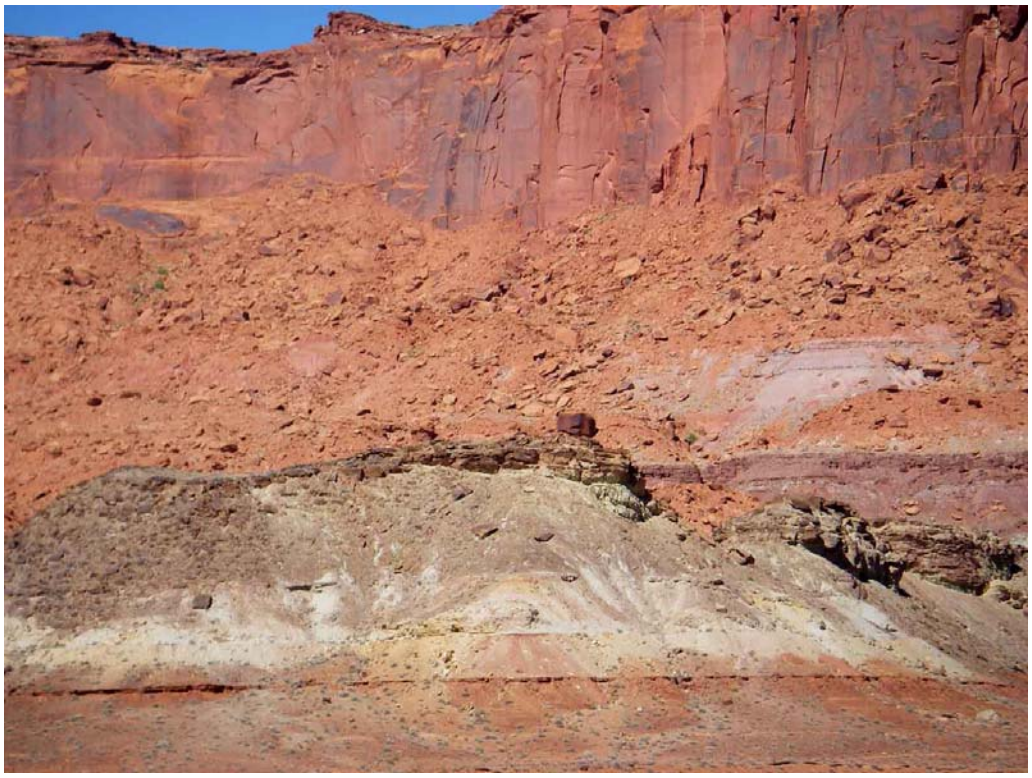

Figure 114.—An area of Torriorthents-Rock outcrop-Badland complex, 4 to 70 percent slopes, extremely bouldery.

Bw horizons are present in some horizons, but are too thin to qualify as cambic horizons.

Rock outcrop
Slope: 35 to 100 percent

Rock outcrop consists of interbedded sandstone and shale and, a few areas, of limestone bedrock, typically exposed on ledges and cliff faces of the Honaker Trail or Halgaito Formations. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

41—Torriorthents-Rock outcrop-Badland complex, 4 to 70 percent slopes, extremely bouldery

Map Unit Setting

Landform(s): plateaus (fig. 114)
Elevation: 3,580 to 5,710 feet (1,090 to 1,740 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Torriorthents and similar soils: 45 percent
Rock outcrop: 35 percent
Badland: 20 percent

Soil Properties and Qualities

Torriorthents soils
Taxonomic classification: Torriorthents
Geomorphic position: occurs on talus slopes, side slopes and structural benches
Parent material: slope alluvium and/or colluvium derived from sandstone and shale
Slope: 4 to 70 percent
Biological crust
Cyanobacteria: 6 percent
Lichen: 1 percent
Moss: 1 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 5 percent
Woody debris: 6 percent
Bare soil: 2 percent
Rock fragments
- gravel: 28 percent
- cobble: 5 percent
- stone: 7 percent
- boulder: 32 percent
- channer: 6 percent
- flagstone:7 percent

Drainage class: well drained
Ksat solum: 0.60 to 2.00 inches per hour (4.23 to 14.11 micrometers per second)
Available water capacity total inches: 5.3 (moderate)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: high
Hydrologic group: B
Ecological site name: Desert Very Steep Stony Loam (Shadscale)
Ecological site number: R035XY146UT
Present vegetation: shadscale saltbush, cheatgrass
Land capability (non irrigated): 7c

Typical Profile

Location
Geographic Coordinate System: 37° 43' 40.00'' north, 110° 24' 12.50'' west

A—0 to 1 inch (0 to 3 cm); red (2.5YR 5/6) very gravelly sandy clay loam, red (2.5YR 4/6), moist; 26 percent clay; weak thin platy structure; loose, friable, moderately sticky and moderately plastic; common fine roots throughout; common very fine tubular pores; 25 percent gravel and 5 percent cobble and 5 percent stone; violently effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

C1—1 inch to 7 inches (3 to 18 cm); yellowish red (5YR 5/6) very cobbly sandy clay loam, yellowish red (5YR 4/6), moist; 30 percent clay; massive; moderately hard, firm, very sticky and moderately plastic; many fine roots throughout; common very fine and

fine tubular pores; 20 percent gravel and 15 percent cobble and 5 percent stone; violently effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—7 to 44 inches (18 to 112 cm); yellowish red (5YR 5/6) very stony sandy clay loam, yellowish red (5YR 4/6), moist; 33 percent clay; massive; hard, very firm, very sticky and moderately plastic; common very fine and fine roots throughout; common very fine tubular pores; 20 percent gravel and 10 percent cobble and 20 percent stone; strongly effervescent; moderately alkaline, pH 8.2; gradual smooth boundary.

C3—44 to 60 inches (112 to 152 cm); yellowish red (5YR 5/6) extremely stony sandy clay loam, yellowish red (5YR 4/6), moist; 30 percent clay; massive; very hard, very firm, very sticky and moderately plastic; common very fine roots throughout; common very fine tubular pores; 20 percent gravel and 20 percent cobble and 30 percent stone; strongly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Torriorthents have soil properties that vary greater than family class limits.

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 5 to 6 dry, 4 to 6 moist
- Chroma: 2 to 6, dry or moist

C horizon
- Hue: 5YR, 7.5YR, 10YR
- Value: 4 to 7 dry, 3 or 6 moist
- Chroma: 2 or 6, dry or moist
- Texture: sandy clay loam, sandy loam, loamy sand
- Clay: 10 to 34 percent
- Rock fragments: 15 to 70 percent

Rock outcrop
Slope: 50 to 100 percent

Rock outcrop consists of sandstone bedrock, typically exposed on ledges and cliff faces of Wingate Sandstone. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

Badland
Slope: 35 to 100 percent

Badland is moderately steep to very steep barren land that is dissected by many intermittent drainage channels. These areas are cut into soft geologic material of the Chinle Formation. Badland also includes areas where the depth to soft bedrock is less than four inches (10 cm).

42—Tsaya-Rock outcrop complex, 2 to 18 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 115)
Elevation: 3,180 to 5,250 feet (970 to 1,600 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)

Figure 115.—An area of Tsaya-Rock outcrop complex, 2 to 18 percent slopes.

Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Tsaya and similar soils: 65 percent
Rock outcrop: 20 percent
Minor components: Soils that are greater than 20 inches (50 cm) deep. Some areas have slopes greater than 18 percent.

Soil Properties and Qualities

Tsaya soils
Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic Lithic Torriorthents
Geomorphic position: occurs on interfluves on hills, mesas, and structural benches
Parent material: gravelly residuum weathered from sandstone and shale
Slope: 2 to 18 percent
Biological crust
Cyanobacteria: 5 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 10 percent

Woody debris: 8 percent
Bare soil: 42 percent
Rock fragments
• gravel: 38 percent
Depth to restrictive feature(s): 6 to 16 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.20 to 2.00 inches per hour (1.40 to 14.11 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.0 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Desert Shallow Sandy Loam (Blackbrush)
Ecological site number: R035XY133UT
Present vegetation: blackbrush, shadscale saltbush, skeletonweed buckwheat
Land capability (non irrigated): 7c

Typical Profile

Location
Geographic Coordinate System: 37° 51' 48.20'' north, 110° 19' 45.00'' west

A—0 to 1 inch (0 to 3 cm); red (2.5YR 4/6) gravelly sandy clay loam, dark red (2.5YR 3/6), moist; 31 percent clay; weak medium platy structure; slightly hard, friable, very sticky and very plastic; common fine roots throughout; many fine dendritic tubular pores; 10 percent gravel and 10 percent channer; strongly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C1—1 inch to 4 inches (3 to 10 cm); red (2.5YR 4/6) very cobbly clay loam, dark red (2.5YR 3/6), moist; 29 percent clay; massive; moderately hard, friable, very sticky and very plastic; many fine roots throughout; many very fine, fine, and common medium dendritic tubular pores; 10 percent cobble and 5 percent stone and 25 percent channer; strongly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C2—4 to 9 inches (10 to 23 cm); red (2.5YR 4/6) very cobbly sandy clay loam, dark red (2.5YR 3/6), moist; 26 percent clay; massive; moderately hard, friable, very sticky and moderately plastic; many fine roots throughout; common very fine and fine dendritic tubular pores; 10 percent cobble and 5 percent stone and 20 percent channer; strongly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

R—9 inches (23 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
Hue: 2.5YR, 5YR, 7.5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 4 or 6, dry or moist

C horizons
Hue: 2.5YR, 5YR, 7.5YR
Value: 4 to 6 dry, 3 to 6 moist
Chroma: 3 to 6, dry or moist
Texture: sandy clay loam, clay loam

Clay: 20 to 35 percent
Rock fragments: 35 to 60 percent

Rock outcrop
Slope: 5 to 18 percent

Rock outcrop consists of interbedded sandstone and shale bedrock, typically exposed along ledges of the Moenkopi Formation. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

43—Tsaya family-Moenkopie complex, 2 to 15 percent slopes

Map Unit Setting

Landform(s): plateaus (fig. 116)
Elevation: 3,920 to 5,380 feet (1,195 to 1,640 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Tsaya family and similar soils: 50 percent
Moenkopie and similar soils: 40 percent

Figure 116.—An area of Tsaya family-Moenkopie complex, 2 to 15 percent slopes.

Minor Components—Areas of rock outcrop. Some areas have soils with depths greater than 20 inches (50 cm).

Soil Properties and Qualities

Tsaya family soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, mesic Lithic Torriorthents
Geomorphic position: occurs on side slopes on hills and structural benches
Parent material: residuum weathered from sandstone and/or slope alluvium derived from sandstone
Slope: 2 to 15 percent

Biological crust
Cyanobacteria: 2 percent
Lichen: 2 percent
Moss: 2 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover
Canopy plant cover: 47 percent
Woody debris: 3 percent
Bare soil: 7 percent
Rock fragments
- gravel: 45 percent
- channer: 40 percent

Depth to restrictive feature(s): 10 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.2 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Desert Shallow Sandy Loam (Shadscale)
Ecological site number: R035XY130UT
Present vegetation: galleta, shadscale saltbush, Torrey Mormon tea
Land capability (non irrigated): 7c

Typical Profile

Typical pedon is from the Soil Survey of Canyonlands National Park.

Location

Geographic Coordinate System: 38° 23' 12.20'' north, 109° 59' 39.50'' west

A—0 to 3.5 inches (0 to 9 cm); reddish brown (5YR 5/4) sandy loam, reddish brown (5YR 4/4), moist; 11 percent clay; weak fine subangular blocky and moderate medium platy structure; slightly hard, friable, slightly sticky and nonplastic; common fine roots throughout; common fine tubular pores; 5 percent fine gravel and 2 percent channer; strongly effervescent, 3 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

Bw—3.5 to 9 inches (9 to 23 cm); reddish brown (5YR 4/4) coarse sandy loam, dark reddish brown (5YR 3/4), moist; 14 percent clay; moderate fine and weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common fine roots throughout; common fine tubular pores; 10 percent fine gravel; violently effervescent, 5 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

C—9 to 16 inches (23 to 41 cm); reddish brown (5YR 4/4) extremely channery sandy loam, dark reddish brown (5YR 3/4), moist; 15 percent clay; massive; very hard, extremely firm, slightly sticky and nonplastic; common fine roots in cracks; common fine tubular pores; 70 percent channer; violently effervescent, 5 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

R—16 inches (41 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Tsaya family differs from the series because the clay content throughout the profile varies to a greater degree than allowed in the official series.

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 to 6 dry, 3 to 6 moist

Bw horizon
- Hue: 2.5YR, 5YR
- Value: 4 or 5 dry, 3 or 4 moist
- Chroma: 4 to 6 dry, 3 to 6 moist
- Texture: sandy loam, loamy coarse sand, coarse sandy loam
- Clay content: 8 to 18 percent
- Rock fragments: 10 to 70 percent

C horizon
- Hue: 2.5YR, 5YR
- Value: 4 dry, 3 moist
- Chroma: 4 to 6 dry, 3 or 4 moist
- Texture: coarse sandy loam, sandy loam
- Clay content: 10 to 20 percent
- Rock fragments: 35 to 80 percent

Moenkopie soils

Taxonomic classification: Loamy, mixed, superactive, calcareous, mesic Lithic Torriorthents
Geomorphic position: occurs on side slopes on hills and structural benches
Parent material: slope alluvium and/or residuum weathered from sandstone
Slope: 2 to 15 percent

Biological crust
- Cyanobacteria: 2 percent

Lichen: 2 percent
- Moss: 2 percent

Chemical crust
- Salt: 0 percent
- Gypsum: 0 percent

Physical cover
- Canopy plant cover: 47 percent

Woody debris: 3 percent
Bare soil: 7 percent
Rock fragments
- channer: 55 percent

Depth to restrictive feature(s): 8 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 2.00 to 20.00 inches per hour (14.11 to 141.14 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.6 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Desert Shallow Sandy Loam (Shadscale)
Ecological site number: R035XY130UT
Present vegetation: shadscale saltbush, galleta, cheatgrass, Torrey Mormon tea, broom snakeweed, Indian ricegrass
Land capability (non irrigated): 7c

Typical Profile

Location

Geographic Coordinate System: 38° 24' 31.80'' north, 109° 46' 14.50'' west

A—0 to 2.5 inches (0 to 6 cm); yellowish red (5YR 5/6) loamy sand, yellowish red (5YR 4/6), moist; 9 percent clay; moderate coarse granular and moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine roots throughout; common very fine irregular pores; 10 percent channer; strongly effervescent, 7 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

2C—2.5 to 8 inches (6 to 20 cm); red (2.5YR 4/6) channery sandy loam, dark red (2.5YR 3/6), moist; 13 percent clay; massive; moderately hard, firm, slightly sticky and nonplastic; common fine roots throughout; common very fine irregular pores; 20 percent channer; slightly effervescent, 3 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

2R—8 inches (20 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Reaction: 7.9 to 8.4 (moderately alkaline)

A horizon
Hue: 2.5YR, 5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 4 to 6, dry or moist

C horizon
Hue: 2.5YR, 5YR
Value: 4 or 5 dry, 3 or 4 moist
Chroma: 4 to 6, dry or moist
Texture: sandy loam, coarse sandy loam
Clay content: 10 to 18 percent
Rock fragments: 10 to 35 percent

Bw horizons are present in some pedons.

44—Ustic Torriorthents-Rock outcrop-Badland complex, 4 to 54 percent slopes, extremely bouldery

Map Unit Setting

Landform(s): plateaus (fig. 117)
Elevation: 4,200 to 7,050 feet (1,280 to 2,150 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Map Unit Composition

Ustic Torriorthents and similar soils: 45 percent
Rock outcrop: 30 percent
Badland: 25 percent

Soil Properties and Qualities

Ustic Torriorthents soils (fig. 118)
Taxonomic classification: Ustic Torriorthents
Geomorphic position: occurs on talus slopes, side slopes, and structural benches

Figure 117.—An area of Ustic Torriorthents-Rock outcrop-Badland complex, 4 to 54 percent slopes, extremely bouldery.

Figure 118.—Profile of Ustic Torriorthents component. Scale is in centimeters.

Parent material: colluvium and/or slope alluvium derived from sandstone and shale
Slope: 4 to 54 percent
Biological crust
Cyanobacteria: 0 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 119)
Canopy plant cover: 5 percent
Woody debris: 12 percent
Bare soil: 12 percent
Rock fragments
- gravel: 46 percent
- cobble: 12 percent
- stone: 3 percent
- boulder: 10 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: somewhat excessively drained
Ksat solum: 2.00 to 6.00 inches per hour (14.11 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.4 (very low)
Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none
Runoff class: high
Hydrologic group: B
Ecological site name: Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper)
Ecological site number: R035XY263UT
Present vegetation: Utah juniper, pinyon, broom snakeweed, Ephedra cutleri, Indian ricegrass
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System: 38° 7' 37.50'' north, 110° 6' 29.50'' west

A—0 to 1 inch (0 to 3 cm); reddish brown (2.5YR 5/4) cobbly sandy loam, reddish brown (2.5YR 4/4), moist; 14 percent clay; weak thin platy structure; loose, slightly sticky and nonplastic; many fine roots throughout; common fine dendritic tubular pores; 10 percent gravel and 10 percent cobble; strongly effervescent; slightly alkaline, pH 7.6; clear smooth boundary.

C1—1 inch to 8 inches (3 to 20 cm); reddish brown (2.5YR 5/4) cobbly sandy loam, reddish brown (2.5YR 4/3), moist; 12 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; many fine and common medium roots throughout; many fine dendritic tubular pores; 10 percent gravel and 10 percent cobble and 5 percent stone; strongly effervescent; moderately alkaline, pH 8.0; clear smooth boundary.

Figure 119.—A close-up of the surface near the sample pit for Ustic Torriorthents cobbly sandy loam.

C2—8 to 23 inches (20 to 58 cm); reddish brown (2.5YR 5/4) very stony sandy loam, reddish brown (2.5YR 4/4), moist; 16 percent clay; massive; moderately hard, friable, slightly sticky and slightly plastic; many fine and medium roots throughout; many fine dendritic tubular pores; 10 percent gravel and 10 percent cobble and 30 percent stone; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

R—23 inches (58 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Ustic Torriorthents have soil properties that vary greater than family class limits.

Reaction: 7.4 to 8.4 (slightly alkaline to moderately alkaline)

A horizon
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 4 or 5 dry, 3 to 5 moist
- Chroma: 3 to 6, dry or moist

C horizon
- Hue: 2.5YR, 5YR, 7.5YR
- Value: 4 to 6 dry, 3 to 5 moist
- Chroma: 3 to 6, dry or moist
- Texture: sandy clay loam, sandy loam
- Clay: 10 to 25 percent
- Rock fragments: 15 to 55 percent

Rock outcrop
Slope: 25 to 100 percent

Rock outcrop consists of sandstone bedrock, typically exposed on ledges and cliff faces of Wingate Sandstone. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

Badland
Slope: 15 to 80 percent

Badland is moderately steep to very steep barren land that is dissected by many intermittent drainage channels. These areas are cut into soft geologic material of the Chinle Formation. Badland also includes areas where the depth to soft bedrock is less than four inches (10 cm).

45—Water

Map Unit Setting

Landform(s):
Elevation: 3,130 to 3,700 feet (955 to 1,128 meters)
Mean annual precipitation: 6 to 10 inches (150 to 250 millimeters)
Mean annual air temperature: 54 to 57 degrees F (12.0 to 14.0 degrees C)
Mean annual soil temperature: 56 to 59 degrees F (13.1 to 15.1 degrees C)
Frost-free period: 150 to 180 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-2 Colorado Plateau Shrub – Grasslands

Map Unit Composition

Water: 100 percent

Soil Properties and Qualities

Water
Lakes and rivers. These areas are, or could potentially be, covered by water most years.

46—Westmion-Rock outcrop complex, 4 to 18 percent slopes, stony

Map Unit Setting

Landform(s): plateaus (fig. 120)
Elevation: 5,090 to 6,730 feet (1,550 to 2,050 meters)
Mean annual precipitation: 10 to 14 inches (250 to 350 millimeters)
Mean annual air temperature: 52 to 55 degrees F (11.0 to 13.0 degrees C)
Mean annual soil temperature: 54 to 57 degrees F (12.1 to 14.1 degrees C)
Frost-free period: 135 to 165 days
Major Land Resource Area: 35 – Colorado Plateau
Land Resource Unit: 35-3 Colorado Plateau Sagebrush – Grasslands

Map Unit Composition

Westmion and similar soils: 60 percent
Rock outcrop: 25 percent
Minor components: Shallow Arches soils on shoulders. Some areas have soils that

Figure 120.—An area of Westmion-Rock outcrop complex, 4 to 18 percent slopes, stony. Ustic Torriorthents-Rock outcrop-Badland complex, 4 to 54 percent slopes, extremely bouldery is in the background.

Figure 121.—Profile of Westmion component. Scale is in centimeters.

are greater than 20 inches (50 cm) deep. A few areas have more than 35 percent rock fragments throughout the profile. Some places have slopes greater than 18 percent.

Soil Properties and Qualities

Westmion soils (fig. 121)
Taxonomic classification: Clayey, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents
Geomorphic position: occurs on interfluves on hills and structural benches
Parent material: residuum weathered from sandstone and/or slope alluvium derived from sandstone and shale
Slope: 4 to 18 percent
Biological crust
Cyanobacteria: 0 percent
Lichen: 0 percent
Moss: 0 percent
Chemical crust
Salt: 0 percent
Gypsum: 0 percent
Physical cover (fig. 122)
Canopy plant cover: 28 percent
Woody debris: 24 percent
Bare soil: 12 percent
Rock fragments
- gravel: 30 percent

- stone: 14 percent
- channer: 10 percent
- flagstone:12 percent

Depth to restrictive feature(s): 4 to 16 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.06 to 6.00 inches per hour (0.42 to 42.34 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 2.2 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Semidesert Shallow Clay (Shadscale-Utah Juniper)
Ecological site number: R035XY239UT
Present vegetation: Utah juniper, blackbrush, Mormon tea, broom snakeweed, roundleaf buffaloberry
Land capability (non irrigated): 6c

Typical Profile

Location

Geographic Coordinate System: 38° 3' 57.30'' north, 110° 10' 33.70'' west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 5/4) gravelly sandy loam, brown (7.5YR 4/4), moist; 18 percent clay; weak thin platy structure; soft, very friable, nonsticky and slightly plastic; common fine roots throughout; common fine dendritic tubular pores;

Figure 122.—A close-up of the surface near the sample pit for Westmion gravelly sandy loam.

15 percent gravel and 5 percent channer; strongly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C1—1 inch to 7 inches (3 to 18 cm); brown (7.5YR 5/4) and yellowish brown (10YR 5/4) clay, brown (7.5YR 4/4) and dark yellowish brown (10YR 4/4), moist; 46 percent clay; moderate medium prismatic structure; moderately hard, friable, moderately sticky and very plastic; many fine and medium roots throughout; many very fine and fine dendritic tubular pores; common fine carbonate nodules; 2 percent gravel; strongly effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C2—7 to 14 inches (18 to 36 cm); yellowish brown (10YR 5/4) and brown (7.5YR 5/4) clay loam, dark yellowish brown (10YR 4/4) and brown (7.5YR 4/4), moist; 38 percent clay; massive; hard, friable, slightly sticky and moderately plastic; common fine and medium roots throughout; many fine dendritic tubular pores; common fine carbonate nodules; 10 percent gravel and 2 percent channer; violently effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

R—14 inches (36 cm); unweathered, unfractured sandstone bedrock.

Range in Characteristics

Westmion, as used in this survey, is a taxadjunct to the official series because it has a lithic contact above 20 inches. The Westmion series is a clayey, mixed, superactive, calcareous, mesic, shallow Ustic Torriorthents. This does not affect use and management.

Reaction: 7.4 to 8.4 (slightly or moderately alkaline)

A horizon
- Hue: 7.5YR, 10YR
- Value: 4 or 5, dry or moist
- Chroma: 3 or 4, dry or moist

C horizons
- Hue: 2.5Y, 10YR, 7.5YR
- Value: 5 to 7 dry, 4 to 6 moist
- Chroma: 2 to 4, dry or moist
- Texture: sandy clay loam, clay loam, clay, loam
- Clay: 20 to 50 percent (averages greater than 35 percent)
- Rock fragments: 0 to 30 percent

Rock outcrop
Slope: 4 to 18 percent

Rock outcrop consists of sandstone bedrock, typically exposed on ledges of the Moenkopi Formation and the Shinarump member of the Chinle Formation. Rock outcrop also includes areas where the depth to bedrock is less than four inches (10 cm).

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for rangeland and forestland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately suited, poorly suited,* and *unsuited* or as *good, fair,* and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

There are no areas in the Glen Canyon National Recreation Area that meet the soil requirements for prime farmland.

The extent of each listed map unit is shown in table 3. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Rangeland and Forest Understory Vegetation

James M. Harrigan helped prepare this section.

In areas that have similar climate and topography, differences in the kind and amount of rangeland or forest understory vegetation are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 4 shows, for each soil that supports vegetation suitable for grazing, the ecological site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. An explanation of the column headings in table 4 follows.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of the site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service. Brief descriptions of ecological sites are also below.

Total dry-weight production is the amount of vegetation that can be expected to grow annually in a well managed area that is supporting the potential natural plant

community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. 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 make growing conditions substantially better than average. In a normal year, growing conditions are about average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. Yields are adjusted to a common percent of air-dry moisture content.

Characteristic plants—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. Tables 5 and 6 show the common plants in the survey area. Table 5 lists plants by their common names, and table 6 lists plants by their scientific names. Table 7 shows the soils by ecological site name, type, and ID.

The native rangeland and forest understory ecological sites are described in the following paragraphs.

Figure 123.—Alkali Bottom (Greasewood) ecological site.

Alkali Bottom (Greasewood) R035XY003UT – This ecological site occurs on stream terraces of flood plains. The slope of the site ranges from 1 to 6 percent. Soils are very deep. Typical native plant species include sand dropseed *(Sporobolus cryptandrus)*, greasewood *(Sarcobatus vermiculatus)*, seepweed *(Suaeda spp.)*, fourwing saltbush *(Atriplex canescens)*, and Indian ricegrass *(Achnatherum hymenoides)*.

Figure 124.—Desert Sand (Sand sagebrush) ecological site.

Desert Sand (Sand Sagebrush) R035XY115UT –This ecological site occurs on interfluves on hills, mesas, and structural benches as coppice mounds and dunes on plateaus. The slope of the site ranges from 2 to 15 percent. Soils are very deep. Typical native plant species include mesa dropseed *(Sporobolus flexuosus)*, sand sagebrush *(Artemisia filifolia)*, alkali jimmyweed *(Isocoma acradenia var. acradenia)*, sand verbena *(Abronia spp.)*, Cutler Mormon tea *(Ephedra cutleri)*, and gooseberryleaf globemallow *(Sphaeralcea grossulariifolia)*.

Figure 125.—Desert Sandy Loam (Blackbrush) ecological site.

Desert Sandy Loam (Blackbrush) R035XY121UT – This ecological site occurs on interfluves and sideslopes on hills, mesas and structural benches on plateaus. The slope of the site ranges from 2 to 20 percent. Soils are moderately deep and deep. Typical native plant species include blackbrush *(Coleogyne ramosissima)*, shadscale saltbush *(Atriplex confertifolia)*, broom snakeweed *(Gutierrezia sarothrae)*, galleta *(Pleuraphis jamesii)*, mesa dropseed *(Sporobolus flexuosus)*, plains pricklypear *(Opuntia polyacantha)*, Indian ricegrass *(Achnetherum hymenoides)*, Torrey Mormon tea *(Ephedra torreyana)*, and desert trumpet buckwheat *(Eriogonum inflatum)*.

Figure 126.—Desert Sandy Loam (Fourwing Saltbush) ecological site.

Desert Sandy Loam (Fourwing Saltbush) R035XY118UT – This ecological site occurs on stream terraces on flood plains. The slope of the site ranges from 1 to 6 percent. Soils are very deep. Typical native plant species include seepweed *(Suaeda spp.)*, fourwing saltbush *(Atriplex canescens)*, and plains pricklypear *(Opuntia polyacantha)*.

Figure 127.—Desert Shallow Clay (Mat Saltbush) ecological site.

Desert Shallow Clay (Mat Saltbush) R035XY124UT – This ecological site occurs on base slopes on hills, structural benches, alluvial fans, and fan remnants on plateaus. The slope of the site ranges from 2 to 65 percent. Soils are moderately deep to very deep. Typical native plant species include mat saltbush *(Atriplex corrugate)*, rayless goldenhead *(Acamptopappus sphaerocephalus)*, Native American pipeweed *(Eriogonum inflatum)*, shadscale saltbush *(Atriplex confertifolia)*, blackbrush *(Coleogyne ramosissima)*, galleta *(Pleuraphis jamesii)*, and Anderson wolfberry *(Lycium andersonii)*.

Figure 128.—Desert Shallow Loam (Shadscale) ecological site.

Desert Shallow Loam (Shadscale) R035XY122UT – This ecological site occurs on interfluves on hills, mesas, and structural benches on plateaus. The slope of the site ranges from 2 to 14 percent. Soils are shallow. Typical native plant species include shadscale saltbush *(Atriplex confertifolia)*, broom snakeweed *(Gutierrez sarothrae)*, galleta *(Pleuraphis jamesii)*, Indian ricegrass *(Achnetherum hymenoides)*, and blackbrush *(Coleogyne ramosissima)*.

Figure 129.—Desert Shallow Sandy Loam (Blackbrush) ecological site.

Desert Shallow Sandy Loam (Blackbrush) R035XY133UT – This ecological site occurs on interfluves and sideslopes on hills, mesas, and structural benches on plateaus. The slope of the site ranges from 2 to 20 percent. Soils are very shallow and shallow. Typical native plant species include blackbrush *(Coleogyne ramosissima)*, Torrey Mormon tea *(Ephedra torreyana)*, galleta *(Pleuraphis jamesii)*, rubber rabbitbrush *(Ericameria nauseosa)*, broom snakeweed *(Gutierrezia sarothrae)*, plains pricklypear *(Opuntia polyacantha)*, skeletonweed buckwheat *(Eriogonum deflexum)*, Douglas rabbitbrush *(Chrysothamnus viscidiflorus)*, Brenda's yellow cryptantha *(Cryptantha flava)*, desert trumpet buckwheat *(Eriogonum inflatum)*, and gooseberryleaf globemallow *(Sphaeralcea grossulariifolia)*.

Figure 130.—Desert Shallow Loam (Shadscale) ecological site.

Desert Shallow Sandy Loam (Shadscale) R035XY130UT – This ecological site occurs on interfluves and sideslopes on hills, mesas, structural benches and talus slopes on plateaus. The slope of the site ranges from 2 to 64 percent. Soils are very shallow and shallow. Typical native plant species include shadscale saltbush *(Atriplex confertifolia)*, galleta *(Pleuraphis jamesii)*, skeletonweed buckwheat *(Eriogonum deflexum)*, Torrey Mormon tea *(Ephedra torreyana)*, Indian ricegrass *(Achnetherum hymenoides)*, blackbrush *(Coleogyne ramosissima)*, pricklypear *(Opuntia spp.)*, sixweeks fescue *(Vulpia octoflora)*, crispleaf buckwheat *(Eriogonum corymbosum)*, and broom snakeweed *(Gutierrezia sarothrae)*.

Figure 131.—Desert Stony Loam (Blackbrush) ecological site.

Desert Stony Loam (Blackbrush) R035XY139UT – This ecological site occurs on interfluves and baseslopes on alluvial fans, fan remnants, and talus slopes on plateaus. The slope of the site ranges from 5 to 65 percent. Soils are deep and very deep. Typical native plant species include blackbrush *(Coleogyne ramosissima)*, shadscale saltbush *(Atriplex confertifolia)*, and galleta *(Pleuraphis jamesii)*.

Figure 132.—Desert Stony Loam (Shadscale–Bud Sagebrush) ecological site.

Desert Stony Loam (Shadscale–Bud Sagebrush) R035XY136UT – This ecological site occurs on base slopes on fan remnants on plateaus, and flood plain steps on flood plains. The slope of the site ranges from 1 to 24 percent. Soils are very deep. Typical native plant species include shadscale saltbush *(Atriplex confertifolia)*, galleta *(Pleuraphis jamesii)*, sand sagebrush *(Artemisia filifolia)*, Indian ricegrass *(Achnetherum hymenoides)*, rayless goldenhead *(Acamptopappus sphaerocephalus)*, fluffgrass *(Dasyochloa pulchella)*, gooseberryleaf globemallow *(Sphaeralcea grossulariifolia)*, sand dropseed *(Sporobolus cryptandrus)*, and Torrey Mormon tea *(Ephedra torreyana)*.

Figure 133.—Desert Very Shallow Gypsum (Torrey's Jointfir) ecological site.

Desert Very Shallow Gypsum *(Torrey's Jointfir)* R035XY142UT – This ecological site occurs on sideslopes on hills and structural benches on plateaus. The slope of the site ranges from 6 to 45 percent. Soils are shallow. Typical native plant species include shadscale saltbush *(Atriplex concertifolia)*, rubber rabbitbrush *(Ericameria nauseosa)*, galleta *(Pleuraphis jamesii)*, Torrey Mormon tea *(Ephedra torreyana)*, scarlet globemallow *(Sphaeralcea coccinea)*, and buckwheat *(Eriogonum spp.)*.

Figure 134.—Desert Very Steep Stony Loam (Shadscale) ecological site.

Desert Very Steep Stony Loam (Shadscale) R035XY146UT – This ecological site occurs on sideslopes on structural benches, talus slopes, and ledges on escarpments on plateaus. The slope of the site ranges from 4 to 70 percent. Soils are very shallow and shallow. Typical native plant species include shadscale saltbush *(Atriplex concertifolia)*, needle and thread *(Hesperostipa comata ssp. comata)*, galleta *(Pleuraphis jamesii)*, rayless goldenhead *(Acamptopappus sphaerocephalus)*, rubber rabbitbrush *(Ericameria nauseosa)*, mat saltbush *(Atriplex corrugata)*, bottlebrush squirreltail *(Elymus elymoides)*, roundleaf buffaloberry *(Shepherdia rotundifolia)*, green Mormon tea *(Ephedra viridis)*, Utah juniper *(Juniperus osteosperma)*, and fourwing saltbush *(Atriplex canescens)*.

Figure 135.—Sandstone Rockland 6-10" p.z. ecological site.

Sandstone Rockland 6–10" p.z. R035XB255AZ – This ecological site occurs on interfluves on hills, mesas, and structural benches as sandsheets on plateaus. The slope of the site ranges from 2 to 30 percent. Soils are very shallow. Typical native plant species include mesa dropseed *(Sporobolus flexuosus)*, blackbrush *(Coleogyne ramosissimus)*, sand verbena *(Abronia spp.)*, sand sagebrush *(Artemisia filifolia)*, broom snakeweed *(Gutierrezia sarothrae)*, Cutler Mormon tea *(Ephedra cutleri)*, and black grama *(Bouteloua eriopoda)*.

Figure 136.—Sandy Wash 6-10" p.z. ecological site.

Sandy Wash 6–10" p.z. R035XB216AZ – This ecological site occurs on flood plains. The slope of the site ranges from 1 to 4 percent. Soils are very deep. A typical native plant species is rubber rabbitbrush *(Ericameria nauseosa)*.

Figure 137.—Semidesert Sand (Fourwing Saltbush) ecological site.

Semidesert Sand (Fourwing Saltbush) R035XY212UT – This ecological site occurs on interfluves on hills, mesas, and structural benches as coppice mounds and dunes on plateaus. The slope of the site ranges from 2 to 22 percent. Soils are very deep. Typical native plant species include Utah juniper *(Juniperus osteosperma)*, Cutler Mormon tea *(Ephedra cutleri)*, Resinbush *(Vanclevea stylosa)*, rosemary mint *(Poliomintha incana)*, Indian ricegrass *(Achnatherum hymenoides)*, galleta *(Pleuraphis jamesii)*, and mesa dropseed *(Sporobolus flexuosus)*.

Figure 138.—Semidesert Sandy Loam (Blackbrush) ecological site.

Semidesert Sandy Loam (Blackbrush) R035XY218UT – This ecological site occurs on interfluves on hills, mesas, and structural benches on plateaus. The slope of the site ranges from 2 to 22 percent. Soils are moderately deep. Typical native plant species include blackbrush *(Coleogyne ramosissima)*, galleta *(Pleuraphis jamesii)*, shadscale saltbush *(Atriplex confertifolia)*, Indian ricegrass *(Achnatherum hymenoides)*, Cutler Mormon tea *(Ephedra cutleri)*, Desert Princesplume *(Stanleya pinnata)*, scarlet globemallow *(Sphaeralcea coccinea)*, and broom snakeweed *(Gutierrezia sarothrae)*.

Figure 139.—Semidesert Shallow Sand (Utah Juniper–Pinyon) ecological site.

Semidesert Shallow Sand (Utah Juniper–Pinyon) R035XY227UT – This ecological site occurs on interfluves on hills, mesas, and structural benches as sandsheets on plateaus. The slope of the site ranges from 2 to 60 percent. Soils are very shallow. Typical native plant species include mesa dropseed *(Sporobolus flexuosus)*, Utah juniper *(Juniperus osteosperma)*, Cutler Mormon tea *(Ephedra cutleri)*, and crispleaf buckwheat *(Eriogonum corymbosum)*.

Figure 140.—Semidesert Shallow Sandy Loam (Blackbrush) ecological site.

Semidesert Shallow Sandy Loam (Blackbrush) R035XY233UT – This ecological site occurs on interfluves, on hills, mesas, and structural benches on plateaus. The slope of the site ranges from 2 to 6 percent. Soils are shallow. Typical native plant species include blackbrush *(Coleogyne ramosissima)*, Desert Princesplume *(Stanleya pinnata)*, galleta *(Pleuraphis jamesii)*, shadscale saltbush *(Atriplex confertifolia)*, Torrey Mormon tea *(Ephedra torreyana)*, and Indian ricegrass *(Achnetherum hymenoides)*.

Figure 141.—Semidesert Shallow Sandy Loam (Utah Juniper–Blackbrush) ecological site.

Semidesert Shallow Sandy Loam (Utah Juniper–Blackbrush) R035XY236UT – This ecological site occurs on interfluves and sideslopes on hills, mesas, and structural benches on plateaus. The slope of the site ranges from 2 to 35 percent. Soils are very shallow and shallow. Typical native plant species include Utah Juniper *(Juniperus osteosperma)*, blackbrush *(Coleogyne ramosissima)*, twoneedle pinyon *(Pinus edulis)*, galleta *(Pleuraphis jamesii)*, broom snakeweed *(Gutierrezia sarothrae)*, fourwing saltbush *(Atriplex canescens)*, narrowleaf yucca *(Yucca angustissima)*, Mormon tea *(Ephedra viridis)*, plains pricklypear *(Opuntia polyacantha)*, cliffrose *(Purshia ericifolia)*, roundleaf buffaloberry *(Shepherdia rotundifolia)*, and rubber rabbitbrush *(Ericameria nauseosa)*.

Figure 142.—Semidesert Stony Loam (Utah Juniper–Pinyon) ecological site.

Semidesert Stony Loam (Utah Juniper-Pinyon) R035XY246UT – This ecological site occurs on baseslopes on fan remnants and structural benches on plateaus. The slope of the site ranges from 8 to 60 percent. Soils are very deep. Typical native plant species include Utah Juniper *(Juniperus osteosperma)*, and grassy rockgoldenrod *(Petradoria pumila)*.

Figure 143.—Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper) ecological site.

Semidesert Very Steep Stony Loam (Pinyon–Utah Juniper) R035XY263UT – This ecological site occurs on talus slopes and ledges on escarpments, baseslopes on fan remnants and structural benches, and sideslopes on plateaus. The slope of the site ranges from 4 to 60 percent. Soils are very shallow and shallow. Typical native plant species include Utah serviceberry *(Amelanchier utahensis)*, Wyoming big sagebrush *(Artemisia tridentata)*, singleleaf ash *(Fraxinus anomala)*, Cutler Mormon tea *(Ephedra cutleri)*, bluebunch wheatgrass *(Pseudoroegneria spicata ssp. spicata)*, Utah juniper *(Juniperus osteosperma)*, muttongrass *(Poa fendleriana)*, twoneedle pinyon *(Pinus edulis)*, Desert Princesplume *(Stanleya pinnata)*, sumac *(Rhus spp.)*, and desert needlegrass *(Achnatherum speciosum)*.

Figure 144.—Semiwet Saline Streambank (Fremont Cottonwood) ecological site.

Semiwet Saline Streambank (Fremont Cottonwood) R035XY012UT – This ecological site occurs on flood plains. The slope of the site ranges from 1 to 4 percent. Soils are very deep. Typical native plant species include Fremont cottonwood *(Populis fremonti)*, Goodding's willow *(Salix gooddingii)*, and scouringrush horsetail *(Equisetum hyemale)*.

Figure 145.—Talus Slope (Blackbrush–Shadscale) ecological site.

Talus Slope (Blackbrush-Shadscale) R035XY018UT – This ecological site occurs on talus slopes on plateaus. The slope of the site ranges from 20 to 65 percent. Soils are very shallow to very deep. Typical native plant species include fourwing saltbush *(Atriplex canescens)*, galleta *(Pleuraphis jamesii)*, skeletonweed buckwheat *(Eriogonum deflexum)*, and Torrey Mormon tea *(Ephedra torreyana)*.

Figure 146.—Upland Loam (Basin Big Sagebrush) ecological site.

Upland Loam (Basin Big Sagebrush) R035XY306UT – This ecological site occurs on drainageways and swales between hills and mesas on plateaus. The slope of the site ranges from 2 to 12 percent. Soils are very deep. Typical native plant species include Utah juniper *(Juniperus osteosperma)*, Wyoming big sagebrush *(Artemisia tridentata)*, dwarf lousewort *(Pedicularis centranthera)*, and twoneedle pinyon *(Pinus edulis)*.

Figure 147.—Upland Shallow Loam (Pinyon–Utah Juniper) ecological site.

Upland Shallow Loam (Pinyon–Utah Juniper) R035XY315UT – This ecological site occurs on interfluves on bedrock-controlled surfaces and drainageways and swales between hills and mesas on plateaus. The slope of the site ranges from 2 to 22 percent. Soils are shallow. Typical native plant species include Utah juniper *(Juniperus osteosperma)*, Wyoming big sagebrush *(Artemisia tridentata)*, dwarf lousewort *(Pedicularis centranthera)*, and twoneedle pinyon *(Pinus edulis)*.

Figure 148.—Upland Stony Loam (Pinyon–Utah Juniper) ecological site.

Upland Stony Loam (Pinyon-Utah Juniper) R035XY321UT – This ecological site occurs on sideslopes on bedrock-controlled surfaces on plateaus. The slope of the site ranges from 15 to 60 percent. Soils are very shallow and shallow. Typical native plant species include Utah juniper *(Juniperus osteosperma)*, Wyoming big sagebrush *(Artemisia tridentata)*, dwarf lousewort *(Pedicularis centranthera)*, and twoneedle pinyon *(Pinus edulis)*.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in chapter 4 of the "National Range and Pasture Handbook" (http://www.ftw.nrcs.usda.gov/glti/NRPH.html).

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 optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Land Management

In tables 8 through 11, interpretive ratings are given for various aspects of land management. The ratings are both verbal and numerical.

Some rating class terms indicate the degree to which the soils are suited to a specified land management practice. *Well suited* indicates that the soil has features that are favorable for the specified practice and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately suited* indicates that the soil has features that are moderately favorable for the specified practice. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more properties that are unfavorable for the specified practice. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. *Unsuited* indicates that the expected performance of the soil is unacceptable for the specified practice or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified land management practice (1.00) and the point at which the soil feature is not a limitation (0.00).

Rating class terms for fire damage and seedling mortality are expressed as *low, moderate,* and *high*. Where these terms are used, the numerical ratings indicate gradations between the point at which the potential for fire damage or seedling mortality is highest (1.00) and the point at which the potential is lowest (0.00).

The paragraphs that follow indicate the soil properties considered in rating the soils for land management practices.

In table 8, ratings in the columns *suitability for hand planting* and *suitability for mechanical planting* are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, moderately suited, poorly suited, or unsuited to these methods of planting. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *soil rutting hazard* are based on depth to a water table, rock fragments on or below the surface, the Unified classification, depth to a restrictive layer, and slope. Ruts form as a result of the operation of forest equipment. The

hazard is described as slight, moderate, or severe. A rating of *slight* indicates that the soil is subject to little or no rutting, *moderate* indicates that rutting is likely, and *severe* indicates that ruts form readily.

In table 9, ratings in the column *hazard of off-road or off-trail erosion* are based on slope and on soil erodibility factor K. The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under ordinary climatic conditions; *moderate* indicates that some erosion is likely and that erosion-control measures may be needed; *severe* indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Ratings in the column *hazard of erosion on roads and trails* are based on the soil erodibility factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that little or no erosion is likely; *moderate* indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and *severe* indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Ratings in the column *suitability for roads (natural surface)* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification, depth to a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately suited, or poorly suited to this use.

In table 10, ratings in the column *suitability for mechanical site preparation (surface)* are based on slope, depth to a restrictive layer, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 1 foot is considered in the ratings.

Ratings in the column *suitability for mechanical site preparation (deep)* are based on slope, depth to a restrictive layer, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 3 feet is considered in the ratings.

In table 11, ratings in the column *potential for damage to soil by fire* are based on texture of the surface layer, content of rock fragments and organic matter in the surface layer, thickness of the surface layer, and slope. The soils are described as having a low, moderate, or high potential for this kind of damage. The ratings indicate an evaluation of the potential impact of prescribed fires or wildfires that are intense enough to remove the duff layer and consume organic matter in the surface layer.

Ratings in the column *potential for seedling mortality* are based on flooding, ponding, depth to a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope. The soils are described as having a low, moderate, or high potential for seedling mortality.

Recreation

The soils of the survey area are rated in tables 12 and 13 according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil

features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in tables 12 and 13 can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

In table 12, *camp areas* require site preparation, such as shaping and leveling the 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 ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

In table 13, *foot traffic and equestrian trails* for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are

stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Mountain bike and off-road vehicle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading “Soil Properties.”

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 14 and 15 show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

In table 14, *dwellings* are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

In table 15, *local roads and streets* have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation

and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

Table 16 shows the degree and kind of soil limitations that affect septic tank absorption fields and sewage lagoons. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

In table 16, *septic tank absorption fields* are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth

of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

Construction Materials

Tables 17 and 18 give information about the soils as potential sources of gravel, sand, topsoil, reclamation material, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

In table 17, *sand* and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 17, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good, fair,* or *poor* as potential sources of sand and gravel. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good, fair,* or *poor* as potential sources of reclamation material, roadfill, and topsoil,. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

In table 18, *reclamation material* is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed,

layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 19 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The

ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps.

Estimates of soil properties are based on field examinations and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

Table 20 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given 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 the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages

are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

Table 21 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 21, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in inches per hour, when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 21, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Table 22 shows erosion factors of the soils. *Erosion factors* are shown in table 22 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.
4L. Calcareous loams, silt loams, clay loams, and silty clay loams.
4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 23 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of groundwater pollution.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It 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 nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the

table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Water Features

Table 24 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive 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 mainly of deep, well drained to excessively drained sands or gravelly sands. 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 having a layer that impedes the downward movement of water or soils of 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 clays that have a high shrink-swell potential, soils that have a 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.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 24 indicates, by month, depth to the top *(upper limit)* of the saturated zone in most years. Estimates of the upper are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 24 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

Table 25 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and

acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Table 26 shows those map unit characteristics related to soil development or pedogenesis - the climate, landscape, parent material, and vegetation. Column headers are as follows: map symbol and soil name, percent of map unit (component composition), slope (range), elevation (range), MAP (mean annual precipitation range), landform, geomorphic position, parent material, and ecological site.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999; 2006). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 27 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludalfs (*Hapl*, meaning minimal horizonation, plus *ustalf*, the suborder of the Alfisols that has a ustic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Aridic Haplustalfs.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle size, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, superactive, mesic Aridic Haplustalfs.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The Parkelei series is a soil series in this survey area.

Formation of the Soils

This section relates the soils in the survey area to the major factors of soil formation.

Factors of Soil Formation

Soil is the product of natural and/or human influenced processes acting on accumulated or deposited geologic material. The development of the soil profile is determined by five basic soil-forming factors: the type of parent material; the living organisms, or the plant and animal life on and in the soil; the climate under which the soil-forming factors were active; topography, or lay of the land; and the length of time these forces have been active.

The parent material affects the kind of soil profile that is formed, and in some cases determines it almost entirely. Living organisms are the active factors of soil formation. Many of the physical and chemical changes in the soil are determined by climatic conditions—water, wind, and temperature. Together, climate and living organisms act on the parent material and slowly change it to a natural body that has genetically related horizons.

Topography commonly modifies these other factors. Finally, time is required for changes in the parent material to result in the formation of a soil. Generally, a long time is required for the development of distinct soil horizons (Henderson, 2004).

These factors of soil formation are closely interrelated. Very few generalizations can be made about the effect of any one factor unless conditions are specified for the others. Soil formation is complex, and many processes of soil development are still unknown.

Parent Material

Parent material is the unconsolidated mass from which soil is formed. The formation or deposition of this material is the first step in the development of a soil. The characteristics of the parent material determine the chemical and mineralogical composition of the soil. In the Glen Canyon National Recreation Area, soil formation begins with the accumulation of parent material. Parent material in the Glen Canyon area is classified into four types, according to the process or combination of processes by which it accumulated. They are residuum, or material weathered from bedrock; colluvium or material deposited by mass movement; eolian or wind-deposited material; and alluvium, or water-deposited material. However, the accumulation of parent material in any one soil is usually a combination of these.

Residuum is considered material derived from bedrock that is weathered in place. This soil parent material has properties of the underlying bedrock that have not been modified by movement (Soil Survey Staff, 1993). In the Recreation Area, many of the soils show signs of soil formation in residuum material at the bedrock contact. However, only a few shallow soils, or those less than twenty inches deep, are developed solely from residuum. The shale or interbedded sandstone and shale bedrock weather to clay loam or other loamy material. Claysprings soils formed in

residuum from shale. Juanalo soils formed in interbedded sandstone and shale residual material. Bedrock from sandstone weathers to sand or loamy sand material. Needle soils formed in sandstone.

Colluvium is unsorted, unconsolidated material deposited on side slopes or at the base of slopes by mass movement, or gravitational action. Within the Recreation Area, soils formed in this material usually are found at the base of cliffs as talus or cliff debris. Because this material varies greatly in depth, texture, and mineralogical composition, these areas are not assigned a soil series name but are denoted as Torriorthents.

Eolian material is transported and deposited by the wind. In the Recreation Area, this material is usually a recent deposition. The other factors that affect the soil-forming process have only begun to work. A layer of eolian sand, varying in thickness, covers much of the Recreation Area. The influence from this material is seen in the upper horizons of soils such as Denazar and Earlweed. Sheppard soils are, in most cases, completely derived from eolian material.

Alluvium is material transported by water and deposited on flood plains, stream terraces, and other depositional areas. Because of the various origins and differing velocities of flowing water, this material varies greatly in texture and mineralogical composition. The source of the parent material on the flood plains along small tributary streams is limited to local uplands. Razito soils formed in alluvial material.

Living Organisms

Plants, animals, and microbial life living on or in the soil are active in the soil-forming process. However, because of the desert conditions covering most of the Recreation Area, their activity is not as obvious as the other soil forming factors. Plants distribute plant nutrients, stabilize the soil surface, and contribute organic matter to the soil. Animals turn and mix the upper layers of the soil. They contribute and synthesize organic matter. In addition, bacteria, algae, and fungi decompose the plant remains, incorporate the organic matter into the soil, and help form protective crusts on the soil surface (USDI, http://www.nps.gov/archive/care/crypto.html).

Plants have a significant influence on soil properties. All plants intercept precipitation, reduce soil erosion, and trap sediments. Decaying plant material is the main source of organic matter. Plant roots increase porosity, which can improve soil drainage. Roots also help to cycle nutrients throughout the soil profile. Algae, mosses, and lichens protect the soil surface from erosion (USDA, 2005).

Insects, worms, humans, and other animals affect soil formation. Bacteria promote the decay of organic material, fix nitrogen, and form a protective surface crust. Burrowing animals and insects loosen and mix various soil horizons. Human activities greatly affect the processes of soil formation. The major alterations include changes in the type of vegetation and accelerated erosion. In areas where vehicle use or livestock grazing continues unchecked, invasive plants may dominate the native plants; there is a destruction of the cryptobiotic crust and a prominence of bare ground. This leaves the soil surface more vulnerable to erosion by wind and water. In some areas, soils such as Pagina and Denazar show evidence of this type of activity (fig. 149). Human activities can have a beneficial effect, however, if stewardship of the natural resources is practiced (Chiaretti, 2004).

Climate

Climate has been and still is an important factor of soil formation. Climate directly affects plant and animal life; the type and amount of erosion; and the movement of weathered minerals in, through, or out of the soil profile (USDA, 2005). Hot summers

Figure 149.—Tracks across an area of Denazar soils.

and moderately cold winters characterize the climate in the Recreation Area. Winds are out of the west-southwest and are commonly strongest during spring. Severe winds are often associated with thunderstorms that are also commonly from the southwest during the summer months. However, precipitation is restricted since the central Colorado Plateau region is in a rain shadow of the mountains to the east and west. The average annual rainfall ranges from 6 inches at Page, Arizona, to just less than 10 inches at Hite Marina in Utah (USDI, http://www.nps.gov/glca/naturescience/weather.html).

Much of soil development is dependent on the movement and weathering of minerals in the soil. High temperatures and rainfall encourage chemical and physical changes in the soil. The limited amount of precipitation in the Recreation Area is conducive to the accumulation of calcium carbonate and other soluble salts within many of the soils on more stable landscape positions. Weathered minerals are moved downward into the soil profile, where the water may evaporate before completely passing through the soil. This process deposits soluble salts at the wetting front, or the depth of water infiltration in the soil. Many of the upland soils in the Recreation Area, such as Earlweed and Seeg soils, have accumulations of calcium carbonates, expressed as a calcic horizon, in the subsoil (fig. 150).

Topography

Topography, or relief, affects soil formation through its influence on runoff, the rate of water infiltration, the amount and type of parent material deposition, and erosion. Topography is characterized by the length, shape, aspect, and degree of slope. It is important in determining the pattern and distribution of soils.

The amount of water entering the soil depends on slope, permeability, and the

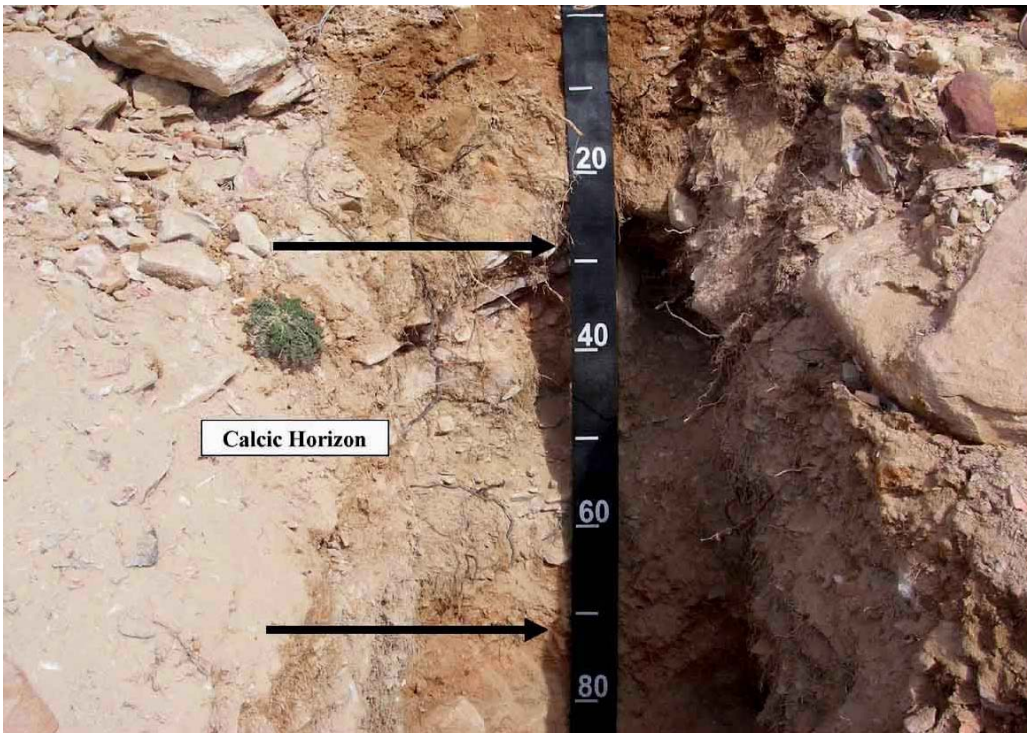

Figure 150.—A profile of the Seeg soil. The calcic horizon begins at 28 cm.

intensity of rainfall. Because runoff is rapid in steep areas, very little water passes through the soil, and soil formation is slow. Erosion may keep pace with the soil-forming processes. In gently sloping areas, runoff is slow, erosion is minimal, and water can pass more readily into the soil. Leaching, the translocation of clay, accumulations of salts, and other soil-forming processes are intensified. Soils in these areas generally show more profile development, forming distinguishable horizons, such as a cambic or calcic.

The amount of material deposited by wind or water depends on slope. As with water movement, the deposition or erosion of soil depends on velocities that are created or enhanced by topographic features. Soils such as Mido are subject to continuous short-term cycles of deposition and erosion because of their landscape position.

Soils on steep, south-facing slopes receive more direct sunlight and are drier and hotter than similar soils on north-facing slopes (Jorgensen, 2004). These conditions influence soil formation somewhat by affecting the kind of vegetation, the susceptibility to erosion, and the cycles of freezing and thawing.

Time

The degree of profile development depends on the length of time that the parent material has been in place and subject to the soil-forming processes. Older soils, which show the effects of leaching, accumulations, and clay movement, have developed distinct horizons in the soil profile. Young soils show little profile development. The soils in the Recreation Area vary in age, but are predominately young.

Soils that formed in recent alluvial deposits, such as Razito soils, or in eolian deposits, such as Sheppard soils, are the least developed or youngest in the

Recreation Area. The older soils have a greater number of profile features. The concentration of calcium or other carbonates, through weathering caused by percolating water into a distinct subsoil horizon, indicates development or an older soil. Soils that have a strong structure and evidence of clay movement expressed as an argillic horizon, such as Parkelei soils, are among the older, or more developed, soils in the survey area (fig. 151).

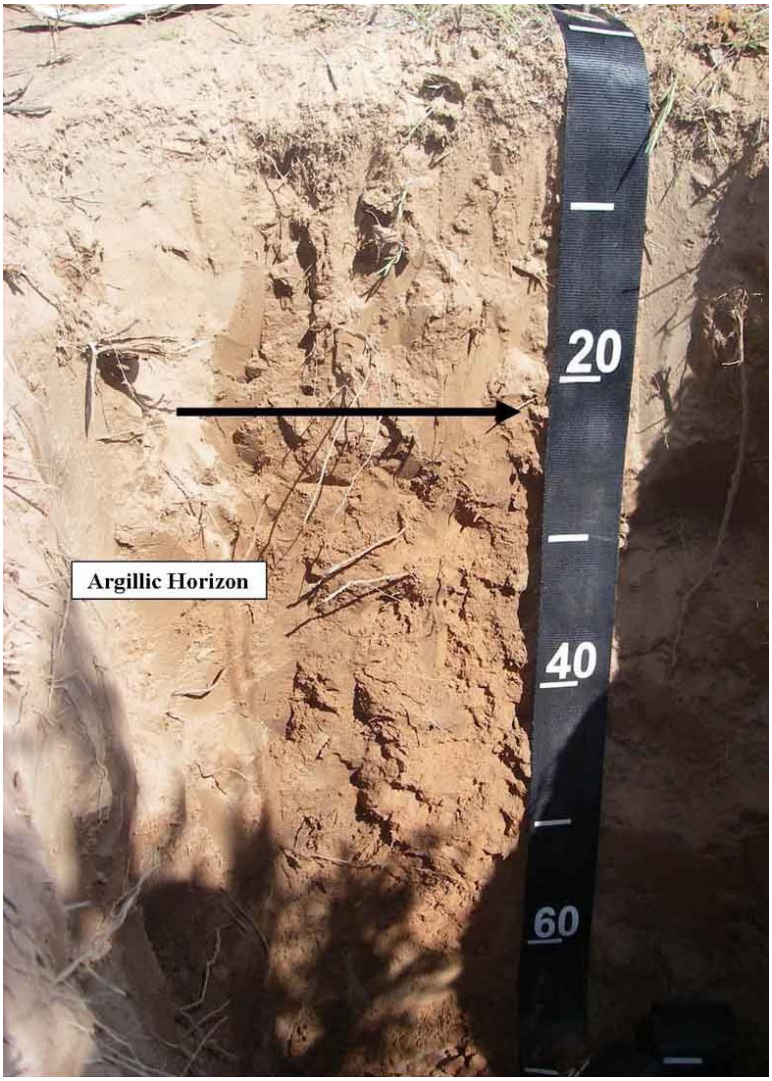

Figure 151.—A profile of the Parkelei soil. The argillic horizon begins at 23 cm.

Geology and Geomorphology

James M. Harrigan prepared this section.

Glen Canyon soils have undergone minimal soil formation. Soil forming processes have done little to disturb prior geologic sorting processes in Glen Canyon. With the close relationship between geology, soil mineralogy, and plants, we can observe clear differences in soil, geology, and habitat over small distances.

Geologic Formations

There are more than 18 sedimentary geologic formations. Some that are minor in extent are not described here. Depositional ages range from Pennsylvanian through Cretaceous periods (300 to 85 million years ago).

Honaker Trail Formation – gray to tan moderately resistant marine beds; limestone with poorly sorted, interbedded carbonate and clastic rocks; minor sandstone.

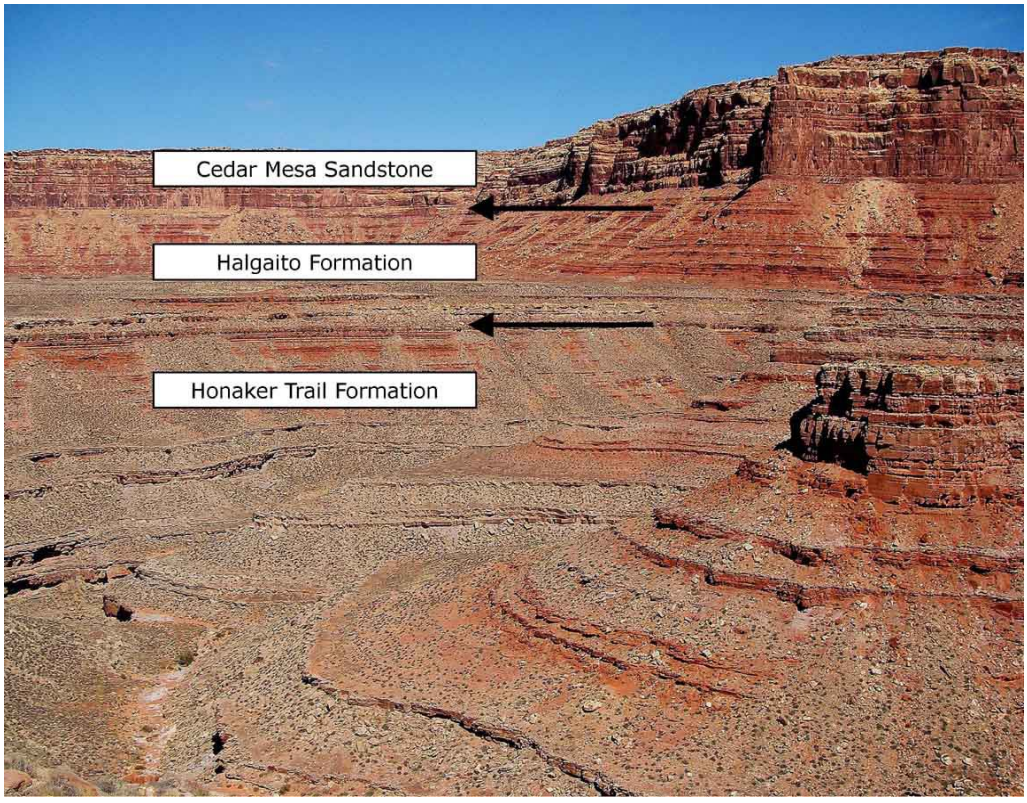

Figure 152.—Orientation is north along cliff faces of the San Juan River. The Honaker Trail Formation exists as blocky canyon walls with debris slides. In the Cutler Group, the Lower Halgaito Formation has a narrow shelf and the Cedar Mesa Sandstone is shear cliff face.

Halgaito Formation – red, yellowish tan to brown moderately resistant marine beds; limestone, sandstone, silty sandstone; fine to medium poorly-sorted grains.

Cedar Mesa Sandstone – yellowish tan to brown resistant cross-beds; eolian sandstone, fine to medium well-sorted grains, calcium carbonate cementation; minor coarse sandstone, red siltstone, and limestone (fig. 152).

Organ Rock Formation – reddish brown moderately resistant marginal marine sandstone, silty sandstone and shale; clasts chiefly quartz with minor muscovite, magnetite, feldspar and chert.

White Rim Sandstone – white to yellowish gray resistant eolian beds (lower half) and reworked marine beds (upper half); sandstone; minor chert.

Moenkopi Formation – dark red moderately resistant marginal marine and fluvial beds; sandstone, siltstone, mudstone and conglomerate; minor gypsum.

Chinle Formation – red, orange, purple, green and dark-brown weakly resistant shale, sandstone and conglomerate; contains bentonite from volcanic ash; minor mudstone, siltstone, and limestone.

Wingate Sandstone – pale orange, red, reddish-brown resistant eolian cross-beds; sandstone, very fine to fine, well-sorted, rounded and frosted grains, calcium carbonate cementation.

Kayenta Formation – pale red to dark-orange moderately resistant fluvial and marginal marine beds; sandstone and siltstone, fine to medium grains; minor shale.

Navajo Sandstone – tan to light reddish-brown resistant eolian cross-beds; sandstone, fine to medium, well-sorted, rounded and frosted grains, calcium carbonate and iron oxide cementation. (fig. 153)

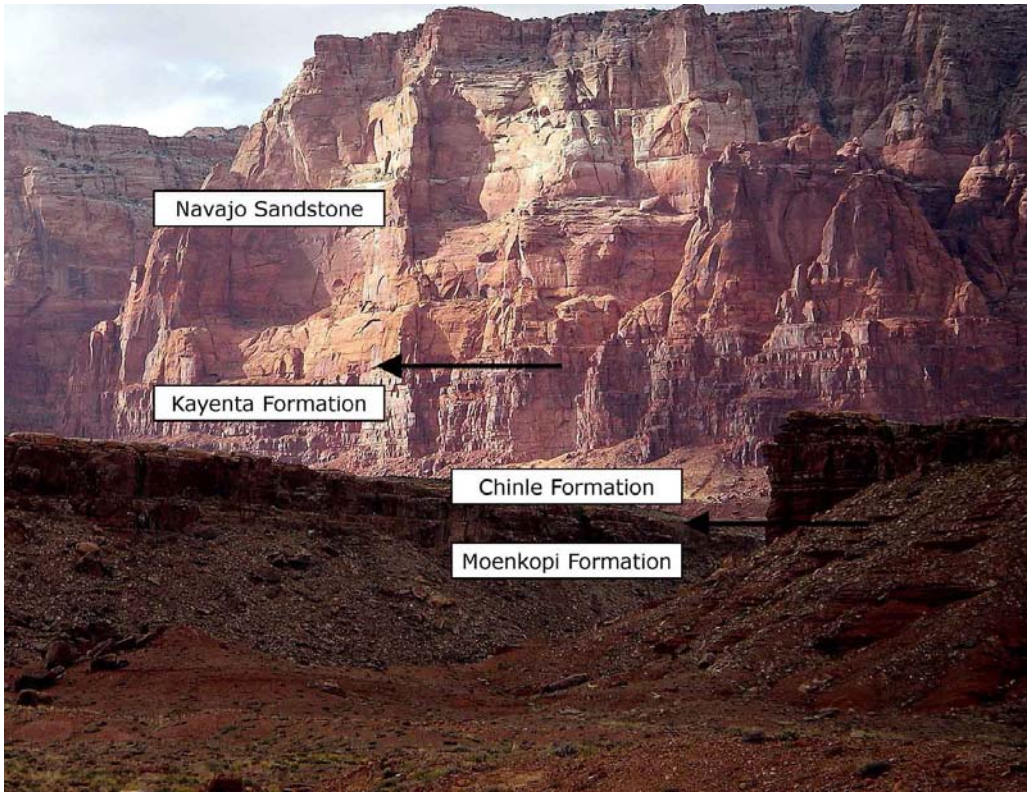

Figure 153.—Orientation is west near Lee's Ferry. The Moenkopi Formation, in the foreground, is gently sloping benches and ledges. The Kayenta Formation and the Navajo Sandstone are the cliff faces in the background.

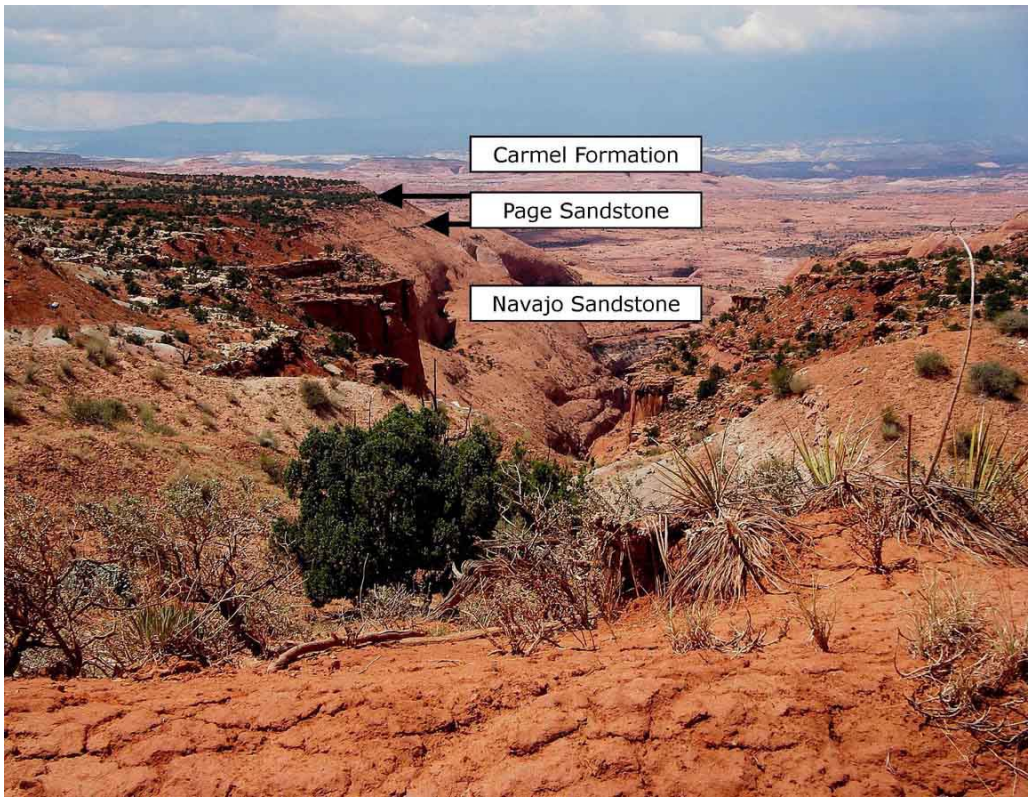

Figure 154.—Orientation is north from the top of a mesa near Allen Dump. The Navajo Sandstone exists as the steeply sloping sides of mesas along with the Page Sandstone. The Carmel Formation of the San Rafael Group is the cinnamon brown and white of the mesa crests.

Page Sandstone – tan to light reddish brown resistant eolian cross-beds; sandstone, fine to medium grained, rounded grains, calcium carbonate and iron oxide cementation.

Carmel Formation – reddish-brown, gray to white weakly resistant marginal marine and marine beds; sandstone, siltstone, limestone and shale; minor gypsum (fig. 154).

Entrada Sandstone – reddish-orange to white resistant, eolian cross-beds; sandstone, very fine and fine, well-rounded grains; sandstone, siltstone; minor shale.

Romana Sandstone – light-tan to gray-green and red resistant fluvial and eolian beds; sandstone, fine to coarse grains; minor siltstone and shale; gypsum veinlets.

Morrison Formation – tan, maroon, gray-green, yellow moderately resistant fluvial, marginal marine and eolian beds; sandstone, conglomerate and siltstone with volcanic ash, yellow reduced iron (fig. 155).

Dakota Formation – tan to brown or gray marine and marginal marine beds; strongly resistant sandstone (lower half), weakly resistant shale (upper half), sandy conglomerate; minor coal and gypsum.

Tropic Shale – dark gray weakly resistant marine beds; shale with coal and gypsum; minor sandstone and siltstone.

Straight Cliffs Formation – dark gray weakly resistant marine beds alternating with tan and brown resistant marine sandstone beds; sandstone, shale, siltstone, gypsum and coal (Sprinkel, 2003; Chronic, 2004) (fig. 156).

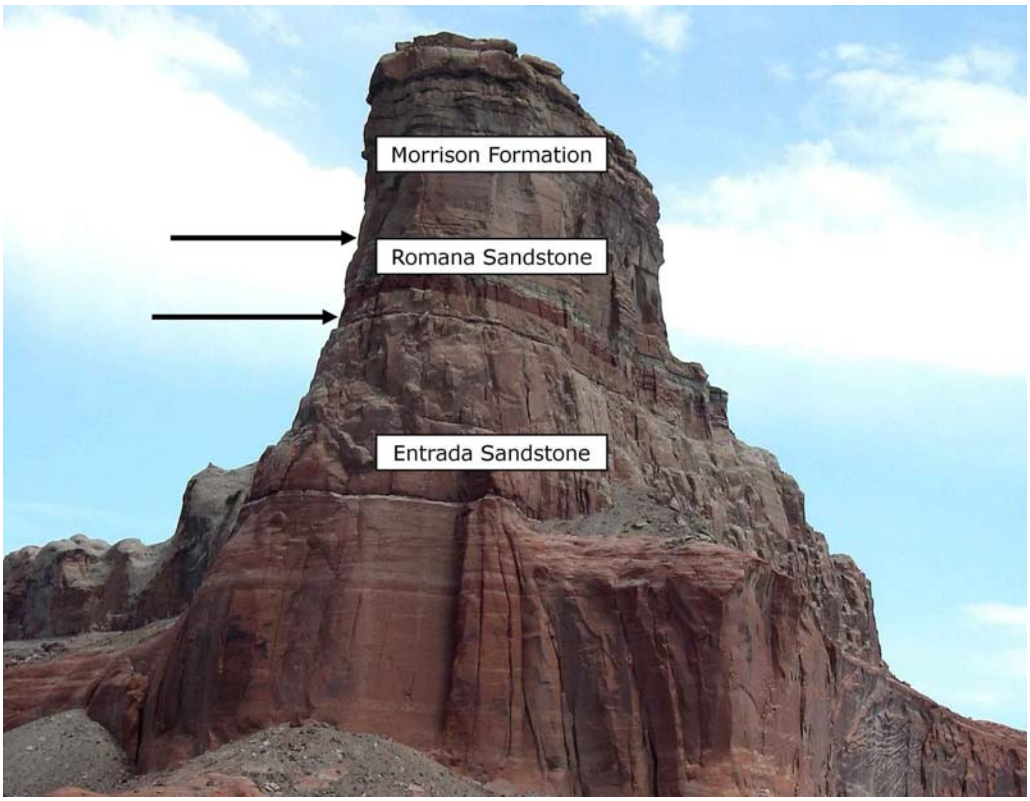

Figure 155.—Orientation is northeast from Lake Powell at Gunsight Butte. The Entrada Sandstone is the gently to steeply sloping bases of cliffs. The Romana Sandstone and the Morrison Formation is the more shear upper half of cliff faces.

Quaternary Deposition

Quaternary deposition refers to deposition from 1.805 million years ago to the present. In the Recreation Area relatively fewer Quaternary deposits exist because of the uplift and the general predominance of erosional environments. Nonetheless, there are eolian deposits, alluvium, stream terrace deposits, pediment gravels, colluvium and landslide deposits (USGS, 2006).

Structural Geology

The major event to influence structural geology of Recreation Area is the Laramide orogeny, from 90 to 50 million years ago. The orogeny is commonly attributed to the shallow subduction of plates sliding beneath the North American plate. Structural contraction came with faulting and folding of sedimentary beds that occurred before the Colorado Plateau uplift, including Waterpocket Fold and the Circle Cliffs uplift. The contraction caused zones of deformation bands having increased resistance to weathering and loss of porosity (Davis, 1999).

Geomorphology and Soil Morphology

Natural erosive conditions throughout Glen Canyon put it in a special class. There are a number of additive processes that cause this high erosion potential to be extreme:

1. The Colorado Plateau Uplift. Over the past 5,000,000 years the Colorado Plateau has been uplifted an average of 0.22 millimeters each year for a total of 1,100 meters (Sahagian, 2002). Regional uplift increases available work for soil erosion, increasing transport by gravitational force and subsequent river load. The resulting landscape factors (steeper slopes) increase overland water flow and promote erosion.

2. Most of the plateau has sand-dominated soil textures that are noncohesive. Weakly aggregated peds do not resist detachment. Where sand does not dominate, as in mudstone geologies, the heavy clays can swell and detach when wet to be transported in large aggregates.

3. Semi-arid vegetation serves as a fragile, but critical role in limiting erosion. Sand and loamy sand soils provide a weaker substrate for plants to become established.

4. Climate adds vulnerability to erosion. Freeze-thaw conditions move and separate particles. Violent monsoonal storms within narrow canyons will flush out large quantities of sand along with shrubs and non-native trees in a single episode.

Because of the regional soil loss from uplift and subsequent river transport, Glen Canyon soils are overwhelmingly very shallow and shallow in depth, between extensive areas of rock outcrop.

Landforms of Glen Canyon are commonly structural benches and mesas (formed from massive blocks of resistant sedimentary rock in this case), talus slopes (from bouldery rock topples), and rock monoliths. Structural geology plays a primary role in creating landforms. Rocks exposed at the surface have been uplifted from deeper

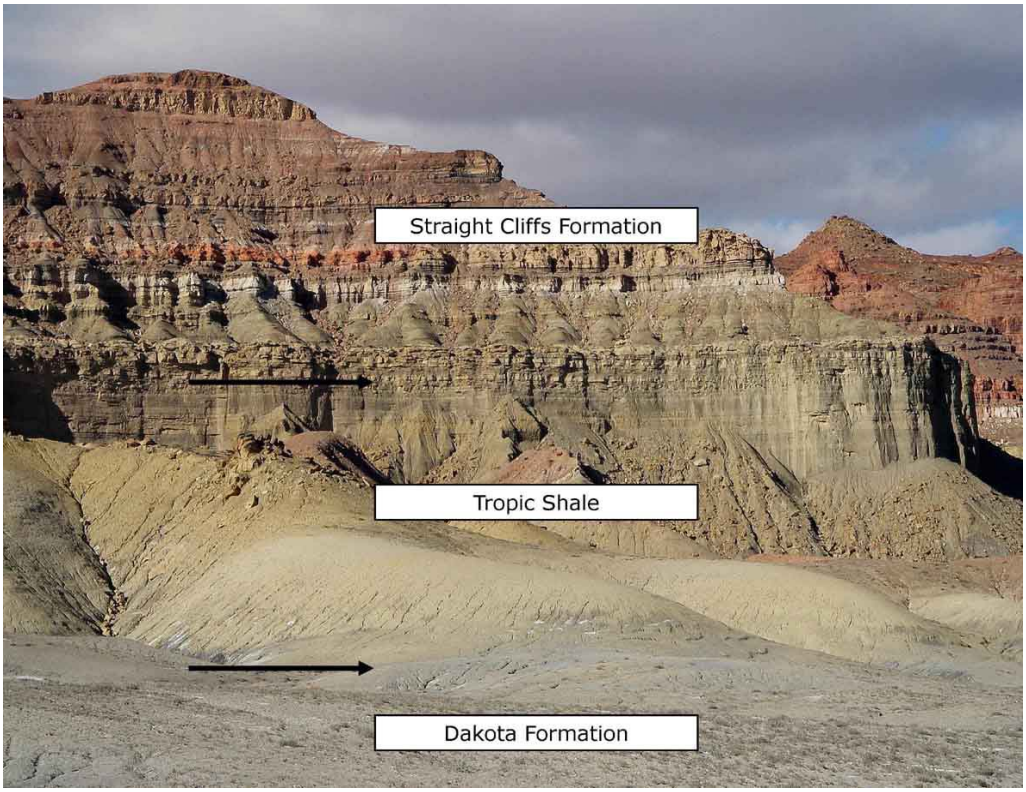

Figure 156.—Orientation is north from Romana Bench at the Smoky Mountains. The Dakota Formation is a stable shelf bedecked with shale. The Tropic Shale is the hillocks and sloping sides at the cliff base. The Straight Cliffs Formation is the steep upper cliff face.

Figure 157.—Orientation is northeast at Stevens Arch. The arch is in Navajo Sandstone near the contact with the Kayenta Formation. Natural arches form where rock is predisposed to erode by differential cementation or flowing cavernous waters.

levels in the crust where they have been broken, bent and contorted from structural geologic activity and tectonics (Twiss, 1992). Differential cementation and structural strain predispose rock to form shapes along zones of weaknesses within rocks and badlands. Differential rock cementation and fracture could allow water to flow within bedrock, enlarging pore spaces and cracks. Weathering might be aided additionally by the movement and drying of soluble salts wherever water can move. Iron oxide precipitation forms laminae, columns, and pipes. Ironstone, being resistant, weathers out as ledges, walls, fins, and towers (Chan, 2005). Joint system surfaces are vulnerable to weathering and frost wedging. Rock fins are produced from the eventual widening of joints and fractures (WWU, 2009). Uplift is especially important in creating certain land features that frequently are the precursors to natural arches, such as joints, fins, and incised meanders (NABS, 2009) (fig. 157).

Sandstone grains are coated with microscopic, oxidized iron films of the red mineral hematite (Chan, 2002) and oxidized manganese films of the black mineral pyrolusite. The coatings can become chemically reduced into soluble minerals and are transported with water along pores, cracks, and structural faults. When the water evaporates, the minerals are oxidized back to hematite and pyrolusite into concentrations where they are seen as the colorful red, tan, and black desert varnish in sandstone cliffs. The same process that creates the desert varnish also causes differential cementation and shapes landforms.

Another important cementing agent in sandstones such as the Entrada is calcium carbonate, or mineral calcite. Calcium carbonate will react with acids in water to cause structurally weak spots in the sandstone bedrock. Dissolved carbon dioxide

increases the solubilizing ability of water (because of increased acidity), particularly for carbonate minerals (Boggs, 1995).

The constant removal of soil from the region leads to immature shallow soils that lack pedogenic development. Soils in the Recreation Area are typically either residuum or blowing sands. A few very deep soils occur in bedrock depressions and cliff faces (where sands pile high), in stream beds, or in talus slopes (where fallen rocks weather). Movement of carbonates, gypsum, and soluble salts within the profile are the most common pedogenic processes seen. The Recreation Area receives more annual rainfall than most deserts, being semi-arid rather than arid; nevertheless, the coarse textured sandy and skeletal soils retain little water, creating the desert conditions. The combination of soils that have low water holding capacity and marginally low rainfall makes the Glen Canyon National Recreation Area unique.

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Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the “National Soil Survey Handbook” (available in local offices of the Natural Resources Conservation Service or on the Internet).

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial fan. A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

Alluvium. Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction toward which a slope faces. Also called slope aspect.

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:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Badland. A landscape that is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes and narrow interfluves. Badlands develop on surfaces that have little or no vegetative

cover overlying unconsolidated or poorly cemented materials (clays, silts, or sandstones) with, in some cases, soluble minerals, such as gypsum or halite.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope (geomorphology). A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bottom land. An informal term loosely applied to various portions of a flood plain.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Bouldery. Refers to a soil containing boulders in numbers that interfere with or prevent tillage.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.

Common resource area. (see Land Resource area)

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas 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 or miscellaneous areas are somewhat similar in all areas.

Concretions. See Redoximorphic features.

Conglomerate. A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

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.

Corrosion (geomorphology). A process of erosion whereby rocks and soil are removed or worn away by natural chemical processes, especially by the solvent action of running water, but also by other reactions, such as hydrolysis, hydration, carbonation, and oxidation.

Corrosion (soil survey interpretations). Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Densic materials. Materials that are relatively unaltered and have a noncemented rupture-resistance class. The bulk density or the organization is such that roots cannot enter, except in cracks. These are mostly earthy materials, such as till, volcanic mudflows, and some mechanically compacted materials, for example, mine spoils. Some noncemented rocks can be densic materials if they are dense or resistant enough to keep roots from entering, except in cracks.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Dune. A low mound, ridge, bank, or hill of loose, windblown granular material (generally sand), either barren and capable of movement from place to place or covered and stabilized with vegetation but retaining its characteristic shape.

Earthy fill. See Mine spoil.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to

produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eolian deposit. Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

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 human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion surface. A land surface shaped by the action of erosion, especially by running water.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.

Fan remnant. A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Flaggy soil material. Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. The nearly level plain that borders a stream and is subject to flooding unless protected artificially.

Flood-plain step. An essentially flat, terrace-like alluvial surface within a valley that is frequently covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of steps.

Fluvial. Of or pertaining to rivers or streams; produced by stream or river action.

Foothills. A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 1,000 feet (300 meters).

Footslope. The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A small channel with steep sides caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. 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.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hard to reclaim (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Head slope (geomorphology). A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

Hill. A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.

Hillslope. A generic term for the steeper part of a hill between its summit and the drainage line, valley flat, or depression floor at the base of a hill.

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 uppercase letter represents the major horizons. Numbers or lowercase 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:

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.—The 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.

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 overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Interfluve (geomorphology). A geomorphic component of hills consisting of the uppermost, comparatively level or gently sloping area of a hill; shoulders of backwearing hillslopes can narrow the upland or can merge, resulting in a strongly convex shape.

Intermittent stream. A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. See Redoximorphic features.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Land resource units (LRUs). These are the basic units from which major land resource areas (MLRAs) are determined. LRUs are created by subdividing MLRAs by resource concerns, soil groups, hydrologic units, resource use, topography, other landscape features, and human considerations affecting use and soil and water conservation treatment needs. Also refered to as common resource area (CRA).

Landslide. A general, encompassing term for most types of mass movement landforms and processes involving the downslope transport and outward deposition of soil and rock materials caused by gravitational forces; the movement may or may not involve saturated materials. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Ledge. A narrow shelf or projection of rock, much longer than wide, formed on a rock wall or cliff face,

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

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.

Low strength. The soil is not strong enough to support loads.

Major land resource areas (MLRAs). These are geographically associated land resource units (LRUs). Identification of these large areas is important in statewide agricultural planning and has value in interstate, regional, and national planning (USDA, 2006).

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal proportions; formed primarily under freshwater lacustrine conditions but also formed in more saline environments.

Mass movement. A generic term for the dislodgment and downslope transport of soil and rock material as a unit under direct gravitational stress.

Masses. See Redoximorphic features.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated landmass bounded by steep slopes or precipitous cliffs and capped by layers of resistant, nearly horizontal rocky material. The summit width is characteristically greater than the height of the bounding escarpments.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline.

Mine spoil. An accumulation of displaced earthy material, rock, or other waste material removed during mining or excavation. Also called earthy fill.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Miscellaneous area. A kind of map unit that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or 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.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range. Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

Mudstone. A blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately equal. Also, a general term for such material as clay, silt, claystone, siltstone, shale, and argillite and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. See Redoximorphic features.

Nose slope (geomorphology). A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent. Nose slopes consist dominantly of colluvium and slope-wash sediments (for example, slope alluvium).

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

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.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plateau (geomorphology). A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Pore linings. See Redoximorphic features.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed as 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 degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly 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

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations. See Redoximorphic features.

Redoximorphic depletions. See Redoximorphic features.

Redoximorphic features. Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:

A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*

B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*

C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.

2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:

A. Iron depletions, i.e., zones that contain low amounts of iron and manganese oxides but have a clay content similar to that of the adjacent matrix; *and*

B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletans).

3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Reduced matrix. See Redoximorphic features.

Relief. The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Riser. The vertical or steep side slope (e.g., escarpment) of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural, steplike landforms, such as successive stream terraces.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock varnish. A thin, dark, shiny film or coating, composed of iron oxide accompanied by traces of manganese oxide and silica, formed on the surfaces of pebbles, boulders, and other rock fragments, commonly on rock outcrops in arid regions. It is believed to be caused by exudation of mineralized solutions from within and deposition by evaporation on the surface.

Rocky. Used in the phase name of soil map units that have between .01 and 10 percent rock outcrop.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an 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 ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. 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-sized particles.

Saturated hydraulic conductivity (K_{sat}). See Permeability.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sedimentary rock. A consolidated deposit of clastic particles, chemical precipitates,

or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder. The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.

Shrink-swell (in tables). 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.

Side slope (geomorphology). A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel. Side slopes are dominantly colluvium and slope-wash sediments.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Slickensides (pedogenic). Grooved, striated, and/or glossy (shiny) slip faces on structural peds, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.

Slick rock. A barren, highly smoothed and subrounded bedrock pavement with considerable, irregular topography sculpted primarily by wind in an arid climate; a type of rock outcrop common on the top of massive sandstone bedrock (e.g. Navajo, Windgate, or Kayenta Formations), especially on summits of ridges and near the leading edge of plateaus, mesas and cuestas.

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.

Slope alluvium. Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished peds and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste.

It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It 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 and by the passage of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

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, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. 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 if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

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).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Talus. Rock fragments of any size or shape (commonly coarse and angular) derived from and lying at the base of a cliff or very steep rock slope. The accumulated mass of such loose broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are

slightly outside the range defined for the family of the series for which the soils are named.

Terrace (geomorphology). A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Toeslope. The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Tread. The flat to gently sloping, topmost, laterally extensive slope of terraces, flood-plain steps, or other stepped landforms; commonly a recurring part of a series of natural steplike landforms, such as successive stream terraces.

Upland. An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Weathering. All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth’s surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1971-2000 at Page, Arizona)

Month	Temperature (oF)						Precipitation (Inches)				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	oF	oF	oF	oF	oF	Units	In	In	In		In
January----	43.5	26.9	35.2	60	12	22	0.64	0.05	1.03	2	1.8
February---	50.6	31.4	41.0	67	15	88	0.49	0.11	0.84	1	0.9
March------	60.2	38.3	49.2	78	25	292	0.66	0.12	1.18	2	0.1
April------	69.4	45.1	57.2	87	30	518	0.50	0.08	0.89	1	0.1
May--------	79.2	53.9	66.6	95	38	820	0.43	0.04	0.76	1	0.0
June-------	91.3	63.9	77.6	103	49	1128	0.14	0.00	0.21	0	0.0
July-------	96.0	69.5	82.8	105	60	1320	0.58	0.12	1.04	1	0.0
August-----	92.9	67.6	80.3	102	48	1244	0.68	0.29	1.03	2	0.0
September--	84.3	59.4	71.9	98	44	948	0.68	0.11	1.10	1	0.0
October----	70.7	47.5	59.1	89	31	590	1.00	0.12	1.79	2	0.0
November---	54.4	35.5	44.9	72	22	177	0.56	0.10	0.98	1	0.6
December---	44.2	27.5	35.9	59	13	25	0.46	0.04	0.74	1	1.2
Yearly:											
Average---	69.7	47.2	58.5	---	---	---	---	---	---	---	---
Extreme---	109	-11	---	105	8	---	---	---	---	---	---
Total-----	---	---	---	---	---	7173	6.81	4.62	8.68	15	4.7

Average number of days per year with at least 1 inch of snow on the ground: 2

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (Threshhold: 40 degrees F).

Table 2.—Freeze Dates in Spring and Fall

(Recorded in the period 1971-2000 at Page, Arizona)

Probability	Temperature		
	24 oF or lower	28 oF or lower	32 oF or lower
	Beginning and Ending Dates Growing Season Length		
50 percent*	Feb. 7-Dec. 4 301 days	March 7-Nov. 20 259 days	March 27-Nov. 9 228 days
70 percent*	Jan. 28-Dec. 15 323 days	March 1-Nov. 27 272 days	March 21-Nov. 15 238 days

* Percent chance of the growing season occurring between the beginning and ending dates.

Table 3.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
1	Arches-Mido-Rock outcrop complex, 2 to 15 percent slopes	24,856	2.0
2	Bluechief-Needle complex, 2 to 15 percent slopes	388	*
3	Claysprings-Badland complex, 2 to 40 percent slopes	8,301	0.7
4	Cowboy clay loam, 3 to 10 percent slopes	3,892	0.3
5	Dient-Claysprings, complex, 5 to 65 percent slopes, bouldery	8,076	0.6
6	Earlweed-Anasazi complex, 5 to 22 percent slopes	12,920	1.0
7	Farb-Pagina-Rock outcrop complex, 4 to 20 percent slopes, bouldery	67,001	5.3
8	Gladel-Rock outcrop complex, 4 to 22 percent slopes, bouldery	3,296	0.3
9	Goblin very gravelly sandy loam, 6 to 45 percent slopes	873	*
10	Jaconita family-Atchee complex, 8 to 60 percent slopes, extremely bouldery	8,827	0.7
11	Juanalo family-Rock outcrop complex, 4 to 28 percent slopes, bouldery	12,519	1.0
12	Kydestea-Rock outcrop complex, 15 to 60 percent slopes, very bouldery	880	*
13	Moenkopie-Rock outcrop complex, 3 to 24 percent slopes	44,247	3.5
14	Moepitz family-Moenkopie-Rock outcrop complex, 12 to 64 percent slopes, extremely bouldery	6,072	0.5
15	Monue-Trail-Nepalto complex, 1 to 6 percent slopes	239	*
16	Myton very gravelly sandy loam, 5 to 18 percent slopes, very bouldery	7,239	0.6
17	Needle-Sheppard complex, 2 to 12 percent slopes, very rocky	17,350	1.4
18	Oxyaquic Torrifluvents, 1 to 4 percent slopes, occasionally flooded	2,012	0.2
19	Oxyaquic Torripsamments, 1 to 3 percent slopes, occasionally flooded	413	*
20	Pagina-Denazar complex, 2 to 14 percent slopes	45,483	3.6
21	Parkelei-Gladel complex, 2 to 12 percent slopes, rocky	871	*
22	Pennell cobbly loam, 3 to 10 percent slopes	690	*
23	Razito-Riverwash complex, 1 to 4 percent slopes, rarely flooded	2,070	0.2
24	Redhouse-Epikom families complex, 2 to 14 percent slopes	4,375	0.3
25	Reef-Rock outcrop complex, 2 to 30 percent slopes	8,255	0.7
26	Reef-Rock outcrop complex, 30 to 60 percent slopes, extremely bouldery	58,463	4.7
27	Remorris family-Rock outcrop complex, 4 to 35 percent slopes, gullied	3,262	0.3
28	Rizno-Rock outcrop complex, 1 to 25 percent slopes	47,804	3.8
29	Rizno-Rock outcrop complex, 2 to 15 percent slopes	526	*
30	Rock outcrop-Arches complex, 2 to 60 percent slopes	131,311	10.5
31	Rock outcrop-Atchee complex, 24 to 60 percent slopes, extremely bouldery	2,093	0.2
32	Rock outcrop-Needle complex, 2 to 30 percent slopes	250,943	20.0
33	Rock outcrop-Torriorthents complex, 20 to 65 percent slopes, extremely bouldery	119,964	9.6
34	Rock outcrop-Tsaya complex, 15 to 60 percent slopes, extremely bouldery	12,404	1.0
35	Sazi-Rizno complex, 2 to 15 percent slopes	867	*
36	Seeg gravelly loam, 4 to 24 percent slopes, bouldery	2,743	0.2
37	Sheppard sand, 2 to 15 percent slopes	4,215	0.3
38	Sheppard-Tsaya-Bluechief families complex, 2 to 15 percent slopes	4,910	0.4
39	Somorent family-Rock outcrop complex, 5 to 12 percent slopes	9,795	0.8
40	Torriorthents-Rock outcrop complex, 35 to 70 percent slopes, extremely bouldery	16,460	1.3
41	Torriorthents-Rock outcrop-Badland complex, 4 to 70 percent slopes, extremely bouldery	56,594	4.5
42	Tsaya-Rock outcrop complex, 2 to 18 percent slopes	18,401	1.5
43	Tsaya family-Moenkopie complex, 2 to 15 percent slopes	9,596	0.8
44	Ustic Torriorthents-Rock outcrop-Badland complex, 4 to 54 percent slopes, extremely bouldery	36,291	2.9
45	Water	165,418	13.2
46	Westmion-Rock outcrop complex, 4 to 18 percent slopes, stony	11,101	0.9
	Total	1,254,306	100.0

* Less than 0.1 percent.

Table 4.--Ecological Sites and Characteristic Plant Communities

[Composition of forest understory based on understory productivity; range site composition is based on percent dry weight. Forest understory is defined as production less than or equal to 13 feet in height. Characteristic plants are pulled from the component existing plants table in the National Soils Information System (NASIS). Absence of an entry indicates the species totalled less than one percent of annual production.]

Map unit symbol soil name - % of map unit	Ecological site name and number	Total production		Characteristic plants	Range Composition
		Kind of year	Dry weight		
			Lb/ac		Pct
1:					
Arches - 40%----	Semidesert Shallow Sand (Utah Juniper-Pinyon) (R035XY227UT)	Favorable	300	mesa dropseed	51
		Normal	150	Utah juniper	22
		Unfavorable	25	Cutler Mormon tea	13
				crispleaf buckwheat	10
Mido - 35%------	Semidesert Sand (Fourwing Saltbush) (R035XY212UT)	Favorable	900	Resinbush	23
		Normal	600	Utah juniper	17
		Unfavorable	300	rosemary mint	10
				mesa dropseed	7
2:					
Bluechief - 45%-	Desert Sandy Loam (Blackbrush) (R035XY121UT)	Favorable	400	blackbrush	45
		Normal	250	Indian ricegrass	35
		Unfavorable	75	galleta	15
				Torrey Mormon tea	5
Needle - 40%----	Desert Shallow Sandy Loam (Blackbrush) (R035XY133UT)	Favorable	300	blackbrush	25
		Normal	200	rubber rabbitbrush	20
		Unfavorable	100	Indian ricegrass	10
				Douglas rabbitbrush	5
				Torrey Mormon tea	5
				broom snakeweed	5
				desert trumpet buckwheat	5
				galleta	5
				gooseberryleaf globemallow	5
3:					
Claysprings - 65%----------	Desert Shallow Clay (Mat Saltbush) (R035XY124UT)	Favorable	50	mat saltbush	50
		Normal	25	shadscale saltbush	17
		Unfavorable	1		
4:					
Cowboy - 85%----	Desert Shallow Clay (Mat Saltbush) (R035XY124UT)	Favorable	600	mat saltbush	84
		Normal	400	Native American pipeweed	3
		Unfavorable	200		
5:					
Dient - 65%-----	Desert Stony Loam (Blackbrush) (R035XY139UT)	Favorable	500	blackbrush	41
		Normal	300	shadscale saltbush	24
		Unfavorable	200	galleta	11
Claysprings - 30%----------	Desert Shallow Clay (Mat Saltbush) (R035XY124UT)	Favorable	500	rayless goldenhead	41
		Normal	300	blackbrush	13
		Unfavorable	200	galleta	12
				Anderson wolfberry	10
6:					
Earlweed - 60%--	Semidesert Sand (Fourwing Saltbush) (R035XY212UT)	Favorable	900	Utah juniper	60
		Normal	600	Cutler Mormon tea	9
		Unfavorable	300	Indian ricegrass	8
				galleta	8

Table 4.--Ecological Sites and Characteristic Plant Communities--Continued

(Composition of forest understory based on canopy cover; range sites are based on percent weight.)

Map unit symbol soil name - % of map unit	Ecological site name and number	Total production		Characteristic plants	Range Composition
		Kind of year	Dry weight		
			Lb/ac		Pct
6:					
Anasazi - 30%---	Semidesert Sandy Loam (Blackbrush) (R035XY218UT)	Favorable	900	blackbrush	59
		Normal	600	galleta	10
		Unfavorable	300	Cutler Mormon tea	6
				Indian ricegrass	6
				shadscale saltbush	6
7:					
Farb - 35%------	Desert Shallow Sandy Loam (Blackbrush) (R035XY133UT)	Favorable	300	blackbrush	44
		Normal	200	galleta	18
		Unfavorable	100	broom snakeweed	12
				plains pricklypear	11
Pagina - 30%----	Desert Sandy Loam (Blackbrush) (R035XY121UT)	Favorable	300	blackbrush	44
		Normal	200	galleta	18
		Unfavorable	100	broom snakeweed	12
				plains pricklypear	11
8:					
Gladel - 50%----	Upland Shallow Loam (Pinyon-Utah Juniper) (R035XY315UT)	Favorable	600	pinyon	31
		Normal	400	Wyoming big sagebrush	18
		Unfavorable	150	Utah juniper	16
				dwarf lousewort	12
				Utah serviceberry	10
				muttongrass	9
9:					
Goblin - 90%----	Desert Very Shallow Gypsum (Torrey's Jointfir) (R035XY142UT)	Favorable	100	shadscale saltbush	24
		Normal	75	rubber rabbitbrush	23
		Unfavorable	50	galleta	20
				Torrey Mormon tea	15
				scarlet globemallow	5
				buckwheat	4
10:					
Jaconita Family 50%----------	Semidesert Stony Loam (Utah Juniper-Pinyon) (R035XY246UT)	Favorable	3000	Utah juniper	71
		Normal	2000	grassy rockgoldenrod	13
		Unfavorable	750		
Atchee - 40%----	Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper) (R035XY263UT)	Favorable	1500	Utah serviceberry	44
		Normal	1000	Wyoming big sagebrush	15
		Unfavorable	600	bluebunch wheatgrass	11
				alderleaf mountain-mahogany	9
				muttongrass	6
11:					
Juanalo Family - 75%----------	Desert Shallow Sandy Loam (Shadscale) (R035XY130UT)	Favorable	400	shadscale saltbush	54
		Normal	300	galleta	16
		Unfavorable	150	sixweeks fescue	7

Table 4.--Ecological Sites and Characteristic Plant Communities--Continued

(Composition of forest understory based on canopy cover; range sites are based on percent weight.)

Map unit symbol soil name - % of map unit	Ecological site name and number	Total production		Characteristic plants	Range Composition
		Kind of year	Dry weight		
			Lb/ac		Pct
12:					
Kydestea - 50%--	Upland Stony Loam (Pinyon-Utah Juniper) (R035XY321UT)	Favorable	700	pinyon	52
		Normal	450	Utah juniper	26
		Unfavorable	300	Utah serviceberry	7
				Wyoming big sagebrush	6
				dwarf lousewort	4
13:					
Moenkopie - 60%-	Desert Shallow Sandy Loam (Shadscale) (R035XY130UT)	Favorable	300	shadscale saltbush	32
		Normal	200	blackbrush	21
		Unfavorable	100	pricklypear	13
				Indian ricegrass	9
				Cutler Mormon tea	8
				galleta	8
14:					
Moepitz Family - 55%----------	Desert Stony Loam (Blackbrush) (R035XY139UT)	Favorable	400	blackbrush	38
		Normal	250	shadscale saltbush	38
		Unfavorable	150		
Moenkopie - 25%-	Desert Shallow Sandy Loam (Shadscale) (R035XY130UT)	Favorable	300	shadscale saltbush	56
		Normal	200	blackbrush	24
		Unfavorable	100	Jones's pepperweed	6
15:					
Monue - 30%-----	Alkali Bottom (Greasewood) (R035XY003UT)	Favorable	700	sand dropseed	30
		Normal	600	greasewood	25
		Unfavorable	500	seepweed	20
				fourwing saltbush	10
				Indian ricegrass	5
				russian thistle	5
Trail - 30%-----	Desert Sandy Loam (Fourwing Saltbush) (R035XY118UT)	Favorable	200	seepweed	45
		Normal	100	fourwing saltbush	25
		Unfavorable	50	plains pricklypear	10
				russian thistle	10
Nepalto - 25%---	Desert Stony Loam (Shadscale-Bud Sagebrush) (R035XY136UT)	Favorable	350	sand sagebrush	30
		Normal	250	shadscale saltbush	20
		Unfavorable	150	Indian ricegrass	10
				sand dropseed	10
				Torrey Mormon tea	5
				galleta	5
16:					
Myton - 95%-----	Desert Stony Loam (Shadscale-Bud Sagebrush) (R035XY136UT)	Favorable	500	shadscale saltbush	33
		Normal	300	galleta	23
		Unfavorable	150	fluffgrass	9
				gooseberryleaf	9
				globemallow	

Table 4.--Ecological Sites and Characteristic Plant Communities--Continued

(Composition of forest understory based on canopy cover; range sites are based on percent weight.)

Map unit symbol soil name - % of map unit	Ecological site name and number	Total production		Characteristic plants	Range Composition
		Kind of year	Dry weight		
			Lb/ac		Pct
17:					
Needle - 50%----	Sandstone Rockland 6-10" p.z. (R035XB255AZ)	Favorable	400	mesa dropseed	48
		Normal	300	sand verbena	11
		Unfavorable	200	sand sagebrush	10
				Ephedra cutleri	9
Sheppard - 40%--	Desert Sand (Sand Sagebrush) (R035XY115UT)	Favorable	400	mesa dropseed	48
		Normal	300	sand verbena	11
		Unfavorable	200	sand sagebrush	10
				Ephedra cutleri	9
18:					
Oxyaquic Torrifluvents - 80%----------	Semiwet Saline Streambank (Fremont Cottonwood) (R035XY012UT)	Favorable	5000	cottonwood	57
		Normal	3000	willow	12
		Unfavorable	2000	saltcedar tamarisk	8
19:					
Oxyaquic Torripsamments 90%----------	Semiwet Saline Streambank (Fremont Cottonwood) (R035XY012UT)	Favorable	5000	Fremont cottonwood	65
		Normal	3000	scouringrush horsetail	5
		Unfavorable	2000	Goodding's willow	4
20:					
Pagina - 65%----	Desert Sandy Loam (Blackbrush) (R035XY121UT)	Favorable	500	blackbrush	29
		Normal	300	broom snakeweed	26
		Unfavorable	150	mesa dropseed	9
20:					
Denazar - 30%---	Desert Sand (Sand Sagebrush) (R035XY115UT)	Favorable	800	mesa dropseed	38
		Normal	500	gooseberryleaf	12
		Unfavorable	200	globemallow	
				Cutler Mormon tea	9
				sumac	10
				desert needlegrass	5
27:					
Remorris Family 75%----------	Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush) (R035XY236UT)	Favorable	800	Utah juniper	57
		Normal	500	galleta	25
		Unfavorable	300	narrowleaf yucca	5
28:					
Rizno - 60%-----	Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush) (R035XY236UT)	Favorable	400	blackbrush	35
		Normal	300	Utah juniper	25
		Unfavorable	200	twoneedle pinyon	10
				broom snakeweed	8
				green Mormon tea	5
				plains pricklypear	5
29:					
Rizno - 40%-----	Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush) (R035XY236UT)	Favorable	500	Utah juniper	30
		Normal	300	twoneedle pinyon	25
		Unfavorable	150	broom snakeweed	20
				fourwing saltbush	10
				Mormon tea	5
				cliffrose	5
				plains pricklypear	5

Table 4.--Ecological Sites and Characteristic Plant Communities--Continued

(Composition of forest understory based on canopy cover; range sites are based on percent weight.)

Map unit symbol soil name - % of map unit	Ecological site name and number	Total production		Characteristic plants	Range Composition
		Kind of year	Dry weight		
			Lb/ac		Pct
30:					
Arches - 30%----	Semidesert Shallow Sand (Utah Juniper-Pinyon) (R035XY227UT)	Favorable	300	mesa dropseed	51
		Normal	150	Utah juniper	22
		Unfavorable	25	Cutler Mormon tea	13
				crispleaf buckwheat	10
31:					
Atchee - 35%----	Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper) (R035XY263UT)	Favorable	1500	Utah serviceberry	44
		Normal	1000	Wyoming big sagebrush	15
		Unfavorable	600	bluebunch wheatgrass	11
				alderleaf mountain-mahogany	9
				muttongrass	6
32:					
Needle - 35%----	Sandstone Rockland 6-10" p.z. (R035XB255AZ)	Favorable	400	blackbrush	19
		Normal	250	broom snakeweed	19
		Unfavorable	100	black grama	17
33:					
Torriorthents - 40%----------	Talus Slope (Blackbrush-Shadscale) (R035XY018UT)	Favorable	400	fourwing saltbush	47
		Normal	200	galleta	13
		Unfavorable	50	skeletonweed buckwheat	10
				Torrey Mormon tea	5
34:					
Tsaya - 40%-----	Desert Very Steep Stony Loam (Shadscale) (R035XY146UT)	Favorable	300	shadscale saltbush	22
		Normal	150	rayless goldenhead	18
		Unfavorable	50	rubber rabbitbrush	6
				bottlebrush squirreltail	2
35:					
Sazi - 50%------	Semidesert Sandy Loam (Blackbrush) (R035XY218UT)	Favorable	300	blackbrush	29
		Normal	250	galleta	15
		Unfavorable	200	Desert Princesplume	14
				scarlet globemallow	13
				shadscale saltbush	10
				Indian ricegrass	5
				broom snakeweed	5
Rizno - 30%-----	Semidesert Shallow Sandy Loam (Blackbrush) (R035XY233UT)	Favorable	300	blackbrush	47
		Normal	200	Desert Princesplume	15
		Unfavorable	100	galleta	10
				shadscale saltbush	10
				Torrey's jointfir	8
				Indian ricegrass	3
36:					
Seeg - 95%------	Desert Stony Loam (Shadscale-Bud Sagebrush) (R035XY136UT)	Favorable	600	galleta	45
		Normal	400	shadscale saltbush	21
		Unfavorable	200	rayless goldenhead	15
37:					
Sheppard - 85%--	Desert Sand (Sand Sagebrush) (R035XY115UT)	Favorable	400	alkali jimmyweed	34
		Normal	200	sand sagebrush	11
		Unfavorable	100	scurfpea	11

Table 4.--Ecological Sites and Characteristic Plant Communities—Continued

(Composition of forest understory based on canopy cover; range sites are based on percent weight.)

Map unit symbol soil name - % of map unit	Ecological site name and number	Total production		Characteristic plants	Range Composition
		Kind of year	Dry weight		
			Lb/ac		Pct
38:					
Sheppard Family 30%----------	Desert Sandy Loam (Blackbrush) (R035XY121UT)	Favorable	350	blackbrush	50
		Normal	250	Indian ricegrass	10
		Unfavorable	150	shadscale saltbush	10
				Torrey Mormon tea	5
				desert trumpet buckwheat	5
				galleta	5
Tsaya Family - 30%----------	Desert Shallow Sandy Loam (Blackbrush) (R035XY133UT)	Favorable	150	blackbrush	45
		Normal	100	Torrey Mormon tea	10
		Unfavorable	50	galleta	10
				Brenda's yellow cryptantha	5
				broom snakeweed	5
				rubber rabbitbrush	5
Bluechief Family 20%----------	Desert Shallow Sandy Loam (Blackbrush) (R035XY133UT)	Favorable	150	blackbrush	45
		Normal	100	Torrey Mormon tea	10
		Unfavorable	50	galleta	10
				Brenda's yellow cryptantha	5
				broom snakeweed	5
				rubber rabbitbrush	5
39:					
Somorent Family 85%----------	Desert Shallow Sandy Loam (Shadscale) (R035XY130UT)	Favorable	250	skeletonweed buckwheat	54
		Normal	150	shadscale saltbush	27
		Unfavorable	50	crispleaf buckwheat	7
40:					
Torriorthents - 50%----------	Desert Very Steep Stony Loam (Shadscale) (R035XY146UT)	Favorable	100	needle and thread	20
		Normal	60	galleta	15
		Unfavorable	10	mat saltbush	15
				roundleaf buffaloberry	15
				green Mormon tea	10
				Utah juniper	6
				fourwing saltbush	5
41:					
Torriorthents - 45%----------	Desert Very Steep Stony Loam (Shadscale) (R035XY146UT)	Favorable	500	shadscale saltbush	33
		Normal	300	cheatgrass	27
		Unfavorable	150		
42:					
Tsaya - 65%-----	Desert Shallow Sandy Loam (Blackbrush) (R035XY133UT)	Favorable	500	blackbrush	21
		Normal	300	shadscale saltbush	21
		Unfavorable	200	skeletonweed buckwheat	20

Table 4.--Ecological Sites and Characteristic Plant Communities—Continued

(Composition of forest understory based on canopy cover; range sites are based on percent weight.)

Map unit symbol soil name - % of map unit	Ecological site name and number	Total production		Characteristic plants	Range Composition
		Kind of year	Dry weight		
			Lb/ac		Pct
43:					
Tsaya Family - 50%----------	Desert Shallow Sandy Loam (Shadscale) (R035XY130UT)	Favorable	350	galleta	45
		Normal	250	shadscale saltbush	35
		Unfavorable	150	Torrey Mormon tea	10
Moenkopie - 40%-	Desert Shallow Sandy Loam (Shadscale) (R035XY130UT)	Favorable	300	shadscale saltbush	55
		Normal	200	galleta	20
		Unfavorable	100	cheatgrass	7
				Torrey Mormon tea	5
				broom snakeweed	4
				Indian ricegrass	3
44:					
Ustic Torriorthents - 45%----------	Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper) (R035XY263UT)	Favorable	300	Utah juniper	42
		Normal	250	pinyon	22
		Unfavorable	200	broom snakeweed	14
				Ephedra cutleri	13
				Indian ricegrass	8
46:					
Westmion - 60%--	Semidesert Shallow Clay (Shadscale-Utah Juniper) (R035XY239UT)	Favorable	500	Utah juniper	34
		Normal	300	blackbrush	26
		Unfavorable	150	Mormon tea	8
				broom snakeweed	6
				roundleaf buffaloberry	6

Table 5.--Index of Common Names, Plant Symbols, and Scientific Names, sorted by common name

Plants displayed occur within the National Soils Information System (NASIS) plant tables used for the soil survey area. The scientific and common names are referenced at the USDA PLANTS database: plants.usda.gov

Local Common Name	Plant Symbol	Scientific Name
alderleaf mountain-mahogany	CEMO2	Cercocarpus montanus
alkali jimmyweed	ISACA2	Isocoma acradenia var. acradenia
Anderson wolfberry	LYAN	Lycium andersonii
black grama	BOER4	Bouteloua eriopoda
blackbrush	CORA	Coleogyne ramosissima
bluebunch wheatgrass	PSSPS	Pseudoroegneria spicata ssp. spicata
bottlebrush squirreltail	ELEL5	Elymus elymoides
Brenda's yellow cryptantha	CRFL5	Cryptantha flava
broom snakeweed	GUSA2	Gutierrezia sarothrae
buckwheat	ERIOG	Eriogonum
cheatgrass	BRTE	Bromus tectorum
China tamarisk	TACH2	Tamarix chinensis
cliffrose	PUER2	Purshia ericifolia
cottonwood	POPUL	Populus
crispleaf buckwheat	ERCO14	Eriogonum corymbosum
Cutler Mormon tea	EPCU	Ephedra cutleri
desert needlegrass	ACSP12	Achnatherum speciosum
Desert Princesplume	STPI	Stanleya pinnata
desert trumpet buckwheat	ERIN4	Eriogonum inflatum
Douglas rabbitbrush	CHVI8	Chrysothamnus viscidiflorus
dwarf lousewort	PECE	Pedicularis centranthera
Ephedra cutleri	EPCU	Ephedra cutleri
fluffgrass	DAPU7	Dasyochloa pulchella
fourwing saltbush	ATCA2	Atriplex canescens
Fremont cottonwood	POFR2	Populus fremontii
galleta	PLJA	Pleuraphis jamesii
Goodding's willow	SAGO	Salix gooddingii
gooseberryleaf globemallow	SPGR2	Sphaeralcea grossulariifolia
grassy rockgoldenrod	PEPU7	Petradoria pumila
greasewood	SAVE4	Sarcobatus vermiculatus
green Mormon tea	EPVI	Ephedra viridis
Indian ricegrass	ACHY	Achnatherum hymenoides
Jones's pepperweed	LEMOJ	Lepidium montanum var. jonesii
mat saltbush	ATCO4	Atriplex corrugata
mesa dropseed	SPFL2	Sporobolus flexuosus
muttongrass	POFE	Poa fendleriana
Mormon tea	EPVI	Ephedra viridis
narrowleaf yucca	YUAN2	Yucca angustissima
Native American pipeweed	ERIN4	Eriogonum inflatum
needle and thread	HECOC8	Hesperostipa comata ssp. comata
pinyon	PIED	Pinus edulis
plains pricklypear	OPPO	Opuntia polyacantha
Pleuraphis jamesii	PLJA	Pleuraphis jamesii
pricklypear	OPUNT	Opuntia
rayless goldenhead	ACSP	Acamptopappus sphaerocephalus
Resinbush	VAST3	Vanclevea stylosa
rosemary mint	POIN3	Poliomintha incana
roundleaf buffaloberry	SHRO	Shepherdia rotundifolia
rubber rabbitbrush	ERNA10	Ericameria nauseosa
saltcedar tamarisk	TARA	Tamarix ramosissima
sand dropseed	SPCR	Sporobolus cryptandrus
sand sagebrush	ARFI2	Artemisia filifolia
sand verbena	ABRON	Abronia
scarlet globemallow	SPCO	Sphaeralcea coccinea
scouringrush horsetail	EQHY	Equisetum hyemale
scurfpea	PSTE5	Psoralidium tenuiflorum
seepweed	SUAED	Suaeda
shadscale saltbush	ATCO	Atriplex confertifolia
singleleaf ash	FRAN2	Fraxinus anomala
sixweeks fescue	VUOC	Vulpia octoflora
skeletonweed buckwheat	ERDE6	Eriogonum deflexum

Table 5.--Index of Common Names, Plant Symbols and Scientific Names--Continued

Local Common Name	Plant Symbol	Scientific Name
sumac	RHUS	Rhus
Torrey's jointfir	EPTO	Ephedra torreyana
Torrey Mormon tea	EPTO	Ephedra torreyana
twoneedle pinyon	PIED	Pinus edulis
Utah juniper	JUOS	Juniperus osteosperma
Utah serviceberry	AMUT	Amelanchier utahensis
willow	SALIX	Salix
Wyoming big sagebrush	ARTRV	Artemisia tridentata ssp. vaseyana
Wyoming big sagebrush	ARTRW8	Artemisia tridentata ssp. wyomingensis

Table 6.--Index of Plant Symbols, Common Names, and Scientific Names, sorted by plant symbol

Plants displayed occur within the National Soils Information System (NASIS) plant tables used for the soil survey area. The scientific and common names are referenced at the USDA PLANTS database: plants.usda.gov

Plant Symbol	Local Common Name	Scientific Name
ABRON	sand verbena	Abronia
ACHY	Indian ricegrass	Achnatherum hymenoides
ACSP	rayless goldenhead	Acamptopappus sphaerocephalus
ACSP12	desert needlegrass	Achnatherum speciosum
AMUT	Utah serviceberry	Amelanchier utahensis
ARFI2	sand sagebrush	Artemisia filifolia
ARTRV	Wyoming big sagebrush	Artemisia tridentata ssp. vaseyana
ARTRW8	Wyoming big sagebrush	Artemisia tridentata ssp. wyomingensis
ATCA2	fourwing saltbush	Atriplex canescens
ATCO	shadscale saltbush	Atriplex confertifolia
ATCO4	mat saltbrush	Atriplex corrugata
BOER4	black grama	Bouteloua eriopoda
BRTE	cheatgrass	Bromus tectorum
CEMO2	alderleaf mountain-mahogany	Cercocarpus montanus
CHVI8	Douglas rabbitbrush	Chrysothamnus viscidiflorus
CORA	blackbrush	Coleogyne ramosissima
CRFL5	Brenda's yellow cryptantha	Cryptantha flava
DAPU7	fluffgrass	Dasyochloa pulchella
ELEL5	bottlebrush squirreltail	Elymus elymoides
EPCU	Cutler Mormon tea	Ephedra cutleri
EPCU	Ephedra cutleri	Ephedra cutleri
EPTO	Torrey's jointfir	Ephedra torreyana
EPTO	Torrey Mormon tea	Ephedra torreyana
EPVI	green Mormon tea	Ephedra viridis
EPVI	Mormon tea	Ephedra viridis
EQHY	scouringrush horsetail	Equisetum hyemale
ERCO14	crispleaf buckwheat	Eriogonum corymbosum
ERDE6	skeletonweed buckwheat	Eriogonum deflexum
ERIN4	desert trumpet buckwheat	Eriogonum inflatum
ERIN4	Native American pipeweed	Eriogonum inflatum
ERIOG	buckwheat	Eriogonum
ERNA10	rubber rabbitbrush	Ericameria nauseosa
FRAN2	singleleaf ash	Fraxinus anomala
GUSA2	broom snakeweed	Gutierrezia sarothrae
HECOC8	needle and thread	Hesperostipa comata ssp. comata
ISACA2	alkali jimmyweed	Isocoma acradenia var. acradenia
JUOS	Utah juniper	Juniperus osteosperma
LEMOJ	Jones's pepperweed	Lepidium montanum var. jonesii
LYAN	Anderson wolfberry	Lycium andersonii
OPPO	plains pricklypear	Opuntia polyacantha
OPUNT	pricklypear	Opuntia
PECE	dwarf lousewort	Pedicularis centranthera
PEPU7	grassy rockgoldenrod	Petradoria pumila
PIED	pinyon	Pinus edulis
PIED	twoneedle pinyon	Pinus edulis
PLJA	galleta	Pleuraphis jamesii
PLJA	Pleuraphis jamesii	Pleuraphis jamesii
POFE	muttongrass	Poa fendleriana
POFR2	Fremont cottonwood	Populus fremontii
POIN3	rosemary mint	Poliomintha incana
POPUL	cottonwood	Populus
PSSPS	bluebunch wheatgrass	Pseudoroegneria spicata ssp. spicata
PSTE5	scurfpea	Psoralidium tenuiflorum
PUER2	cliffrose	Purshia ericifolia
RHUS	sumac	Rhus
SAGO	Goodding's willow	Salix gooddingii
SALIX	willow	Salix
SAVE4	greasewood	Sarcobatus vermiculatus
SHRO	roundleaf buffaloberry	Shepherdia rotundifolia

Table 6.--Index of Plant Symbols, Common Names and Scientific Names--Continued

Plant Symbol	Local Common Name	Scientific Name
SPCO	scarlet globemallow	Sphaeralcea coccinea
SPCR	sand dropseed	Sporobolus cryptandrus
SPFL2	mesa dropseed	Sporobolus flexuosus
SPGR2	gooseberryleaf globemallow	Sphaeralcea grossulariifolia
STPI	Desert Princeplume	Stanleya pinnata
SUAED	seepweed	Suaeda
TACH2	China tamarisk	Tamarix chinensis
TARA	saltcedar tamatisk	Tamarix ramosissima
VAST3	Resinbush	Vanclevea stylosa
VUOC	sixweeks fesue	Vulpia octoflora
YUAN2	narrowleaf yucca	Yucca angustissima

Table 7.--Ecological Site-Soil Correlation

(Only soils and miscellaneous land types with correlated ecological sites are shown)

Map unit symbol soil % and soil name	Ecological site name	Ecological site type	Ecological site ID
1:			
40%-Arches	Semidesert Shallow Sand (Utah Juniper-Pinyon)/Artemisia bigelovii	Rangeland	R035XY227UT
35%-Mido	Semidesert Sand (Fourwing Saltbush)/Atriplex canescens/Achnatherum hymenoides	Rangeland	R035XY212UT
2:			
45%-Bluechief	Desert Sandy Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY121UT
40%-Needle	Desert Shallow Sandy Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY133UT
3:			
65%-Claysprings	Desert Shallow Clay (Mat Saltbush)/Atriplex corrugata	Rangeland	R035XY124UT
4:			
85%-Cowboy	Desert Shallow Clay (Mat Saltbush)/Atriplex corrugata	Rangeland	R035XY124UT
5:			
65%-Dient	Desert Stony Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY139UT
30%-Claysprings	Desert Shallow Clay (Mat Saltbush)/Atriplex corrugata	Rangeland	R035XY124UT
6:			
60%-Earlweed	Semidesert Sand (Fourwing Saltbush)/Atriplex canescens/Achnatherum hymenoides	Rangeland	R035XY212UT
30%-Anasazi	Semidesert Sandy Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY218UT
7:			
35%-Farb	Desert Shallow Sandy Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY133UT
30%-Pagina	Desert Sandy Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY121UT
8:			
50%-Gladel	Upland Shallow Loam (Pinyon-Utah Juniper)/Artemisia bigelovii	Rangeland	R035XY315UT
9:			
90%-Goblin	Desert Very Shallow Gypsum (Torrey's Jointfir)/Ephedra torreyana	Rangeland	R035XY142UT

Table 7.--Ecological Site-Soil Correlation--Continued

Map unit symbol soil % and soil name	Ecological site name	Ecological site type	Ecological site ID
10:			
50%-Jaconita family	Semidesert Stony Loam (Utah Juniper-Pinyon)	Rangeland	R035XY246UT
40%-Atchee	Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper)/Artemisia bigelovii	Rangeland	R035XY263UT
11:			
75%-Juanalo family	Desert Shallow Sandy Loam (Shadscale)/Atriplex confertifolia/Eriogonum inflatum	Rangeland	R035XY130UT
12:			
50%-Kydestea	Upland Stony Loam (Pinyon-Utah Juniper)	Rangeland	R035XY321UT
13:			
60%-Moenkopie	Desert Shallow Sandy Loam (Shadscale)/Atriplex confertifolia/Eriogonum inflatum	Rangeland	R035XY130UT
14:			
55%-Moepitz family	Desert Stony Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY139UT
25%-Moenkopie	Desert Shallow Sandy Loam (Shadscale)/Atriplex confertifolia/Eriogonum inflatum	Rangeland	R035XY130UT
15:			
30%-Monue	Alkali Bottom (Greasewood)/Sarcobatus vermiculatus	Rangeland	R035XY003UT
30%-Trail	Desert Sandy Loam (Fourwing Saltbush)/Atriplex canescens/Achnatherum hymenoides	Rangeland	R035XY118UT
25%-Nepalto	Desert Stony Loam (Shadscale-Bud Sagebrush)/Atriplex confertifolia/Hilaria jamesii	Rangeland	R035XY136UT
16:			
95%-Myton	Desert Stony Loam (Shadscale-Bud Sagebrush)/Atriplex confertifolia/Hilaria jamesii	Rangeland	R035XY136UT
17:			
50%-Needle	Sandstone Rockland 6-10" p.z.	Rangeland	R035XB255AZ
40%-Sheppard	Desert Sand (Sand Sagebrush)/Achnatherum hymenoides	Rangeland	R035XY115UT

Table 7.--Ecological Site-Soil Correlation--Continued

Map unit symbol soil % and soil name	Ecological site name	Ecological site type	Ecological site ID
18:			
80%-Oxyaquic Torrifluvents	Semiwet Saline Streambank (Fremont Cottonwood)/Sporobolus airoides	Rangeland	R035XY012UT
19:			
90%-Oxyaquic Torripsamments	Semiwet Saline Streambank (Fremont Cottonwood)/Sporobolus airoides	Rangeland	R035XY012UT
20:			
65%-Pagina	Desert Sandy Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY121UT
30%-Denazar	Desert Sand (Sand Sagebrush)/Achnatherum hymenoides	Rangeland	R035XY115UT
21:			
65%-Parkelei	Upland Loam (Basin Big Sagebrush)/Artemisia tridentata ssp. tridentata	Rangeland	R035XY306UT
25%-Gladel	Upland Shallow Loam (Pinyon-Utah Juniper)/Artemisia bigelovii	Rangeland	R035XY315UT
22:			
85%-Pennell	Desert Shallow Loam (Shadscale)/Atriplex confertifolia	Rangeland	R035XY122UT
23:			
55%-Razito	Sandy Wash 6-10" p.z./Atriplex canescens/Pascopyrum smithii	Rangeland	R035XB216AZ
24:			
50%-Redhouse family	Desert Sandy Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY121UT
35%-Epikom family	Desert Shallow Loam (Shadscale)/Atriplex confertifolia	Rangeland	R035XY122UT
25:			
60%-Reef	Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY236UT
26:			
65%-Reef	Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper)/Artemisia bigelovii	Rangeland	R035XY263UT

Table 7.--Ecological Site-Soil Correlation--Continued

Map unit symbol soil % and soil name	Ecological site name	Ecological site type	Ecological site ID
27:			
75%-Remorris family	Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY236UT
28:			
60%-Rizno	Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY236UT
29:			
40%-Rizno	Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY236UT
30:			
30%-Arches	Semidesert Shallow Sand (Utah Juniper-Pinyon)/Artemisia bigelovii	Rangeland	R035XY227UT
31:			
35%-Atchee	Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper)/Artemisia bigelovii	Rangeland	R035XY263UT
32:			
35%-Needle	Sandstone Rockland 6-10" p.z.	Rangeland	R035XB255AZ
33:			
40%-Torriorthents	Talus Slope (Blackbrush-Shadscale)/Achnatherum hymenoides	Rangeland	R035XY018UT
34:			
40%-Tsaya	Desert Very Steep Stony Loam (Shadscale)	Rangeland	R035XY146UT
35:			
50%-Sazi	Semidesert Sandy Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY218UT
30%-Rizno	Semidesert Shallow Sandy Loam (Blackbrush)/Coleogyne ramosissima/Pleuraphis jamesii	Rangeland	R035XY233UT
36:			
95%-Seeg	Desert Stony Loam (Shadscale-Bud Sagebrush)/Atriplex confertifolia/Hilaria jamesii	Rangeland	R035XY136UT
37:			
85%-Sheppard	Desert Sand (Sand Sagebrush)/Achnatherum hymenoides	Rangeland	R035XY115UT

Table 7.--Ecological Site-Soil Correlation--Continued

Map unit symbol soil % and soil name	Ecological site name	Ecological site type	Ecological site ID
38:			
30%-Sheppard family	Desert Sandy Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY121UT
30%-Tsaya family	Desert Shallow Sandy Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY133UT
20%-Bluechief family	Desert Shallow Sandy Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY133UT
39:			
85%-Somorent family	Desert Shallow Sandy Loam (Shadscale)/Atriplex confertifolia/Eriogonum inflatum	Rangeland	R035XY130UT
40:			
50%-Torriorthents	Desert Very Steep Stony Loam (Shadscale)	Rangeland	R035XY146UT
41:			
45%-Torriorthents	Desert Very Steep Stony Loam (Shadscale)	Rangeland	R035XY146UT
42:			
65%-Tsaya	Desert Shallow Sandy Loam (Blackbrush)/Coleogyne ramosissima	Rangeland	R035XY133UT
43:			
50%-Tsaya family	Desert Shallow Sandy Loam (Shadscale)/Atriplex confertifolia/Eriogonum inflatum	Rangeland	R035XY130UT
40%-Moenkopie	Desert Shallow Sandy Loam (Shadscale)/Atriplex confertifolia/Eriogonum inflatum	Rangeland	R035XY130UT
44:			
45%-Ustic Torriorthents	Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper)/Artemisia bigelovii	Rangeland	R035XY263UT
46:			
60%-Westmion	Semidesert Shallow Clay (Shadscale-Utah Juniper)/Atriplex confertifolia	Rangeland	R035XY239UT

Table 8.--Land Management - Suitability for Planting and Soil Rutting Hazard

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil Rutting Hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Arches	40	Well suited		Moderately suited		Moderate	
				Rock fragments	0.50	Low strength	0.50
Mido	35	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
Rock outcrop	20	Not rated		Not rated		Not rated	
2:							
Bluechief	45	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
Needle	40	Unsuited		Unsuited		Moderate	
		Restrictive layer	1.00	Restrictive layer	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		
3:							
Claysprings	65	Poorly suited		Poorly suited		Severe	
		Stickiness; high plasticity index	0.75	Stickiness; high plasticity index	0.75	Low strength	1.00
		Restrictive layer	0.75				
Badland	30	Not rated		Not rated		Not rated	
4:							
Cowboy	85	Moderately suited		Moderately suited		Severe	
		Stickiness; high plasticity index	0.50	Stickiness; high plasticity index	0.50	Low strength	1.00
				Slope	0.50		
				Rock fragments	0.50		
5:							
Dient	65	Moderately suited		Poorly suited		Moderate	
		Rock fragments	0.50	Rock fragments	0.75	Low strength	0.50
				Slope	0.75		
Claysprings	30	Moderately suited		Poorly suited		Moderate	
		Stickiness; high plasticity index	0.50	Rock fragments	0.75	Low strength	0.50
		Rock fragments	0.50	Slope	0.50		
				Stickiness; high plasticity index	0.50		

Table 8.--Land Management - Suitability for Planting and Soil Rutting Hazard--Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil Rutting Hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6:							
Earlweed	60	Well suited		Poorly suited		Moderate	
				Slope	0.75	Low strength	0.50
Anasazi	30	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
7:							
Farb	35	Unsuited		Poorly suited		Moderate	
		Restrictive layer	1.00	Rock fragments	0.75	Low strength	0.50
		Rock fragments	0.50	Slope	0.50		
				Restrictive layer	0.50		
Pagina	30	Moderately suited		Poorly suited		Moderate	
		Rock fragments	0.50	Rock fragments	0.75	Low strength	0.50
				Slope	0.50		
Rock outcrop	25	Not rated		Not rated		Not rated	
8:							
Gladel	50	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
Rock outcrop	30	Not rated		Not rated		Not rated	
9:							
Goblin	90	Unsuited		Unsuited		Slight	
		Restrictive layer	1.00	Rock fragments	1.00	Strength	0.10
		Sandiness	0.50	Restrictive layer	1.00		
		Rock fragments	0.50	Slope	0.75		
				Sandiness	0.50		
10:							
Jaconita family	50	Moderately suited		Poorly suited		Moderate	
		Sandiness	0.50	Slope	0.75	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		
				Sandiness	0.50		
Atchee	40	Moderately suited		Poorly suited		Moderate	
		Rock fragments	0.50	Rock fragments	0.75	Low strength	0.50
				Slope	0.50		
11:							
Juanalo family	75	Moderately suited		Poorly suited		Severe	
		Stickiness; high plasticity index	0.50	Rock fragments	0.75	Low strength	1.00
		Rock fragments	0.50	Slope	0.50		
				Stickiness; high plasticity index	0.50		
Rock outcrop	15	Not rated		Not rated		Not rated	

Table 8.--Land Management - Suitability for Planting and Soil Rutting Hazard--Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil Rutting Hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
12:							
Kydestea	50	Poorly suited		Unsuited		Moderate	
		Rock fragments	0.75	Rock fragments	1.00	Low strength	0.50
		Slope	0.50	Slope	1.00		
		Stickiness; high plasticity index	0.50	Stickiness; high plasticity index	0.50		
Rock outcrop	40	Not rated		Not rated		Not rated	
13:							
Moenkopie	60	Unsuited		Unsuited		Severe	
		Restrictive layer	1.00	Restrictive layer	1.00	Low strength	1.00
		Rock fragments	0.50	Slope	0.50		
				Rock fragments	0.50		
Rock outcrop	30	Not rated		Not rated		Not rated	
14:							
Moepitz family	55	Poorly suited		Unsuited		Slight	
		Rock fragments	0.75	Rock fragments	1.00	Strength	0.10
		Slope	0.50	Slope	1.00		
Moenkopie	25	Unsuited		Unsuited		Moderate	
		Restrictive layer	1.00	Rock fragments	1.00	Low strength	0.50
		Rock fragments	0.75	Restrictive layer	1.00		
				Slope	0.50		
Rock outcrop	15	Not rated		Not rated		Not rated	
15:							
Monue	30	Well suited		Well suited		Severe	
						Low strength	1.00
Trail	30	Well suited		Well suited		Moderate	
						Low strength	0.50
Nepalto	25	Moderately suited		Poorly suited		Moderate	
		Sandiness	0.50	Rock fragments	0.75	Low strength	0.50
		Rock fragments	0.50	Sandiness	0.50		
16:							
Myton	95	Moderately suited		Poorly suited		Moderate	
		Rock fragments	0.50	Rock fragments	0.75	Low strength	0.50
				Slope	0.75		
17:							
Needle	50	Unsuited		Unsuited		Moderate	
		Restrictive layer	1.00	Restrictive layer	1.00	Low strength	0.50
				Slope	0.50		
Sheppard	40	Well suited		Well suited		Moderate	
						Low strength	0.50

Table 8.--Land Management - Suitability for Planting and Soil Rutting Hazard--Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil Rutting Hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
18:							
Oxyaquic Torrifluvents	80	Well suited		Well suited		Severe	
						Low strength	1.00
19:							
Oxyaquic Torripsamments	90	Well suited		Well suited		Moderate	
						Low strength	0.50
		Stickiness; high plasticity index	0.50	Stickiness; high plasticity index	0.50	Low strength	1.00
Epikom family	35	Unsuited		Unsuited		Severe	
		Restrictive layer	1.00	Restrictive layer	1.00	Low strength	1.00
				Slope	0.50		
25:							
Reef	60	Unsuited		Unsuited		Slight	
		Restrictive layer	1.00	Restrictive layer	1.00	Strength	0.10
		Sandiness	0.50	Rock fragments	0.75		
		Rock fragments	0.50	Sandiness	0.50		
Rock outcrop	15	Not rated		Not rated		Not rated	
20:							
Pagina	65	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
Denazar	30	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
21:							
Parkelei	65	Well suited		Well suited		Moderate	
						Low strength	0.50
Gladel	25	Well suited		Moderately suited		Severe	
				Slope	0.50	Low strength	1.00
22:							
Pennell	85	Poorly suited		Unsuited		Moderate	
		Rock fragments	0.75	Rock fragments	1.00	Low strength	0.50
				Slope	0.50		
23:							
Razito	55	Moderately suited		Poorly suited		Moderate	
		Rock fragments	0.50	Rock fragments	0.75	Low strength	0.50
Riverwash	40	Not rated		Not rated		Not rated	
24:							
Redhouse family	50	Moderately suited		Moderately suited		Severe	

Table 8.--Land Management - Suitability for Planting and Soil Rutting Hazard--Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil Rutting Hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
26:							
Reef	65	Unsuited		Unsuited		Moderate	
		Restrictive layer	1.00	Slope	1.00	Low strength	0.50
		Rock fragments	0.75	Rock fragments	1.00		
		Slope	0.50	Restrictive layer	1.00		
Rock outcrop	30	Not rated		Not rated		Not rated	
27:							
Remorris family	75	Well suited		Unsuited		Severe	
				Slope	1.00	Low strength	1.00
Rock outcrop	10	Not rated		Not rated		Not rated	
28:							
Rizno	60	Unsuited		Unsuited		Moderate	
		Restrictive layer	1.00	Restrictive layer	1.00	Low strength	0.50
				Slope	0.50		
				Rock fragments	0.50		
Rock outcrop	20	Not rated		Not rated		Not rated	
29:							
Rizno	40	Unsuited		Unsuited		Moderate	
		Restrictive layer	1.00	Restrictive layer	1.00	Low strength	0.50
				Slope	0.50		
Rock outcrop	25	Not rated		Not rated		Not rated	
30:							
Rock outcrop	60	Not rated		Not rated		Not rated	
Arches	30	Unsuited		Unsuited		Moderate	
		Restrictive layer	1.00	Restrictive layer	1.00	Low strength	0.50
				Rock fragments	0.50		
31:							
Rock outcrop	55	Not rated		Not rated		Not rated	
Atchee	35	Poorly suited		Unsuited		Slight	
		Rock fragments	0.75	Slope	1.00	Strength	0.10
		Slope	0.50	Rock fragments	1.00		
32:							
Rock outcrop	60	Not rated		Not rated		Not rated	
Needle	35	Unsuited		Unsuited		Moderate	
		Restrictive layer	1.00	Restrictive layer	1.00	Low strength	0.50
				Slope	0.50		
33:							
Rock outcrop	60	Not rated		Not rated		Not rated	
Torriorthents	40	Poorly suited		Unsuited		Slight	
		Rock fragments	0.75	Slope	1.00	Strength	0.10
		Slope	0.50	Rock fragments	1.00		

Table 8.--Land Management - Suitability for Planting and Soil Rutting Hazard--Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil Rutting Hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
34:							
Rock outcrop--------	50	Not rated		Not rated		Not rated	
Tsaya----------	40	Poorly suited		Unsuited		Moderate	
		Rock fragments	0.75	Rock fragments	1.00	Low strength	0.50
		Slope	0.50	Slope	1.00		
		Stickiness; high plasticity index	0.50	Stickiness; high plasticity index	0.50		
35:							
Sazi----------	50	Well suited		Well suited		Moderate	
						Low strength	0.50
Rizno----------	30	Unsuited		Unsuited		Moderate	
		Restrictive layer	1.00	Restrictive layer	1.00	Low strength	0.50
				Rock fragments	0.50		
36:							
Seeg----------	95	Moderately suited		Poorly suited		Moderate	
		Rock fragments	0.50	Rock fragments	0.75	Low strength	0.50
				Slope	0.50		
37:							
Sheppard----------	85	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
38:							
Sheppard family-----	30	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
Tsaya family--------	30	Unsuited		Unsuited		Moderate	
		Restrictive layer	1.00	Restrictive layer	1.00	Low strength	0.50
		Rock fragments	0.50	Rock fragments	0.75		
				Slope	0.50		
Bluechief family----	20	Moderately suited		Poorly suited		Moderate	
		Rock fragments	0.50	Rock fragments	0.75	Low strength	0.50
				Slope	0.50		
39:							
Somorent family-----	85	Poorly suited		Moderately suited		Moderate	
		Restrictive layer	0.75	Slope	0.50	Low strength	0.50
				Rock fragments	0.50		
Rock outcrop--------	10	Not rated		Not rated		Not rated	
40:							
Torriorthents-------	50	Poorly suited		Unsuited		Moderate	
		Rock fragments	0.75	Slope	1.00	Low strength	0.50
		Slope	0.50	Rock fragments	1.00		
Rock outcrop--------	40	Not rated		Not rated		Not rated	

Table 8.--Land Management - Suitability for Planting and Soil Rutting Hazard--Continued

Map symbol and soil name	Pct. of map unit	Suitability for hand planting		Suitability for mechanical planting		Soil Rutting Hazard	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
41:							
Torriorthents-------	45	Moderately suited		Unsuited		Slight	
		Rock fragments	0.50	Slope	1.00	Strength	0.10
		Slope	0.50	Rock fragments	0.75		
		Stickiness; high plasticity index	0.50	Stickiness; high plasticity index	0.50		
Rock outcrop--------	35	Not rated		Not rated		Not rated	
Badland-------------	20	Not rated		Not rated		Not rated	
42:							
Tsaya---------------	65	Unsuited		Unsuited		Moderate	
		Restrictive layer	1.00	Restrictive layer	1.00	Low strength	0.50
		Stickiness; high plasticity index	0.50	Slope	0.50		
				Rock fragments	0.50		
				Stickiness; high plasticity index	0.50		
Rock outcrop--------	20	Not rated		Not rated		Not rated	
43:							
Tsaya family--------	50	Moderately suited		Unsuited		Moderate	
		Rock fragments	0.50	Rock fragments	1.00	Low strength	0.50
Moenkopie-----------	40	Unsuited		Unsuited		Moderate	
		Restrictive layer	1.00	Restrictive layer	1.00	Low strength	0.50
				Rock fragments	0.50		
44:							
Ustic Torriorthents-	45	Poorly suited		Unsuited		Moderate	
		Rock fragments	0.75	Rock fragments	1.00	Low strength	0.50
		Slope	0.50	Slope	1.00		
Rock outcrop--------	30	Not rated		Not rated		Not rated	
Badland-------------	25	Not rated		Not rated		Not rated	
45:							
Water---------------	100	Not rated		Not rated		Not rated	
46:							
Westmion------------	60	Poorly suited		Unsuited		Severe	
		Stickiness; high plasticity index	0.75	Rock fragments	1.00	Low strength	1.00
		Rock fragments	0.75	Stickiness; high plasticity index	0.75		
				Slope	0.50		
Rock outcrop--------	25	Not rated		Not rated		Not rated	

Table 9.--Land Management - Hazard of Erosion and Suitability for Roads

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Arches	40	Slight		Slight		Well suited	
Mido	35	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
Rock outcrop	20	Not rated		Not rated		Not rated	
2:							
Bluechief	45	Slight		Moderate		Well suited	
				Slope/erodibility	0.50		
Needle	40	Slight		Slight		Moderately suited	
						Sandiness	0.50
3:							
Claysprings	65	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Low strength	0.50
						Stickiness; high plasticity index	0.50
Badland	30	Not rated		Not rated		Not rated	
4:							
Cowboy	85	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
5:							
Dient	65	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Rock fragments	1.00
						Slope	1.00
Claysprings	30	Slight		Severe		Poorly suited	
				Slope/erodibility	0.95	Slope	1.00
6:							
Earlweed	60	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
Anasazi	30	Slight		Moderate		Well suited	
				Slope/erodibility	0.50		
7:							
Farb	35	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Rock fragments	1.00
						Slope	0.50
Pagina	30	Slight		Moderate		Poorly suited	
				Slope/erodibility	0.50	Rock fragments	1.00
						Slope	0.50
Rock outcrop	25	Not rated		Not rated		Not rated	

Table 9.--Land Management - Hazard of Erosion and Suitability for Roads

Map symbol and soil name	Pct. of map unit	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
8:							
Gladel	50	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
Rock outcrop	30	Not rated		Not rated		Not rated	
9:							
Goblin	90	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
10:							
Jaconita family	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
						Rock fragments	0.50
Atchee	40	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Rock fragments	0.50
11:							
Juanalo family	75	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Rock fragments	0.50
Rock outcrop	15	Not rated		Not rated		Not rated	
12:							
Kydestea	50	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	1.00
Rock outcrop	40	Not rated		Not rated		Not rated	
13:							
Moenkopie	60	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Low strength	0.50
Rock outcrop	30	Not rated		Not rated		Not rated	
14:							
Moepitz family	55	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Rock fragments	1.00
						Slope	1.00
Moenkopie	25	Slight		Moderate		Poorly suited	
				Slope/erodibility	0.50	Rock fragments	1.00
						Slope	0.50
Rock outcrop	15	Not rated		Not rated		Not rated	
15:							
Monue	30	Slight		Slight		Moderately suited	
						Low strength	0.50

Table 9.--Land Management - Hazard of Erosion and Suitability for Roads--Continued

Map symbol and soil name	Pct. of map unit	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
15:							
Trail	30	Slight		Slight		Well suited	
Nepalto	25	Slight		Slight		Moderately suited	
						Sandiness	0.50
16:							
Myton	95	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Rock fragments	0.50
17:							
Needle	50	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
Sheppard	40	Slight		Slight		Well suited	
18:							
Oxyaquic Torrifluvents	80	Slight		Slight		Moderately suited	
						Flooding	0.50
						Low strength	0.50
19:							
Oxyaquic Torripsamments	90	Slight		Slight		Moderately suited	
						Flooding	0.50
20:							
Pagina	65	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
Denazar	30	Slight		Slight		Moderately suited	
						Sandiness	0.50
21:							
Parkelei	65	Slight		Slight		Well suited	
Gladel	25	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
22:							
Pennell	85	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Rock fragments	0.50
						Slope	0.50
23:							
Razito	55	Slight		Slight		Moderately suited	
						Rock fragments	0.50
Riverwash	40	Not rated		Not rated		Not rated	
24:							
Redhouse family	50	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Low strength	0.50
Epikom family	35	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Low strength	0.50

Table 9.--Land Management - Hazard of Erosion and Suitability for Roads--Continued

Map symbol and soil name	Pct. of map unit	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
25:							
Reef	60	Slight		Slight		Moderately suited	
						Sandiness	0.50
Rock outcrop	15	Not rated		Not rated		Not rated	
26:							
Reef	65	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Rock fragments	1.00
						Slope	1.00
Rock outcrop	30	Not rated		Not rated		Not rated	
27:							
Remorris family	75	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Low strength	0.50
Rock outcrop	10	Not rated		Not rated		Not rated	
28:							
Rizno	60	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
Rock outcrop	20	Not rated		Not rated		Not rated	
29:							
Rizno	40	Slight		Moderate		Well suited	
				Slope/erodibility	0.50		
Rock outcrop	25	Not rated		Not rated		Not rated	
30:							
Rock outcrop	60	Not rated		Not rated		Not rated	
Arches	30	Slight		Slight		Well suited	
31:							
Rock outcrop	55	Not rated		Not rated		Not rated	
Atchee	35	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Rock fragments	1.00
						Slope	1.00
32:							
Rock outcrop	60	Not rated		Not rated		Not rated	
Needle	35	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
33:							
Rock outcrop	60	Not rated		Not rated		Not rated	
Torriorthents	40	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	1.00

Table 9.--Land Management - Hazard of Erosion and Suitability for Roads--Continued

Map symbol and soil name	Pct. of map unit	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
34:							
Rock outcrop--------	50	Not rated		Not rated		Not rated	
Tsaya----------	40	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Rock fragments	1.00
						Slope	1.00
35:							
Sazi----------	50	Slight		Moderate		Well suited	
				Slope/erodibility	0.50		
Rizno----------	30	Slight		Slight		Well suited	
36:							
Seeg----------	95	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Rock fragments	0.50
						Slope	0.50
37:							
Sheppard----------	85	Slight		Moderate		Well suited	
				Slope/erodibility	0.50		
38:							
Sheppard family-----	30	Slight		Moderate		Well suited	
				Slope/erodibility	0.50		
Tsaya family--------	30	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
Bluechief family----	20	Slight		Moderate		Well suited	
				Slope/erodibility	0.50		
39:							
Somorent family-----	85	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
Rock outcrop--------	10	Not rated		Not rated		Not rated	
40:							
Torriorthents-------	50	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	1.00
Rock outcrop--------	40	Not rated		Not rated		Not rated	
41:							
Torriorthents-------	45	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Rock fragments	0.50
Rock outcrop--------	35	Not rated		Not rated		Not rated	
Badland----------	20	Not rated		Not rated		Not rated	

Table 9.--Land Management - Hazard of Erosion and Suitability for Roads--Continued

Map symbol and soil name	Pct. of map unit	Hazard of off-road or off-trail erosion		Hazard of erosion on roads and trails		Suitability for roads (natural surface)	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
42:							
Tsaya	65	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
Rock outcrop	20	Not rated		Not rated		Not rated	
43:							
Tsaya family	50	Slight		Moderate		Well suited	
				Slope/erodibility	0.50		
Moenkopie	40	Slight		Slight		Well suited	
44:							
Ustic Torriorthents	45	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Rock fragments	1.00
						Slope	1.00
Rock outcrop	30	Not rated		Not rated		Not rated	
Badland	25	Not rated		Not rated		Not rated	
45:							
Water	100	Not rated		Not rated		Not rated	
46:							
Westmion	60	Slight		Moderate		Poorly suited	
				Slope/erodibility	0.50	Rock fragments	1.00
						Slope	0.50
						Low strength	0.50
Rock outcrop	25	Not rated		Not rated		Not rated	

Table 10.--Land Management - Site Preparation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (surface)		Suitability for mechanical site preparation (deep)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1:					
Arches	40	Well suited		Unsuited Restrictive layer	1.00
Mido	35	Well suited		Well suited	
Rock outcrop	20	Not rated		Not rated	
2:					
Bluechief	45	Well suited		Poorly suited Restrictive layer	0.50
Needle	40	Unsuited Restrictive layer	1.00	Unsuited Restrictive layer	1.00
3:					
Claysprings	65	Poorly suited Stickiness; high plasticity index	0.50	Well suited	
Badland	30	Not rated		Not rated	
4:					
Cowboy	85	Well suited		Well suited	
5:					
Dient	65	Unsuited Rock fragments Slope	1.00 0.50	Poorly suited Slope Rock fragments	0.50 0.50
Claysprings	30	Well suited		Well suited	
6:					
Earlweed	60	Poorly suited Slope	0.50	Poorly suited Slope	0.50
Anasazi	30	Well suited		Poorly suited Restrictive layer	0.50
7:					
Farb	35	Unsuited Rock fragments Restrictive layer	1.00 0.50	Unsuited Restrictive layer Rock fragments	1.00 0.50
7:					
Pagina	30	Unsuited Rock fragments	1.00	Poorly suited Rock fragments	0.50
Rock outcrop	25	Not rated		Not rated	

Table 10.--Land Management - Site Preparation--Continued

Map symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (surface)		Suitability for mechanical site preparation (deep)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
8:					
Gladel	50	Well suited		Unsuited	
				Restrictive layer	1.00
Rock outcrop	30	Not rated		Not rated	
9:					
Goblin	90	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
		Slope	0.50	Slope	0.50
		Rock fragments	0.50		
10:					
Jaconita family	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
		Rock fragments	0.50		
Atchee	40	Poorly suited		Unsuited	
		Rock fragments	0.50	Restrictive layer	1.00
11:					
Juanalo family	75	Poorly suited		Well suited	
		Rock fragments	0.50		
Rock outcrop	15	Not rated		Not rated	
12:					
Kydestea	50	Unsuited		Unsuited	
		Slope	1.00	Restrictive layer	1.00
		Rock fragments	1.00	Slope	1.00
				Rock fragments	0.50
Rock outcrop	40	Not rated		Not rated	
13:					
Moenkopie	60	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
Rock outcrop	30	Not rated		Not rated	
14:					
Moepitz family	55	Unsuited		Unsuited	
		Rock fragments	1.00	Rock fragments	1.00
		Slope	1.00	Slope	1.00
Moenkopie	25	Unsuited		Unsuited	
		Rock fragments	1.00	Rock fragments	1.00
		Restrictive layer	1.00	Restrictive layer	1.00
Rock outcrop	15	Not rated		Not rated	
15:					
Monue	30	Well suited		Well suited	
Trail	30	Well suited		Well suited	
Nepalto	25	Poorly suited		Well suited	
		Rock fragments	0.50		

Table 10.--Land Management - Site Preparation--Continued

Map symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (surface)		Suitability for mechanical site preparation (deep)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
16:					
Myton	95	Poorly suited		Poorly suited	
		Rock fragments	0.50	Slope	0.50
		Slope	0.50	Rock fragments	0.50
17:					
Needle	50	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
Sheppard	40	Well suited		Well suited	
18:					
Oxyaquic Torrifluvents	80	Well suited		Well suited	
19:					
Oxyaquic Torripsamments	90	Well suited		Well suited	
20:					
Pagina	65	Well suited		Well suited	
Denazar	30	Well suited		Well suited	
21:					
Parkelei	65	Well suited		Well suited	
Gladel	25	Well suited		Unsuited	
				Restrictive layer	1.00
22:					
Pennell	85	Poorly suited		Unsuited	
		Rock fragments	0.50	Restrictive layer	1.00
23:					
Razito	55	Poorly suited		Well suited	
		Rock fragments	0.50		
Riverwash	40	Not rated		Not rated	
24:					
Redhouse family	50	Well suited		Well suited	
Epikom family	35	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
25:					
Reef	60	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
		Rock fragments	0.50		
Rock outcrop	15	Not rated		Not rated	
26:					
Reef	65	Unsuited		Unsuited	
		Rock fragments	1.00	Slope	1.00
		Slope	1.00	Rock fragments	1.00
		Restrictive layer	1.00	Restrictive layer	1.00

Table 10.--Land Management - Site Preparation--Continued

Map symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (surface)		Suitability for mechanical site preparation (deep)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
26:					
Rock outcrop--------	30	Not rated		Not rated	
27:					
Remorris family-----	75	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Rock outcrop--------	10	Not rated		Not rated	
28:					
Rizno---------------	60	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
Rock outcrop--------	20	Not rated		Not rated	
29:					
Rizno---------------	40	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
Rock outcrop--------	25	Not rated		Not rated	
30:					
Rock outcrop--------	60	Not rated		Not rated	
Arches--------------	30	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
31:					
Rock outcrop--------	55	Not rated		Not rated	
Atchee--------------	35	Unsuited		Unsuited	
		Rock fragments	1.00	Restrictive layer	1.00
		Slope	1.00	Slope	1.00
				Rock fragments	1.00
32:					
Rock outcrop--------	60	Not rated		Not rated	
Needle--------------	35	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
33:					
Rock outcrop--------	60	Not rated		Not rated	
Torriorthents-------	40	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	1.00	Rock fragments	0.50
34:					
Rock outcrop--------	50	Not rated		Not rated	
Tsaya---------------	40	Unsuited		Unsuited	
		Rock fragments	1.00	Rock fragments	1.00
		Slope	1.00	Slope	1.00
				Restrictive layer	1.00

Table 10.--Land Management - Site Preparation--Continued

Map symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (surface)		Suitability for mechanical site preparation (deep)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
35:					
Sazi	50	Well suited		Poorly suited	
				Restrictive layer	0.50
Rizno	30	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
36:					
Seeg	95	Poorly suited		Well suited	
		Rock fragments	0.50		
37:					
Sheppard	85	Well suited		Well suited	
38:					
Sheppard family	30	Well suited		Poorly suited	
				Restrictive layer	0.50
Tsaya family	30	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
		Rock fragments	0.50	Slope	0.50
		Slope	0.50		
Bluechief family	20	Well suited		Poorly suited	
				Restrictive layer	0.50
39:					
Somorent family	85	Well suited		Well suited	
Rock outcrop	10	Not rated		Not rated	
40:					
Torriorthents	50	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	1.00	Rock fragments	1.00
				Restrictive layer	0.50
Rock outcrop	40	Not rated		Not rated	
41:					
Torriorthents	45	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
		Rock fragments	0.50	Rock fragments	0.50
Rock outcrop	35	Not rated		Not rated	
41:					
Badland	20	Not rated		Not rated	
42:					
Tsaya	65	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
Rock outcrop	20	Not rated		Not rated	

Table 10.--Land Management - Site Preparation--Continued

Map symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (surface)		Suitability for mechanical site preparation (deep)	
		Rating class and limiting features	Value	Rating class and limiting features	Value
43:					
Tsaya family--------	50	Poorly suited		Unsuited	
		Rock fragments	0.50	Restrictive layer	1.00
Moenkopie----------	40	Unsuited		Unsuited	
		Restrictive layer	1.00	Restrictive layer	1.00
44:					
Ustic Torriorthents-	45	Unsuited		Unsuited	
		Rock fragments	1.00	Slope	1.00
		Slope	1.00	Rock fragments	0.50
				Restrictive layer	0.50
Rock outcrop--------	30	Not rated		Not rated	
Badland------------	25	Not rated		Not rated	
45:					
Water---------------	100	Not rated		Not rated	
46:					
Westmion-----------	60	Unsuited		Unsuited	
		Rock fragments	1.00	Restrictive layer	1.00
		Stickiness; high plasticity index	0.50	Rock fragments	1.00
Rock outcrop--------	25	Not rated		Not rated	

Table 11.--Land Management - Damage by Fire and Seedling Mortality

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1:					
Arches	40	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
				Soil reaction	0.50
Mido	35	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
Rock outcrop	20	Not rated		Not rated	
2:					
Bluechief	45	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
				Soil reaction	0.50
Needle	40	High		High	
		Texture/rock fragments	1.00	Available water	1.00
				Soil reaction	0.50
3:					
Claysprings	65	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
				Soil reaction	0.50
Badland	30	Not rated		Not rated	
4:					
Cowboy	85	Low		Moderate	
				Salinity	0.50
				Soil reaction	0.50
				Available water	0.50

Table 11.--Land Management - Damage by Fire and Seedling Mortality—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
5:					
Dient	65	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
				Soil reaction	0.50
Claysprings	30	Moderate Texture/surface depth/rock fragments	0.50	Moderate Available water	0.50
6:					
Earlweed	60	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
				Soil reaction	0.50
Anasazi	30	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
				Soil reaction	0.50
7:					
Farb	35	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
				Soil reaction	0.50
Pagina	30	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
				Carbonate content	0.50
Rock outcrop	25	Not rated		Not rated	
8:					
Gladel	50	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
Rock outcrop	30	Not rated		Not rated	

Table 11.--Land Management - Damage by Fire and Seedling Mortality—Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
9:					
Goblin	90	High		Moderate	
		Texture/surface depth/rock fragments	1.00	Available water	0.50
				Soil reaction	0.50
				Salinity	0.50
10:					
Jaconita family	50	High		Moderate	
		Texture/surface depth/rock fragments	1.00	Available water	0.50
				Soil reaction	0.50
Atchee	40	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
				Soil reaction	0.50
11:					
Juanalo family	75	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
Rock outcrop	15	Not rated		Not rated	
12:					
Kydestea	50	High		High	
		Texture/slope/surface depth/rock fragments	1.00	Available water	1.00
Rock outcrop	40	Not rated		Not rated	
13:					
Moenkopie	60	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00

Table 11.--Land Management - Damage by Fire and Seedling Mortality--Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
13:					
Rock outcrop--------	30	Not rated		Not rated	
14:					
Moepitz family------	55	High		Moderate	
		Texture/slope/surface depth/rock fragments	1.00	Available water	0.50
				Carbonate content	0.50
				Soil reaction	0.50
Moenkopie-----------	25	Moderate		High	
		Texture/surface depth/rock fragments	0.50	Available water	1.00
				Carbonate content	0.50
				Soil reaction	0.50
Rock outcrop--------	15	Not rated		Not rated	
15:					
Monue---------------	30	High		Moderate	
		Texture/rock fragments	1.00	Available water	0.50
				Soil reaction	0.50
Trail---------------	30	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
				Soil reaction	0.50
Nepalto-------------	25	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
				Soil reaction	0.50
16:					
Myton---------------	95	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
17:					
Needle--------------	50	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00

Table 11.--Land Management - Damage by Fire and Seedling Mortality--Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
17:					
Sheppard	40	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
18:					
Oxyaquic Torrifluvents	80	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
				Soil reaction	0.50
19:					
Oxyaquic Torripsamments	90	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
20:					
Pagina	65	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
Denazar	30	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
21:					
Parkelei	65	Moderate Texture/surface depth/rock fragments	0.50	Moderate Available water	0.50
Gladel	25	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
22:					
Pennell	85	Moderate Texture/surface depth/rock fragments	0.50	High Available water	1.00
				Soil reaction	0.50

Table 11.--Land Management - Damage by Fire and Seedling Mortality--Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
23:					
Razito	55	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
Riverwash	40	Not rated		Not rated	
24:					
Redhouse family	50	High Texture/surface depth/rock fragments	1.00	Moderate Carbonate content Available water Soil reaction	0.50 0.50 0.50
Epikom family	35	High Texture/surface depth/rock fragments	1.00	High Available water Carbonate content Soil reaction	1.00 0.50 0.50
25:					
Reef	60	High Texture/surface depth/rock fragments	1.00	High Available water Soil reaction	1.00 0.50
25:					
Rock outcrop	15	Not rated		Not rated	
26:					
Reef	65	High Texture/slope/surface depth/rock fragments	1.00	Moderate Soil reaction Available water	0.50 0.50
Rock outcrop	30	Not rated		Not rated	

Table 11.--Land Management - Damage by Fire and Seedling Mortality--Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
27:					
Remorris family-----	75	Moderate		Moderate	
		Texture/surface depth/rock fragments	0.50	Available water	0.50
				Carbonate content	0.50
				Soil reaction	0.50
Rock outcrop--------	10	Not rated		Not rated	
28:					
Rizno---------------	60	Moderate		High	
		Texture/surface depth/rock fragments	0.50	Available water	1.00
				Soil reaction	0.50
Rock outcrop--------	20	Not rated		Not rated	
29:					
Rizno---------------	40	Moderate		High	
		Texture/surface depth/rock fragments	0.50	Available water	1.00
				Soil reaction	0.50
Rock outcrop--------	25	Not rated		Not rated	
30:					
Rock outcrop--------	60	Not rated		Not rated	
Arches--------------	30	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
31:					
Rock outcrop--------	55	Not rated		Not rated	
Atchee--------------	35	High		High	
		Texture/slope/surface depth/rock fragments	1.00	Available water	1.00
				Carbonate content	0.50
				Soil reaction	0.50

Table 11.--Land Management - Damage by Fire and Seedling Mortality--Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
32:					
Rock outcrop--------	60	Not rated		Not rated	
Needle--------------	35	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
33:					
Rock outcrop--------	60	Not rated		Not rated	
Torriorthents-------	40	High		High	
		Texture/slope/surface depth/rock fragments	1.00	Available water	1.00
34:					
Rock outcrop--------	50	Not rated		Not rated	
Tsaya---------------	40	High		Moderate	
		Texture/slope/surface depth/rock fragments	1.00	Available water	0.50
				Soil reaction	0.50
35:					
Sazi----------------	50	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
				Carbonate content	0.50
				Soil reaction	0.50
Rizno---------------	30	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
				Soil reaction	0.50
36:					
Seeg----------------	95	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00

Table 11.--Land Management - Damage by Fire and Seedling Mortality--Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
37:					
Sheppard	85	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
38:					
Sheppard family	30	High Texture/surface depth/rock fragments	1.00	High Available water Carbonate content Soil reaction	1.00 0.50 0.50
Tsaya family	30	Moderate Texture/surface depth/rock fragments	0.50	High Available water Soil reaction	1.00 0.50
Bluechief family	20	Moderate Texture/surface depth/rock fragments	0.50	High Available water Soil reaction	1.00 0.50
39:					
Somorent family	85	High Texture/surface depth/rock fragments	1.00	High Available water	1.00
Rock outcrop	10	Not rated		Not rated	
40:					
Torriorthents	50	Moderate Texture/slope/rock fragments	0.50	Moderate Carbonate content Soil reaction Available water	0.50 0.50 0.50
Rock outcrop	40	Not rated		Not rated	
41:					
Torriorthents	45	High Texture/slope/surface depth/rock fragments	1.00	High Available water Soil reaction	1.00 0.50

Table 11.--Land Management - Damage by Fire and Seedling Mortality--Continued

Map symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
41:					
Rock outcrop--------	35	Not rated		Not rated	
Badland----------	20	Not rated		Not rated	
42:					
Tsaya----------	65	Moderate		High	
		Texture/surface depth/rock fragments	0.50	Available water	1.00
				Soil reaction	0.50
Rock outcrop--------	20	Not rated		Not rated	
43:					
Tsaya family--------	50	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
				Soil reaction	0.50
Moenkopie----------	40	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
				Soil reaction	0.50
44:					
Ustic Torriorthents-	45	High		High	
		Texture/slope/surface depth/rock fragments	1.00	Available water	1.00
Rock outcrop--------	30	Not rated		Not rated	
Badland----------	25	Not rated		Not rated	
45:					
Water----------	100	Not rated		Not rated	
46:					
Westmion----------	60	High		High	
		Texture/surface depth/rock fragments	1.00	Available water	1.00
				Soil reaction	0.50
Rock outcrop--------	25	Not rated		Not rated	

Table 12.--Camp and Picnic Areas

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1:					
Arches	40	Very limited		Very limited	
		Depth to bedrock	1.00	Too sandy	1.00
		Too sandy	1.00	Depth to bedrock	1.00
Mido	35	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.01	Slope	0.01
Rock outcrop	20	Not rated		Not rated	
2:					
Bluechief	45	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Needle	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
3:					
Claysprings	65	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50	Too clayey	0.50
		Slow water movement	0.41	Slow water movement	0.41
Badland	30	Not rated		Not rated	
4:					
Cowboy	85	Somewhat limited		Somewhat limited	
		Slow water movement	0.96	Slow water movement	0.96
		Slope	0.16	Slope	0.16
5:					
Dient	65	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Gravel	1.00	Gravel	1.00
		Too steep	1.00	Too steep	1.00
		Dusty	0.50	Dusty	0.50
Claysprings	30	Somewhat limited		Somewhat limited	
		Slope	0.96	Slope	0.96
		Slow water movement	0.41	Slow water movement	0.41
		Gravel	0.01	Gravel	0.01

Table 12.--Camp and Picnic Areas--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6:					
Earlweed	60	Very limited		Very limited	
		Too steep	1.00	Too steep	1.00
		Too sandy	0.88	Too sandy	0.88
Anasazi	30	Not limited		Not limited	
7:					
Farb	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Large stones content	1.00	Large stones content	1.00
		Slope	0.37	Slope	0.37
Pagina	30	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	0.01	Slope	0.01
Rock outcrop	25	Not rated		Not rated	
8:					
Gladel	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
Rock outcrop	30	Not rated		Not rated	
9:					
Goblin	90	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Too steep	1.00	Too steep	1.00
		Gravel	1.00	Gravel	1.00
		Too sandy	0.32	Too sandy	0.32
		Salinity	0.01	Salinity	0.01
10:					
Jaconita family	50	Very limited		Very limited	
		Too steep	1.00	Too steep	1.00
		Large stones content	0.76	Large stones content	0.76
		Too sandy	0.76	Too sandy	0.76
		Gravel	0.08	Gravel	0.08
Atchee	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Gravel	0.92	Gravel	0.92
		Large stones content	0.76	Large stones content	0.76
		Slope	0.63	Slope	0.63
11:					
Juanalo family	75	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Large stones content	0.76	Large stones content	0.76
		Dusty	0.50	Dusty	0.50
		Gravel	0.08	Gravel	0.08
		Slope	0.01	Slope	0.01

Table 12.--Camp and Picnic Areas--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
11:					
Rock outcrop--------	15	Not rated		Not rated	
12:					
Kydestea----------	50	Very limited		Very limited	
		Too steep	1.00	Too steep	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Large stones content	1.00	Large stones content	1.00
		Gravel	0.04	Gravel	0.04
Rock outcrop--------	40	Not rated		Not rated	
13:					
Moenkopie----------	60	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Too sandy	0.82	Too sandy	0.82
		Slope	0.01	Slope	0.01
Rock outcrop--------	30	Not rated		Not rated	
14:					
Moepitz family------	55	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Too steep	1.00	Too steep	1.00
		Gravel	0.71	Gravel	0.71
		Too sandy	0.02	Too sandy	0.02
Moenkopie----------	25	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63
		Gravel	0.08	Gravel	0.08
		Too sandy	0.02	Too sandy	0.02
Rock outcrop--------	15	Not rated		Not rated	
15:					
Monue---------------	30	Very limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.92
		Too sandy	0.92		
15:					
Trail---------------	30	Very limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.82
		Too sandy	0.82		
Nepalto-------------	25	Very limited		Very limited	
		Flooding	1.00	Too sandy	1.00
		Too sandy	1.00		

Table 12.--Camp and Picnic Areas--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
16:					
Myton	95	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Too steep	1.00	Too steep	1.00
		Gravel	0.98	Gravel	0.98
		Too sandy	0.12	Too sandy	0.12
17:					
Needle	50	Very limited		Very limited	
		Depth to bedrock	1.00	Too sandy	1.00
		Too sandy	1.00	Depth to bedrock	1.00
		Slope	0.01	Slope	0.01
Sheppard	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
18:					
Oxyaquic Torrifluvents	80	Very limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.32
		Too sandy	0.32		
19:					
Oxyaquic Torripsamments	90	Very limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.41
		Too sandy	0.41		
20:					
Pagina	65	Somewhat limited		Somewhat limited	
		Too sandy	0.76	Too sandy	0.76
Denazar	30	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
21:					
Parkelei	65	Not limited		Not limited	
Gladel	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.01	Slope	0.01
22:					
Pennell	85	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Gravel	0.57	Gravel	0.57
		Dusty	0.50	Dusty	0.50
		Large stones content	0.19	Large stones content	0.19
23:					
Razito	55	Very limited		Very limited	
		Flooding	1.00	Too sandy	1.00
		Too sandy	1.00	Large stones content	0.76
		Large stones content	0.76		

Table 12.--Camp and Picnic Areas--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
23:					
Riverwash	40	Not rated		Not rated	
24:					
Redhouse family	50	Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50
		Slow water movement	0.26	Slow water movement	0.26
Epikom family	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Dusty	0.50	Dusty	0.50
25:					
Reef	60	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Gravel	1.00	Gravel	1.00
		Too sandy	0.32	Too sandy	0.32
Rock outcrop	15	Not rated		Not rated	
26:					
Reef	65	Very limited		Very limited	
		Too steep	1.00	Large stones content	1.00
		Large stones content	1.00	Too steep	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Dusty	0.50	Dusty	0.50
		Gravel	0.03	Gravel	0.03
Rock outcrop	30	Not rated		Not rated	
27:					
Remorris family	75	Very limited		Very limited	
		Too steep	1.00	Too steep	1.00
Rock outcrop	10	Not rated		Not rated	
28:					
Rizno	60	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Gravel	0.68	Gravel	0.68
		Too sandy	0.12	Too sandy	0.12
Rock outcrop	20	Not rated		Not rated	
29:					
Rizno	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Too sandy	0.04	Too sandy	0.04
Rock outcrop	25	Not rated		Not rated	

Table 12.--Camp and Picnic Areas--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
30:					
Rock outcrop--------	60	Not rated		Not rated	
Arches--------------	30	Very limited		Very limited	
		Depth to bedrock	1.00	Too sandy	1.00
		Too sandy	1.00	Depth to bedrock	1.00
31:					
Rock outcrop--------	55	Not rated		Not rated	
Atchee--------------	35	Very limited		Very limited	
		Too steep	1.00	Large stones content	1.00
		Large stones content	1.00	Too steep	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Gravel	0.71	Gravel	0.71
32:					
Rock outcrop--------	60	Not rated		Not rated	
Needle--------------	35	Very limited		Very limited	
		Depth to bedrock	1.00	Too sandy	1.00
		Too sandy	1.00	Depth to bedrock	1.00
33:					
Rock outcrop--------	60	Not rated		Not rated	
Torriorthents-------	40	Very limited		Very limited	
		Too steep	1.00	Too steep	1.00
		Large stones content	1.00	Large stones content	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Gravel	0.92	Gravel	0.92
		Dusty	0.50	Dusty	0.50
34:					
Rock outcrop--------	50	Not rated		Not rated	
Tsaya---------------	40	Very limited		Very limited	
		Too steep	1.00	Large stones content	1.00
		Large stones content	1.00	Too steep	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Gravel	0.92	Gravel	0.92
		Dusty	0.50	Dusty	0.50

Table 12.--Camp and Picnic Areas--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
35:					
Sazi	50	Somewhat limited		Somewhat limited	
		Too sandy	0.12	Too sandy	0.12
Rizno	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Too sandy	0.82	Too sandy	0.82
		Gravel	0.01	Gravel	0.01
36:					
Seeg	95	Somewhat limited		Somewhat limited	
		Large stones content	0.76	Large stones content	0.76
		Gravel	0.54	Gravel	0.54
		Dusty	0.50	Dusty	0.50
37:					
Sheppard	85	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
38:					
Sheppard family	30	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Tsaya family	30	Very limited		Very limited	
		Too steep	1.00	Too steep	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Too sandy	0.12	Too sandy	0.12
Bluechief family	20	Somewhat limited		Somewhat limited	
		Gravel	0.68	Gravel	0.68
39:					
Somorent family	85	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Gravel	0.68	Gravel	0.68
Rock outcrop	10	Not rated		Not rated	
40:					
Torriorthents	50	Very limited		Very limited	
		Too steep	1.00	Too steep	1.00
		Large stones content	1.00	Large stones content	1.00
		Too sandy	0.04	Too sandy	0.04
Rock outcrop	40	Not rated		Not rated	
41:					
Torriorthents	45	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Too steep	1.00	Too steep	1.00
		Gravel	0.08	Gravel	0.08

Table 12.--Camp and Picnic Areas--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
41:					
Rock outcrop--------	35	Not rated		Not rated	
Badland----------	20	Not rated		Not rated	
42:					
Tsaya----------	65	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Gravel	0.04	Gravel	0.04
		Slope	0.01	Slope	0.01
Rock outcrop--------	20	Not rated		Not rated	
43:					
Tsaya family--------	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Too sandy	0.18	Too sandy	0.18
Moenkopie----------	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Too sandy	0.68	Too sandy	0.68
44:					
Ustic Torriorthents-	45	Very limited		Very limited	
		Too steep	1.00	Large stones content	1.00
		Large stones content	1.00	Too steep	1.00
Rock outcrop--------	30	Not rated		Not rated	
Badland----------	25	Not rated		Not rated	
45:					
Water----------	100	Not rated		Not rated	
46:					
Westmion----------	60	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00
		Slow water movement	0.41	Slow water movement	0.41
		Gravel	0.06	Gravel	0.06
Rock outcrop--------	25	Not rated		Not rated	

Table 13.--Trail Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1:					
Arches	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Mido	35	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Rock outcrop	20	Not rated		Not rated	
2:					
Bluechief	45	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Needle	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
3:					
Claysprings	65	Somewhat limited		Somewhat limited	
		Too clayey	0.50	Too clayey	0.50
Badland	30	Not rated		Not rated	
4:					
Cowboy	85	Not limited		Not limited	
5:					
Dient	65	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	0.98	Dusty	0.50
		Dusty	0.50		
Claysprings	30	Not limited		Not limited	
6:					
Earlweed	60	Somewhat limited		Somewhat limited	
		Too sandy	0.88	Too sandy	0.88
		Slope	0.68		
Anasazi	30	Not limited		Not limited	
7:					
Farb	35	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Water erosion	1.00	Water erosion	1.00
Pagina	30	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
Rock outcrop	25	Not rated		Not rated	

Table 13.--Trail Management--Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
8:					
Gladel	50	Not limited		Not limited	
Rock outcrop	30	Not rated		Not rated	
9:					
Goblin	90	Somewhat limited		Somewhat limited	
		Slope	0.50	Too sandy	0.32
		Too sandy	0.32		
10:					
Jaconita family	50	Somewhat limited		Somewhat limited	
		Slope	0.82	Large stones content	0.76
		Large stones content	0.76	Too sandy	0.76
		Too sandy	0.76		
Atchee	40	Somewhat limited		Somewhat limited	
		Large stones content	0.76	Large stones content	0.76
11:					
Juanalo family	75	Somewhat limited		Somewhat limited	
		Large stones content	0.76	Large stones content	0.76
		Dusty	0.50	Dusty	0.50
Rock outcrop	15	Not rated		Not rated	
12:					
Kydestea	50	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Slope	1.00
Rock outcrop	40	Not rated		Not rated	
13:					
Moenkopie	60	Somewhat limited		Somewhat limited	
		Too sandy	0.82	Too sandy	0.82
Rock outcrop	30	Not rated		Not rated	
14:					
Moepitz family	55	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Slope	1.00
		Too sandy	0.02	Too sandy	0.02
Moenkopie	25	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Too sandy	0.02	Too sandy	0.02
Rock outcrop	15	Not rated		Not rated	
15:					
Monue	30	Somewhat limited		Somewhat limited	
		Too sandy	0.92	Too sandy	0.92
Trail	30	Somewhat limited		Somewhat limited	
		Too sandy	0.82	Too sandy	0.82

Table 13.--Trail Management--Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
15:					
Nepalto	25	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
16:					
Myton	95	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Too sandy	0.12	Too sandy	0.12
		Slope	0.02		
17:					
Needle	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Sheppard	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
18:					
Oxyaquic Torrifluvents	80	Somewhat limited		Somewhat limited	
		Too sandy	0.32	Too sandy	0.32
19:					
Oxyaquic Torripsamments	90	Somewhat limited		Somewhat limited	
		Too sandy	0.41	Too sandy	0.41
20:					
Pagina	65	Somewhat limited		Somewhat limited	
		Too sandy	0.76	Too sandy	0.76
Denazar	30	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
21:					
Parkelei	65	Not limited		Not limited	
Gladel	25	Not limited		Not limited	
22:					
Pennell	85	Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50
		Large stones content	0.19	Large stones content	0.19
23:					
Razito	55	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Large stones content	0.76	Large stones content	0.76
Riverwash	40	Not rated		Not rated	
24:					
Redhouse family	50	Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50
Epikom family	35	Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50

Table 13.--Trail Management--Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
25:					
Reef	60	Somewhat limited		Somewhat limited	
		Too sandy	0.32	Too sandy	0.32
Rock outcrop	15	Not rated		Not rated	
26:					
Reef	65	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50
Rock outcrop	30	Not rated		Not rated	
27:					
Remorris family	75	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.08
Rock outcrop	10	Not rated		Not rated	
28:					
Rizno	60	Somewhat limited		Somewhat limited	
		Too sandy	0.12	Too sandy	0.12
Rock outcrop	20	Not rated		Not rated	
29:					
Rizno	40	Somewhat limited		Somewhat limited	
		Too sandy	0.04	Too sandy	0.04
Rock outcrop	25	Not rated		Not rated	
30:					
Rock outcrop	60	Not rated		Not rated	
Arches	30	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
31:					
Rock outcrop	55	Not rated		Not rated	
Atchee	35	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Slope	1.00
32:					
Rock outcrop	60	Not rated		Not rated	
Needle	35	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
33:					
Rock outcrop	60	Not rated		Not rated	

Table 13.--Trail Management--Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
33:					
Torriorthents	40	Very limited		Very limited	
		Slope	1.00	Large stones content	1.00
		Large stones content	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50
34:					
Rock outcrop	50	Not rated		Not rated	
Tsaya	40	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50
35:					
Sazi	50	Somewhat limited		Somewhat limited	
		Too sandy	0.12	Too sandy	0.12
Rizno	30	Somewhat limited		Somewhat limited	
		Too sandy	0.82	Too sandy	0.82
36:					
Seeg	95	Somewhat limited		Somewhat limited	
		Large stones content	0.76	Large stones content	0.76
		Dusty	0.50	Dusty	0.50
37:					
Sheppard	85	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
38:					
Sheppard family	30	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Tsaya family	30	Somewhat limited		Somewhat limited	
		Too sandy	0.12	Too sandy	0.12
Bluechief family	20	Not limited		Not limited	
39:					
Somorent family	85	Not limited		Not limited	
Rock outcrop	10	Not rated		Not rated	
40:					
Torriorthents	50	Very limited		Very limited	
		Slope	1.00	Large stones content	1.00
		Large stones content	1.00	Slope	0.99
		Too sandy	0.04	Too sandy	0.04

Table 13.--Trail Management--Continued

Map symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
40:					
Rock outcrop	40	Not rated		Not rated	
41:					
Torriorthents	45	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Slope	1.00
Rock outcrop	35	Not rated		Not rated	
Badland	20	Not rated		Not rated	
42:					
Tsaya	65	Not limited		Not limited	
Rock outcrop	20	Not rated		Not rated	
43:					
Tsaya family	50	Somewhat limited		Somewhat limited	
		Too sandy	0.18	Too sandy	0.18
Moenkopie	40	Somewhat limited		Somewhat limited	
		Too sandy	0.68	Too sandy	0.68
44:					
Ustic Torriorthents	45	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
		Slope	1.00	Slope	0.86
Rock outcrop	30	Not rated		Not rated	
Badland	25	Not rated		Not rated	
45:					
Water	100	Not rated		Not rated	
46:					
Westmion	60	Very limited		Very limited	
		Large stones content	1.00	Large stones content	1.00
Rock outcrop	25	Not rated		Not rated	

Table 14.--Dwellings and Small Commercial Buildings

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Arches	40	Very limited Depth to hard bedrock	 1.00	Very limited Depth to hard bedrock	 1.00	Very limited Depth to hard bedrock	 1.00
Mido	35	Somewhat limited Slope	 0.01	Somewhat limited Slope	 0.01	Very limited Slope	 1.00
Rock outcrop	20	Not rated		Not rated		Not rated	
2:							
Bluechief	45	Somewhat limited Depth to hard bedrock	 0.13	Very limited Depth to hard bedrock	 1.00	Somewhat limited Depth to hard bedrock Slope	 0.13 0.12
Needle	40	Very limited Depth to hard bedrock	 1.00	Very limited Depth to hard bedrock	 1.00	Very limited Depth to hard bedrock	 1.00
3:							
Claysprings	65	Somewhat limited Shrink-swell Depth to soft bedrock	 0.50 0.50	Very limited Depth to soft bedrock Shrink-swell	 1.00 0.50	Somewhat limited Depth to soft bedrock Shrink-swell	 1.00 0.50
Badland	30	Not rated		Not rated		Not rated	
4:							
Cowboy	85	Very limited Shrink-swell Slope	 1.00 0.16	Very limited Shrink-swell Slope	 1.00 0.16	Very limited Shrink-swell Slope	 1.00 1.00
5:							
Dient	65	Very limited Too steep Shrink-swell Large stones	 1.00 0.50 0.17	Very limited Too steep Shrink-swell Large stones	 1.00 0.50 0.17	Very limited Slope Shrink-swell Large stones	 1.00 0.50 0.17
Claysprings	30	Very limited Shrink-swell Slope	 1.00 0.96	Very limited Shrink-swell Slope	 1.00 0.96	Very limited Shrink-swell Slope	 1.00 1.00
6:							
Earlweed	60	Very limited Too steep	 1.00	Very limited Too steep	 1.00	Very limited Slope	 1.00

Table 14.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6:							
Anasazi	30	Somewhat limited		Very limited		Somewhat limited	
		Depth to hard bedrock	0.54	Depth to hard bedrock	1.00	Depth to hard bedrock	0.54
						Slope	0.12
7:							
Farb	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.37	Slope	0.37	Slope	1.00
Pagina	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.01	Depth to soft bedrock	0.79	Slope	1.00
				Slope	0.01		
Rock outcrop	25	Not rated		Not rated		Not rated	
8:							
Gladel	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
						Slope	0.88
Rock outcrop	30	Not rated		Not rated		Not rated	
9:							
Goblin	90	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Too steep	1.00	Too steep	1.00	Slope	1.00
10:							
Jaconita family	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
Atchee	40	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Depth to hard bedrock	1.00
11:							
Juanalo family	75	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
Rock outcrop	15	Not rated		Not rated		Not rated	

Table 14.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
12:							
Kydestea	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Rock outcrop	40	Not rated		Not rated		Not rated	
13:							
Moenkopie	60	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
13:							
Rock outcrop	30	Not rated		Not rated		Not rated	
14:							
Moepitz family	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Shrink-swell	0.50	Depth to hard bedrock	0.61	Shrink-swell	0.50
				Shrink-swell	0.50		
Moenkopie	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Rock outcrop	15	Not rated		Not rated		Not rated	
15:							
Monue	30	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
Trail	30	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
Nepalto	25	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
16:							
Myton	95	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
17:							
Needle	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
Sheppard	40	Not limited		Not limited		Not limited	

Table 14.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
18:							
Oxyaquic Torrifluvents	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.99		
19:							
Oxyaquic Torripsamments	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.43		
20:							
Pagina	65	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.88
				Depth to soft bedrock	0.15	Shrink-swell	0.50
Denazar	30	Not limited		Not limited		Not limited	
21:							
Parkelei	65	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Gladel	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Slope	0.01	Slope	1.00
22:							
Pennell	85	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
						Slope	0.88
23:							
Razito	55	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
Riverwash	40	Not rated		Not rated		Not rated	
24:							
Redhouse family	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to hard bedrock	0.02		
Epikom family	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12

Table 14.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
25:							
Reef	60	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Depth to soft bedrock	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
Rock outcrop	15	Not rated		Not rated		Not rated	
26:							
Reef	65	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Large stones	0.08	Large stones	0.08	Large stones	0.08
Rock outcrop	30	Not rated		Not rated		Not rated	
27:							
Remorris family	75	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
Rock outcrop	10	Not rated		Not rated		Not rated	
28:							
Rizno	60	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Depth to soft bedrock	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
						Slope	0.88
Rock outcrop	20	Not rated		Not rated		Not rated	
29:							
Rizno	40	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
						Slope	0.12
Rock outcrop	25	Not rated		Not rated		Not rated	
30:							
Rock outcrop	60	Not rated		Not rated		Not rated	
Arches	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
31:							
Rock outcrop	55	Not rated		Not rated		Not rated	
Atchee	35	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Large stones	1.00	Large stones	1.00	Large stones	1.00

Table 14.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
32:							
Rock outcrop--------	60	Not rated		Not rated		Not rated	
Needle--------------	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.78	Shrink-swell	0.78	Slope	0.88
						Shrink-swell	0.78
33:							
Rock outcrop--------	60	Not rated		Not rated		Not rated	
Torriorthents-------	40	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Depth to soft bedrock	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
34:							
Rock outcrop--------	50	Not rated		Not rated		Not rated	
35:							
Sazi----------------	50	Somewhat limited		Very limited		Somewhat limited	
		Depth to hard bedrock	0.50	Depth to hard bedrock	1.00	Depth to hard bedrock	0.50
				Depth to soft bedrock	0.68		
Rizno---------------	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
36:							
Seeg----------------	95	Not limited		Not limited		Somewhat limited	
						Slope	0.88
37:							
Sheppard------------	85	Not limited		Not limited		Somewhat limited	
						Slope	0.12
38:							
Sheppard family-----	30	Somewhat limited		Very limited		Somewhat limited	
		Depth to hard bedrock	0.50	Depth to hard bedrock	1.00	Depth to hard bedrock	0.50
						Slope	0.12
Tsaya family--------	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Too steep	1.00	Too steep	1.00	Slope	1.00
Bluechief family----	20	Somewhat limited		Very limited		Somewhat limited	
		Depth to hard bedrock	0.97	Depth to hard bedrock	1.00	Depth to hard bedrock	0.97
						Slope	0.12

Table 14.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
39:							
Somorent family-----	85	Somewhat limited		Very limited		Somewhat limited	
		Depth to soft bedrock	0.50	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
						Slope	0.88
Rock outcrop--------	10	Not rated		Not rated		Not rated	
40:							
Torriorthents-------	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Depth to hard bedrock	0.20	Depth to hard bedrock	1.00	Depth to hard bedrock	0.20
Rock outcrop--------	40	Not rated		Not rated		Not rated	
41:							
Torriorthents-------	45	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Slope	1.00
		Large stones	0.95	Large stones	0.95	Large stones	0.95
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Rock outcrop--------	35	Not rated		Not rated		Not rated	
Badland-------------	20	Not rated		Not rated		Not rated	
42:							
Tsaya---------------	65	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Large stones	0.46	Large stones	0.46	Shrink-swell	0.50
		Slope	0.01	Slope	0.01	Large stones	0.46
Rock outcrop--------	20	Not rated		Not rated		Not rated	
43:							
Tsaya family--------	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
Moenkopie-----------	40	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
44:							
Ustic Torriorthents-	45	Very limited		Very limited		Very limited	
		Too steep	1.00	Depth to hard bedrock	1.00	Slope	1.00
		Large stones	0.98	Too steep	1.00	Large stones	0.98
		Depth to hard bedrock	0.95	Large stones	0.98	Depth to hard bedrock	0.95
Rock outcrop--------	30	Not rated		Not rated		Not rated	
Badland-------------	25	Not rated		Not rated		Not rated	

Table 14.--Dwellings and Small Commercial Buildings--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
45:							
Water	100	Not rated		Not rated		Not rated	
46:							
Westmion	60	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to hard bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.50
						Shrink-swell	0.50
Rock outcrop	25	Not rated		Not rated		Not rated	

Table 15.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Arches	40	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
				Unstable excavation walls	0.10	Droughty	1.00
Mido	35	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.01	Unstable excavation walls	1.00	Droughty	0.92
				Slope	0.01	Slope	0.01
Rock outcrop	20	Not rated		Not rated		Not rated	
2:							
Bluechief	45	Somewhat limited		Very limited		Somewhat limited	
		Frost action	0.50	Depth to hard bedrock	1.00	Droughty	0.49
		Depth to hard bedrock	0.13	Unstable excavation walls	1.00	Depth to bedrock	0.14
Needle	40	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Droughty	1.00
						Depth to bedrock	1.00
3:							
Claysprings	65	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Droughty	1.00
		Low strength	1.00			Depth to bedrock	1.00
		Shrink-swell	0.50			Too clayey	1.00
Badland	30	Not rated		Not rated		Not rated	
4:							
Cowboy	85	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.16	Slope	0.16
		Shrink-swell	1.00	Too clayey	0.12		
		Slope	0.16	Unstable excavation walls	0.10		
5:							
Dient	65	Very limited		Very limited		Very limited	
		Too steep	1.00	Unstable excavation walls	1.00	Gravel	1.00
		Shrink-swell	0.50	Too steep	1.00	Too steep	1.00
		Frost action	0.50	Large stones	0.17	Droughty	0.82
		Large stones	0.17				

Table 15.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5:							
Claysprings---------	30	Very limited		Somewhat limited		Somewhat limited	
		Shrink-swell	1.00	Slope	0.96	Slope	0.96
		Low strength	1.00	Unstable excavation walls	0.10	Droughty	0.64
		Slope	0.96			Gravel	0.01
6:							
Earlweed----------	60	Very limited		Very limited		Very limited	
		Too steep	1.00	Unstable excavation walls	1.00	Too steep	1.00
				Too steep	1.00	Droughty	0.01
Anasazi----------	30	Somewhat limited		Very limited		Somewhat limited	
		Depth to hard bedrock	0.54	Depth to hard bedrock	1.00	Droughty	0.82
		Frost action	0.50	Unstable excavation walls	1.00	Depth to bedrock	0.54
7:							
Farb----------	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Frost action	0.50	Slope	0.37	Droughty	1.00
		Slope	0.37			Slope	0.37
Pagina----------	30	Somewhat limited		Very limited		Somewhat limited	
		Frost action	0.50	Unstable excavation walls	1.00	Droughty	0.87
		Slope	0.01	Depth to soft bedrock	0.79	Depth to bedrock	0.80
				Slope	0.01	Slope	0.01
Rock outcrop--------	25	Not rated		Not rated		Not rated	
8:							
Gladel----------	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Frost action	0.50	Unstable excavation walls	0.10	Droughty	1.00
Rock outcrop--------	30	Not rated		Not rated		Not rated	
9:							
Goblin----------	90	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Too steep	1.00	Too steep	1.00	Droughty	1.00
		Frost action	0.50			Too steep	1.00
						Gravel	0.99
						Salinity	0.01

Table 15.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
10:							
Jaconita family-----	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Unstable excavation walls	1.00	Droughty	1.00
				Too steep	1.00	Too steep	1.00
						Gravel	0.08
Atchee-------------	40	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Droughty	1.00
		Frost action	0.50	Unstable excavation walls	0.10	Gravel	0.92
						Slope	0.63
11:							
Juanalo family------	75	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Frost action	0.50	Unstable excavation walls	0.10	Droughty	1.00
		Slope	0.01	Slope	0.01	Gravel	0.08
						Slope	0.01
Rock outcrop--------	15	Not rated		Not rated		Not rated	
12:							
Kydestea-----------	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Shrink-swell	0.50	Unstable excavation walls	0.10	Droughty	1.00
		Frost action	0.50			Gravel	0.04
						Large stones	0.01
Rock outcrop--------	40	Not rated		Not rated		Not rated	
13:							
Moenkopie----------	60	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Frost action	0.50	Slope	0.01	Droughty	1.00
		Slope	0.01			Slope	0.01
Rock outcrop--------	30	Not rated		Not rated		Not rated	
14:							
Moepitz family------	55	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Shrink-swell	0.50	Depth to hard bedrock	0.61	Gravel	0.71
		Frost action	0.50	Unstable excavation walls	0.10	Large stones	0.08
						Droughty	0.07

Table 15.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
14:							
Moenkopie	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Droughty	1.00
		Shrink-swell	0.50			Slope	0.63
		Frost action	0.50			Gravel	0.08
Rock outcrop	15	Not rated		Not rated		Not rated	
15:							
Monue	30	Somewhat limited		Very limited		Not limited	
		Frost action	0.50	Unstable excavation walls	1.00		
		Flooding	0.20				
Trail	30	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.40	Unstable excavation walls	1.00	Droughty	0.01
15:							
N epalto	25	Somewhat limited		Very limited		Very limited	
		Flooding	0.20	Unstable excavation walls	1.00	Droughty	1.00
						Too sandy	0.50
16:							
Myton	95	Very limited		Very limited		Very limited	
		Too steep	1.00	Unstable excavation walls	1.00	Droughty	1.00
		Frost action	0.50	Too steep	1.00	Too steep	1.00
						Gravel	0.98
						Large stones	0.01
17:							
Needle	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Slope	0.01	Unstable excavation walls	0.10	Droughty	1.00
				Slope	0.01	Too sandy	0.50
						Slope	0.01
Sheppard	40	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.92
						Too sandy	0.50
18:							
Oxyaquic Torrifluvents	80	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Unstable excavation walls	1.00	Flooding	0.60
				Depth to saturated zone	0.99	Droughty	0.01
				Flooding	0.60		

Table 15.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
19:							
Oxyaquic Torripsamments	90	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Unstable excavation walls	1.00	Droughty	0.92
				Flooding	0.60	Flooding	0.60
				Depth to saturated zone	0.43		
20:							
Pagina	65	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Depth to soft bedrock	0.15	Depth to bedrock	0.16
		Frost action	0.50	Unstable excavation walls	0.10	Droughty	0.06
Denazar	30	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.92
						Too sandy	0.50
21:							
Parkelei	65	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Gladel	25	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Frost action	0.50	Unstable excavation walls	0.10	Droughty	1.00
		Slope	0.01	Slope	0.01	Slope	0.01
22:							
Pennell	85	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Droughty	1.00
		Frost action	0.50	Unstable excavation walls	0.10	Depth to bedrock	1.00
						Large stones	0.99
						Gravel	0.57
23:							
Razito	55	Somewhat limited		Very limited		Somewhat limited	
		Flooding	0.40	Unstable excavation walls	1.00	Droughty	0.92
						Too sandy	0.50
Riverwash	40	Not rated		Not rated		Not rated	

Table 15.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
24:							
Redhouse family-----	50	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Unstable excavation walls	0.10		
		Shrink-swell	0.50	Depth to hard bedrock	0.02		
		Frost action	0.50				
Epikom family-------	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Shrink-swell	0.50	Unstable excavation walls	0.10	Droughty	1.00
		Frost action	0.50				
25:							
Reef----------	60	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Droughty	1.00
		Frost action	0.50			Gravel	1.00
25:							
Rock outcrop--------	15	Not rated		Not rated		Not rated	
26:							
Reef----------	65	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Frost action	0.50	Large stones	0.08	Droughty	1.00
		Large stones	0.08			Large stones	0.99
						Gravel	0.03
Rock outcrop--------	30	Not rated		Not rated		Not rated	
27:							
Remorris family-----	75	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Frost action	0.50	Unstable excavation walls	0.10	Droughty	0.29
Rock outcrop--------	10	Not rated		Not rated		Not rated	
28:							
Rizno----------	60	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Droughty	1.00
		Frost action	0.50			Gravel	0.68
Rock outcrop--------	20	Not rated		Not rated		Not rated	

Table 15.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
29:							
Rizno	40	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Droughty	1.00
		Frost action	0.50			Depth to bedrock	1.00
Rock outcrop	25	Not rated		Not rated		Not rated	
30:							
Rock outcrop	60	Not rated		Not rated		Not rated	
Arches	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
				Unstable excavation walls	0.10	Droughty	1.00
31:							
Rock outcrop	55	Not rated		Not rated		Not rated	
Atchee	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Large stones	1.00	Large stones	1.00	Droughty	1.00
		Frost action	0.50	Unstable excavation walls	0.10	Gravel	0.71
						Large stones	0.08
32:							
Rock outcrop	60	Not rated		Not rated		Not rated	
Needle	35	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Shrink-swell	0.78	Unstable excavation walls	0.10	Droughty	1.00
						Too sandy	0.50
33:							
Rock outcrop	60	Not rated		Not rated		Not rated	
Torriorthents	40	Very limited		Very limited		Very limited	
		Too steep	1.00	Depth to soft bedrock	1.00	Too steep	1.00
		Depth to soft bedrock	1.00	Too steep	1.00	Droughty	1.00
				Unstable excavation walls	0.10	Depth to bedrock	1.00
						Gravel	0.92
34:							
Rock outcrop	50	Not rated		Not rated		Not rated	

Table 15.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
34:							
Tsaya	40	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Too steep	1.00
		Too steep	1.00	Too steep	1.00	Droughty	1.00
		Shrink-swell	0.50	Unstable excavation walls	0.10	Depth to bedrock	1.00
		Frost action	0.50			Gravel	0.92
35:							
Sazi	50	Somewhat limited		Very limited		Somewhat limited	
		Frost action	0.50	Depth to hard bedrock	1.00	Depth to bedrock	0.68
		Depth to hard bedrock	0.50	Depth to soft bedrock	0.68	Droughty	0.50
				Unstable excavation walls	0.10		
35:							
Rizno	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
				Unstable excavation walls	0.10	Droughty	1.00
						Too sandy	0.50
						Gravel	0.01
36:							
Seeg	95	Somewhat limited		Very limited		Somewhat limited	
		Frost action	0.50	Unstable excavation walls	1.00	Gravel	0.54
						Droughty	0.43
						Large stones	0.01
37:							
Sheppard	85	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.92
						Too sandy	0.50
38:							
Sheppard family	30	Somewhat limited		Very limited		Somewhat limited	
		Depth to hard bedrock	0.50	Depth to hard bedrock	1.00	Droughty	0.72
				Unstable excavation walls	1.00	Depth to bedrock	0.50
Tsaya family	30	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Droughty	1.00
		Too steep	1.00	Too steep	1.00	Depth to bedrock	1.00
		Frost action	0.50	Unstable excavation walls	0.10	Too steep	1.00

Table 15.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
38:							
Bluechief family----	20	Somewhat limited		Very limited		Very limited	
		Depth to hard bedrock	0.97	Depth to hard bedrock	1.00	Droughty	1.00
		Frost action	0.50	Unstable excavation walls	0.10	Depth to bedrock	0.97
						Gravel	0.68
39:							
Somorent family-----	85	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Frost action	0.50			Droughty	1.00
						Gravel	0.68
Rock outcrop--------	10	Not rated		Not rated		Not rated	
40:							
Torriorthents-------	50	Very limited		Very limited		Very limited	
		Too steep	1.00	Depth to hard bedrock	1.00	Too steep	1.00
		Depth to hard bedrock	0.20	Too steep	1.00	Droughty	0.33
				Unstable excavation walls	1.00	Depth to bedrock	0.20
Rock outcrop--------	40	Not rated		Not rated		Not rated	
41:							
Torriorthents-------	45	Very limited		Very limited		Very limited	
		Too steep	1.00	Too steep	1.00	Too steep	1.00
		Large stones	0.95	Large stones	0.95	Large stones	0.92
		Shrink-swell	0.50	Unstable excavation walls	0.10	Gravel	0.08
		Frost action	0.50			Droughty	0.06
Rock outcrop--------	35	Not rated		Not rated		Not rated	
Badland-------------	20	Not rated		Not rated		Not rated	
42:							
Tsaya---------------	65	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Shrink-swell	0.50	Large stones	0.46	Droughty	1.00
		Frost action	0.50	Slope	0.01	Gravel	0.04
		Large stones	0.46			Large stones	0.01
		Slope	0.01			Slope	0.01
Rock outcrop--------	20	Not rated		Not rated		Not rated	

Table 15.--Roads and Streets, Shallow Excavations, and Lawns and Landscaping--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
43:							
Tsaya family--------	50	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Droughty	1.00
		Frost action	0.50	Unstable excavation walls	0.10	Depth to bedrock	1.00
Moenkopie----------	40	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Droughty	1.00
		Frost action	0.50			Depth to bedrock	1.00
44:							
Ustic Torriorthents-	45	Very limited		Very limited		Very limited	
		Too steep	1.00	Depth to hard bedrock	1.00	Droughty	1.00
		Large stones	0.98	Too steep	1.00	Too steep	1.00
		Depth to hard bedrock	0.95	Large stones	0.98	Depth to bedrock	0.95
				Unstable excavation walls	0.10	Large stones	0.32
Rock outcrop--------	30	Not rated		Not rated		Not rated	
Badland------------	25	Not rated		Not rated		Not rated	
45:							
Water---------------	100	Not rated		Not rated		Not rated	
46:							
Westmion------------	60	Very limited		Very limited		Very limited	
		Depth to hard bedrock	1.00	Depth to hard bedrock	1.00	Depth to bedrock	1.00
		Low strength	0.78	Unstable excavation walls	0.10	Droughty	0.98
		Shrink-swell	0.50			Gravel	0.06
Rock outcrop--------	25	Not rated		Not rated		Not rated	

Table 16.--Sewage Disposal

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1:					
Arches	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	0.08
Mido	35	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Slope	0.01	Slope	1.00
Rock outcrop	20	Not rated		Not rated	
2:					
Bluechief	45	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Seepage	1.00
				Slope	0.68
Needle	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	0.32
3:					
Claysprings	65	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.32
Badland	30	Not rated		Not rated	
4:					
Cowboy	85	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.16	Seepage	0.50
5:					
Dient	65	Very limited		Very limited	
		Too steep	1.00	Seepage	1.00
		Large stones	0.17	Slope	1.00
				Large stones	0.30
Claysprings	30	Somewhat limited		Very limited	
		Slope	0.96	Slope	1.00

Table 16.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6:					
Earlweed----------	60	Very limited		Very limited	
		Too steep	1.00	Seepage	1.00
				Slope	1.00
Anasazi----------	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Seepage	1.00
				Slope	0.68
7:					
Farb----------	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.37	Slope	1.00
Pagina----------	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.01	Seepage	1.00
				Slope	1.00
Rock outcrop--------	25	Not rated		Not rated	
8:					
Gladel----------	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Seepage	1.00
				Slope	1.00
Rock outcrop--------	30	Not rated		Not rated	
9:					
Goblin----------	90	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Too steep	1.00	Slope	1.00
10:					
Jaconita family-----	50	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
		Too steep	1.00	Seepage	1.00
Atchee----------	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.63	Slope	1.00
				Seepage	1.00
11:					
Juanalo family------	75	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Seepage	1.00
				Slope	1.00

Table 16.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
11:					
Rock outcrop--------	15	Not rated		Not rated	
12:					
Kydestea----------	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Too steep	1.00	Slope	1.00
				Seepage	0.50
Rock outcrop--------	40	Not rated		Not rated	
13:					
Moenkopie----------	60	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Slope	1.00
Rock outcrop--------	30	Not rated		Not rated	
14:					
Moepitz family------	55	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Depth to bedrock	0.86	Seepage	1.00
				Depth to hard bedrock	0.61
Moenkopie----------	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.63	Slope	1.00
Rock outcrop--------	15	Not rated		Not rated	
15:					
Monue---------------	30	Somewhat limited		Very limited	
		Slow water movement	0.50	Seepage	1.00
		Flooding	0.20	Flooding	0.20
Trail---------------	30	Somewhat limited		Very limited	
		Flooding	0.40	Seepage	1.00
				Flooding	0.40
Nepalto-------------	25	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Flooding	0.20	Flooding	0.20
				Slope	0.08
16:					
Myton---------------	95	Very limited		Very limited	
		Too steep	1.00	Seepage	1.00
		Slow water movement	0.50	Slope	1.00

Table 16.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
17:					
Needle	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Slope	1.00
Sheppard	40	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.32
18:					
Oxyaquic Torrifluvents	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Slow water movement	0.50	Depth to saturated zone	1.00
19:					
Oxyaquic Torripsamments	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	1.00	Seepage	1.00
		Depth to saturated zone	0.92	Depth to saturated zone	0.32
20:					
Pagina	65	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	1.00
				Slope	1.00
Denazar	30	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.32
21:					
Parkelei	65	Very limited		Very limited	
		Slow water movement	1.00	Seepage	1.00
Gladel	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Slope	0.01	Seepage	1.00
				Slope	1.00
22:					
Pennell	85	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Seepage	1.00
				Slope	1.00

Table 16.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
23:					
Razito	55	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Flooding	0.40	Flooding	0.40
Riverwash	40	Not rated		Not rated	
24:					
Redhouse family	50	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.50
		Depth to bedrock	0.41	Slope	0.08
				Depth to hard bedrock	0.02
Epikom family	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	0.68
25:					
Reef	60	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Depth to soft bedrock	1.00
				Slope	0.32
Rock outcrop	15	Not rated		Not rated	
26:					
Reef	65	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Too steep	1.00	Slope	1.00
		Large stones	0.08	Seepage	0.39
Rock outcrop	30	Not rated		Not rated	
27:					
Remorris family	75	Very limited		Very limited	
		Too steep	1.00	Seepage	1.00
		Slow water movement	0.61	Slope	1.00
Rock outcrop	10	Not rated		Not rated	
28:					
Rizno	60	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Depth to soft bedrock	1.00
				Slope	1.00
Rock outcrop	20	Not rated		Not rated	

Table 16.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
29:					
Rizno	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	0.68
Rock outcrop	25	Not rated		Not rated	
30:					
Rock outcrop	60	Not rated		Not rated	
Arches	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	0.08
31:					
Rock outcrop	55	Not rated		Not rated	
Atchee	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Too steep	1.00	Slope	1.00
		Large stones	1.00	Seepage	1.00
				Large stones	1.00
32:					
Rock outcrop	60	Not rated		Not rated	
Needle	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	1.00
33:					
Rock outcrop	60	Not rated		Not rated	
Torriorthents	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Too steep	1.00	Slope	1.00
				Seepage	1.00
34:					
Rock outcrop	50	Not rated		Not rated	
Tsaya	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Too steep	1.00	Slope	1.00
				Seepage	0.50

Table 16.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
35:					
Sazi	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Depth to soft bedrock	1.00
				Seepage	1.00
				Slope	0.32
Rizno	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
36:					
Seeg	95	Somewhat limited		Very limited	
		Slow water movement	0.50	Seepage	1.00
				Slope	1.00
37:					
Sheppard	85	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.68
38:					
Sheppard family	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Seepage	1.00
				Slope	0.68
Tsaya family	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Too steep	1.00	Slope	1.00
Bluechief family	20	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Seepage	1.00
				Slope	0.68
39:					
Somorent family	85	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	1.00
Rock outcrop	10	Not rated		Not rated	
40:					
Torriorthents	50	Very limited		Very limited	
		Too steep	1.00	Depth to hard bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00
				Seepage	1.00

Table 16.--Sewage Disposal--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
40:					
Rock outcrop--------	40	Not rated		Not rated	
41:					
Torriorthents-------	45	Very limited		Very limited	
		Too steep	1.00	Slope	1.00
		Large stones	0.95	Large stones	1.00
		Slow water movement	0.50	Seepage	0.50
Rock outcrop--------	35	Not rated		Not rated	
Badland-------------	20	Not rated		Not rated	
42:					
Tsaya---------------	65	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Large stones	0.46	Slope	1.00
		Slope	0.01		
Rock outcrop--------	20	Not rated		Not rated	
43:					
Tsaya family--------	50	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Seepage	1.00
				Slope	0.32
Moenkopie-----------	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	0.08
44:					
Ustic Torriorthents-	45	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
		Too steep	1.00	Seepage	1.00
		Large stones	0.98	Slope	1.00
				Large stones	1.00
Rock outcrop--------	30	Not rated		Not rated	
Badland-------------	25	Not rated		Not rated	
45:					
Water---------------	100	Not rated		Not rated	
46:					
Westmion------------	60	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to hard bedrock	1.00
				Slope	0.92
Rock outcrop--------	25	Not rated		Not rated	

Table 17.--Source of Gravel and Sand

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
1:					
Arches	40	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.25
Mido	35	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.28
		Thickest layer	0.00	Thickest layer	0.32
Rock outcrop	20	Not rated		Not rated	
2:					
Bluechief	45	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.02
		Thickest layer	0.00	Thickest layer	0.02
Needle	40	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.35
3:					
Claysprings	65	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Badland	30	Not rated		Not rated	
4:					
Cowboy	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
5:					
Dient	65	Fair		Poor	
		Thickest layer	0.14	Thickest layer	0.00
		Bottom layer	0.14	Bottom layer	0.00
Claysprings	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
6:					
Earlweed	60	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.04
		Thickest layer	0.00	Thickest layer	0.06

Table 17.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
6:					
Anasazi	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.01
		Thickest layer	0.00	Bottom layer	0.04
7:					
Farb	35	Poor		Poor	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.00
Pagina	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.01
Rock outcrop	25	Not rated		Not rated	
8:					
Gladel	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.04
		Thickest layer	0.00	Thickest layer	0.04
Rock outcrop	30	Not rated		Not rated	
9:					
Goblin	90	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.62	Bottom layer	0.07
10:					
Jaconita family	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.13
Atchee	40	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.12	Bottom layer	0.04
11:					
Juanalo family	75	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.01
Rock outcrop	15	Not rated		Not rated	
12:					
Kydestea	50	Poor		Poor	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.00
Rock outcrop	40	Not rated		Not rated	
13:					
Moenkopie	60	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.04

Table 17.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
13:					
Rock outcrop--------	30	Not rated		Not rated	
14:					
Moepitz family------	55	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.05
		Thickest layer	0.00	Thickest layer	0.05
Moenkopie-----------	25	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.06
Rock outcrop--------	15	Not rated		Not rated	
15:					
Monue---------------	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.68
Trail---------------	30	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.04
		Thickest layer	0.00	Thickest layer	0.06
Nepalto-------------	25	Fair		Fair	
		Thickest layer	0.00	Bottom layer	0.31
		Bottom layer	0.12	Thickest layer	0.38
16:					
Myton---------------	95	Fair		Fair	
		Bottom layer	0.00	Bottom layer	0.07
		Thickest layer	0.38	Thickest layer	0.10
17:					
Needle--------------	50	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.31
Sheppard------------	40	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.31
		Bottom layer	0.00	Bottom layer	0.31
18:					
Oxyaquic Torrifluvents------	80	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.27
19:					
Oxyaquic Torripsamments-----	90	Poor		Fair	
		Thickest layer	0.00	Bottom layer	0.07
		Bottom layer	0.00	Thickest layer	0.08
20:					
Pagina--------------	65	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.02

Table 17.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
20:					
Denazar	30	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.29
21:					
Parkelei	65	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Gladel	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
22:					
Pennell	85	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.04
23:					
Razito	55	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.14
		Bottom layer	0.00	Bottom layer	0.38
Riverwash	40	Not rated		Not rated	
24:					
Redhouse family	50	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Epikom family	35	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
25:					
Reef	60	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.10
Rock outcrop	15	Not rated		Not rated	
26:					
Reef	65	Poor		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Rock outcrop	30	Not rated		Not rated	
27:					
Remorris family	75	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.01

Table 17.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
27:					
Rock outcrop--------	10	Not rated		Not rated	
28:					
Rizno---------------	60	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.05
Rock outcrop--------	20	Not rated		Not rated	
29:					
Rizno---------------	40	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.06
Rock outcrop--------	25	Not rated		Not rated	
30:					
Rock outcrop--------	60	Not rated		Not rated	
Arches--------------	30	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.25
31:					
Rock outcrop--------	55	Not rated		Not rated	
Atchee--------------	35	Poor		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
32:					
Rock outcrop--------	60	Not rated		Not rated	
Needle--------------	35	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.31
33:					
Rock outcrop--------	60	Not rated		Not rated	
Torriorthents-------	40	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.06
34:					
Rock outcrop--------	50	Not rated		Not rated	
Tsaya---------------	40	Fair		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.62	Thickest layer	0.00

Table 17.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
35:					
Sazi	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.07
		Thickest layer	0.00	Thickest layer	0.07
Rizno	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.07
36:					
Seeg	95	Fair		Fair	
		Thickest layer	0.50	Thickest layer	0.00
		Bottom layer	0.57	Bottom layer	0.05
37:					
Sheppard	85	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.31
38:					
Sheppard family	30	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.05
		Thickest layer	0.00	Thickest layer	0.06
Tsaya family	30	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.25	Bottom layer	0.04
Bluechief family	20	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.07
		Thickest layer	0.00	Thickest layer	0.07
39:					
Somorent family	85	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.05
Rock outcrop	10	Not rated		Not rated	
40:					
Torriorthents	50	Poor		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Rock outcrop	40	Not rated		Not rated	
41:					
Torriorthents	45	Poor		Poor	
		Thickest layer	0.00	Bottom layer	0.00
		Bottom layer	0.00	Thickest layer	0.00
Rock outcrop	35	Not rated		Not rated	
Badland	20	Not rated		Not rated	

Table 17.--Source of Gravel and Sand--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
42:					
Tsaya	65	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.01
Rock outcrop	20	Not rated		Not rated	
43:					
Tsaya family	50	Poor		Poor	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.00
Moenkopie	40	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.06
44:					
Ustic Torriorthents	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Rock outcrop	30	Not rated		Not rated	
Badland	25	Not rated		Not rated	
45:					
Water	100	Not rated		Not rated	
46:					
Westmion	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Rock outcrop	25	Not rated		Not rated	

Table 18.--Source of Reclamation Material, Roadfill, and Topsoil

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Arches	40	Poor		Poor		Poor	
		Too sandy	0.00	Depth to bedrock	0.00	Too sandy	0.00
		Wind erosion	0.00			Depth to bedrock	0.00
		Droughty	0.00				
		Depth to bedrock	0.00				
		Organic matter content low	0.08				
Mido	35	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Organic matter content low	0.08				
		Droughty	0.09				
Rock outcrop	20	Not rated		Not rated		Not rated	
2:							
Bluechief	45	Poor		Poor		Fair	
		Wind erosion	0.00	Depth to bedrock	0.00	Rock fragments	0.12
		Organic matter content low	0.00			Depth to bedrock	0.86
		Droughty	0.00			Carbonate content	0.92
		Carbonate content	0.46				
		Depth to bedrock	0.86				
Needle	40	Poor		Poor		Poor	
		Wind erosion	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Droughty	0.00			Too sandy	0.00
		Depth to bedrock	0.00				
		Too sandy	0.00				
		Organic matter content low	0.50				
3:							
Claysprings	65	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Low strength	0.00	Too clayey	0.00
		Too clayey	0.00				
		Organic matter content low	0.50				
Badland	30	Not rated		Not rated		Not rated	
4:							
Cowboy	85	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Organic matter content low	0.08	Shrink-swell	0.12	Salinity	0.00
		Salinity	0.50			Slope	0.84

Table 18.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
5:							
Dient	65	Fair		Fair		Poor	
		Droughty	0.17	Slope	0.02	Slope	0.00
		Organic matter content low	0.50	Cobble content	0.66	Hard to reclaim (rock fragments)	0.00
		Stone content	0.61	Stones	0.67	Rock fragments	0.00
		No cobble limitation	0.99	Shrink-swell	0.87		
Claysprings	30	Poor		Poor		Poor	
		Too clayey	0.00	Low strength	0.00	Too clayey	0.00
		Droughty	0.00	Shrink-swell	0.12	Slope	0.04
		Organic matter content low	0.50				
6:							
Earlweed	60	Poor		Fair		Poor	
		Too sandy	0.00	Slope	0.32	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Organic matter content low	0.08				
Anasazi	30	Poor		Poor		Fair	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.12
		Organic matter content low	0.08			Depth to bedrock	0.46
		Depth to bedrock	0.46				
		Carbonate content	0.97				
7:							
Farb	35	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Slope	0.63
		Organic matter content low	0.08				
		Water erosion	0.99				
Pagina	30	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Organic matter content low	0.08			Depth to bedrock	0.21
		Depth to bedrock	0.21			Carbonate content	0.99
		Carbonate content	0.54				
		Water erosion	0.99				
Rock outcrop	25	Not rated		Not rated		Not rated	
8:							
Gladel	50	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00				
		Organic matter content low	0.50				

Table 18.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
8:							
Gladel	50	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00				
		Organic matter content low	0.50				
Rock outcrop	30	Not rated		Not rated		Not rated	
9:							
Goblin	90	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00	Slope	0.50	Depth to bedrock	0.00
		Organic matter content low	0.50			Slope	0.00
		Too sandy	0.78			Too sandy	0.78
10:							
Jaconita family	50	Poor		Fair		Poor	
		Wind erosion	0.00	Slope	0.18	Rock fragments	0.00
		Droughty	0.00			Slope	0.00
		Too sandy	0.04			Too sandy	0.04
		Organic matter content low	0.08			Hard to reclaim (rock fragments)	0.32
Atchee	40	Poor		Poor		Poor	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Droughty	0.00			Rock fragments	0.00
		Organic matter content low	0.08			Slope	0.37
11:							
Juanalo family	75	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.88
		Organic matter content low	0.50				
Rock outcrop	15	Not rated		Not rated		Not rated	
12:							
Kydestea	50	Poor		Poor		Poor	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Droughty	0.00	Slope	0.00	Depth to bedrock	0.00
		Organic matter content low	0.50	Shrink-swell	0.87	Slope	0.00
Rock outcrop	40	Not rated		Not rated		Not rated	
13:							
Moenkopie	60	Poor		Poor		Poor	
		Wind erosion	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Droughty	0.00			Rock fragments	0.50
		Depth to bedrock	0.00				
		Organic matter content low	0.08				
		Water erosion	0.68				

Table 18.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
13:							
Rock outcrop--------	30	Not rated		Not rated		Not rated	
14:							
Moepitz family------	55	Fair		Poor		Poor	
		Carbonate content	0.03	Slope	0.00	Slope	0.00
		Organic matter content low	0.08	Depth to bedrock	0.39	Rock fragments	0.00
		Droughty	0.58	Shrink-swell	0.87	Carbonate content	0.33
		Too sandy	0.96			Too sandy	0.96
Moenkopie-----------	25	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.12
		Organic matter content low	0.08			Slope	0.37
		Carbonate content	0.46			Carbonate content	0.80
		Too sandy	0.96			Too sandy	0.96
Rock outcrop--------	15	Not rated		Not rated		Not rated	
15:							
Monue---------------	30	Poor		Good		Good	
		Wind erosion	0.00				
		Organic matter content low	0.00				
		Water erosion	0.37				
		Carbonate content	0.99				
Trail---------------	30	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Organic matter content low	0.00				
Nepalto-------------	25	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Rock fragments	0.00
		Droughty	0.00			Hard to reclaim (rock fragments)	0.00
		Organic matter content low	0.00				
16:							
Myton---------------	95	Fair		Fair		Poor	
		Droughty	0.07	Stones	0.80	Slope	0.00
		Too sandy	0.22	Slope	0.98	Rock fragments	0.00
		Organic matter content low	0.50			Hard to reclaim (rock fragments)	0.00
		Stone content	0.83			Too sandy	0.22

Table 18.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
17:							
Needle	50	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Too sandy	0.00
		Wind erosion	0.00			Depth to bedrock	0.00
		Too sandy	0.00				
		Depth to bedrock	0.00				
		Organic matter content low	0.08				
Sheppard	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Organic matter content low	0.08				
		Droughty	0.09				
18:							
Oxyaquic Torrifluvents	80	Poor		Fair		Poor	
		Wind erosion	0.00	Wetness depth	0.95	Too sandy	0.00
		Too sandy	0.00			Wetness depth	0.95
		Organic matter content low	0.08				
		Water erosion	0.68				
19:							
Oxyaquic Torripsamments	90	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.32
		Organic matter content low	0.08				
		Droughty	0.20				
		Too sandy	0.32				
20:							
Pagina	65	Poor		Poor		Fair	
		Wind erosion	0.00	Depth to bedrock	0.00	Too sandy	0.08
		Too sandy	0.08	Shrink-swell	0.91	Depth to bedrock	0.84
		Organic matter content low	0.08				
		Droughty	0.10				
		Carbonate content	0.80				
		Depth to bedrock	0.84				
		Water erosion	0.99				
Denazar	30	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Organic matter content low	0.08				
		Droughty	0.09				

Table 18.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
21:							
Parkelei	65	Fair		Fair		Good	
		Organic matter content low	0.50	Low strength	0.78		
		Water erosion	0.99	Shrink-swell	0.94		
Gladel	25	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00				
		Organic matter content low	0.50				
		Water erosion	0.99				
22:							
Pennell	85	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.00
		Organic matter content low	0.12				
23:							
Razito	55	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Organic matter content low	0.08				
		Droughty	0.09				
Riverwash	40	Not rated		Not rated		Not rated	
24:							
Redhouse family	50	Fair		Poor		Fair	
		Organic matter content low	0.08	Low strength	0.00	Carbonate content	0.93
		Carbonate content	0.12	Shrink-swell	0.87		
		Water erosion	0.90	Depth to bedrock	0.98		
Epikom family	35	Poor		Poor		Poor	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Droughty	0.00	Shrink-swell	0.87		
		Organic matter content low	0.08				
		Carbonate content	0.74				
		Water erosion	0.90				
25:							
Reef	60	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
		Too sandy	0.44			Too sandy	0.44

Table 18.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
25:							
Rock outcrop--------	15	Not rated		Not rated		Not rated	
26:							
Reef----------	65	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Slope	0.00
		Depth to bedrock	0.00	Slope	0.00	Rock fragments	0.00
		Cobble content	0.92			Depth to bedrock	0.00
Rock outcrop--------	30	Not rated		Not rated		Not rated	
27:							
Remorris family-----	75	Fair		Poor		Poor	
		Droughty	0.02	Slope	0.00	Slope	0.00
		Organic matter content low	0.08			Carbonate content	0.99
		Carbonate content	0.92				
Rock outcrop--------	10	Not rated		Not rated		Not rated	
28:							
Rizno----------	60	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.50
Rock outcrop--------	20	Not rated		Not rated		Not rated	
29:							
Rizno----------	40	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Too sandy	0.99
		Organic matter content low	0.00				
		Too sandy	0.99				
Rock outcrop--------	25	Not rated		Not rated		Not rated	
30:							
Rock outcrop--------	60	Not rated		Not rated		Not rated	
Arches----------	30	Poor		Poor		Poor	
		Depth to bedrock	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Droughty	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Too sandy	0.00				
		Organic matter content low	0.08				

Table 18.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
31:							
Rock outcrop--------	55	Not rated		Not rated		Not rated	
Atchee--------------	35	Poor		Poor		Poor	
		Droughty	0.00	Slope	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Cobble content	0.00	Cobble content	0.04	Slope	0.00
		Organic matter content low	0.50			Carbonate content	0.90
		Carbonate content	0.84				
32:							
Rock outcrop--------	60	Not rated		Not rated		Not rated	
Needle--------------	35	Poor		Poor		Poor	
		Wind erosion	0.00	Depth to bedrock	0.00	Too sandy	0.00
		Too sandy	0.00	Shrink-swell	0.78	Depth to bedrock	0.00
		Droughty	0.00				
		Depth to bedrock	0.00				
		Organic matter content low	0.08				
33:							
Rock outcrop--------	60	Not rated		Not rated		Not rated	
Torriorthents-------	40	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00	Slope	0.00	Depth to bedrock	0.00
		Organic matter content low	0.50			Slope	0.00
34:							
Rock outcrop--------	50	Not rated		Not rated		Not rated	
Tsaya---------------	40	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Slope	0.00	Rock fragments	0.00
		Organic matter content low	0.50	Shrink-swell	0.87	Slope	0.00
35:							
Sazi----------------	50	Poor		Poor		Fair	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.32
		Carbonate content	0.05			Carbonate content	0.61
		Depth to bedrock	0.32				
		Organic matter content low	0.50				

Table 18.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
35:							
Rizno	30	Poor		Poor		Poor	
		Wind erosion	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Droughty	0.00			Too sandy	0.78
		Depth to bedrock	0.00			Rock fragments	0.88
		Organic matter content low	0.00				
		Too sandy	0.78				
36:							
Seeg	95	Fair		Fair		Poor	
		Organic matter content low	0.08	Stones	0.98	Hard to reclaim (rock fragments)	0.00
		Droughty	0.28			Rock fragments	0.00
		Stone content	0.89				
37:							
Sheppard	85	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Organic matter content low	0.08				
		Droughty	0.09				
38:							
Sheppard family	30	Poor		Poor		Poor	
		Too sandy	0.00	Depth to bedrock	0.00	Too sandy	0.00
		Wind erosion	0.00			Depth to bedrock	0.50
		Droughty	0.00			Carbonate content	0.92
		Organic matter content low	0.50				
		Depth to bedrock	0.50				
		Carbonate content	0.92				
Tsaya family	30	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
		Organic matter content low	0.00			Slope	0.00
		Too sandy	0.44			Too sandy	0.44
Bluechief family	20	Poor		Poor		Fair	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.03
		Organic matter content low	0.00			Rock fragments	0.12
		Depth to bedrock	0.03			Too sandy	0.78
		Too sandy	0.78				
39:							
Somorent family	85	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00				
		Organic matter content low	0.50				
Rock outcrop	10	Not rated		Not rated		Not rated	

Table 18.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
40:							
Torriorthents-------	50	Poor		Poor		Poor	
		Organic matter content low	0.00	Slope	0.00	Slope	0.00
		Too alkaline	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Droughty	0.01			Depth to bedrock	0.79
		Depth to bedrock	0.79			Carbonate content	0.94
		Carbonate content	0.92				
Rock outcrop--------	40	Not rated		Not rated		Not rated	
41:							
Torriorthents-------	45	Poor		Poor		Poor	
		Stone content	0.00	Stones	0.00	Rock fragments	0.00
		Organic matter content low	0.50	Slope	0.00	Hard to reclaim (rock fragments)	0.00
		Too clayey	0.82	Shrink-swell	0.87	Slope	0.00
		Droughty	0.92	Cobble content	0.88	Too clayey	0.54
Rock outcrop--------	35	Not rated		Not rated		Not rated	
Badland-------------	20	Not rated		Not rated		Not rated	
42:							
Tsaya---------------	65	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
		Organic matter content low	0.08				
		Stone content	0.73				
		Cobble content	0.97				
Rock outcrop--------	20	Not rated		Not rated		Not rated	
43:							
Tsaya family--------	50	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Rock fragments	0.00
		Depth to bedrock	0.00			Depth to bedrock	0.00
		Organic matter content low	0.00				
Moenkopie-----------	40	Poor		Poor		Poor	
		Wind erosion	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Droughty	0.00			Rock fragments	0.00
		Depth to bedrock	0.00			Too sandy	0.92
		Organic matter content low	0.00				
		Too sandy	0.92				

Table 18.--Source of Reclamation Material, Roadfill, and Topsoil--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
44:							
Ustic Torriorthents-	45	Poor		Poor		Poor	
		Stone content	0.00	Depth to bedrock	0.00	Slope	0.00
		Droughty	0.00	Stones	0.00	Depth to bedrock	0.05
		Depth to bedrock	0.05	Slope	0.00	Rock fragments	0.12
		Organic matter content low	0.50				
Rock outcrop--------	30	Not rated		Not rated		Not rated	
Badland----------	25	Not rated		Not rated		Not rated	
45:							
Water----------	100	Not rated		Not rated		Not rated	
46:							
Westmion----------	60	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Low strength	0.22	Too clayey	0.05
		Too clayey	0.08	Shrink-swell	0.87	Rock fragments	0.50
		Organic matter content low	0.08				
Rock outcrop--------	25	Not rated		Not rated		Not rated	

Table 19.--Ponds and Embankments

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Arches	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
				Thin layer	1.00		
Mido	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Rock outcrop	20	Not rated		Not rated		Not rated	
2:							
Bluechief	45	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.73	Depth to water	1.00
		Depth to bedrock	0.72				
		Slope	0.32				
Needle	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.08	Thin layer	1.00		
3:							
Claysprings	65	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.92	Seepage	1.00	Depth to water	1.00
		Slope	0.08	Thin layer	1.00		
				Hard to pack	0.68		
Badland	30	Not rated		Not rated		Not rated	
4:							
Cowboy	85	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Hard to pack	0.65	Depth to water	1.00
		Seepage	0.03	Salinity	0.50		
5:							
Dient	65	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00	Large stones	0.17		
Claysprings	30	Very limited		Very limited		Very limited	
		Slope	1.00	Thin layer	1.00	Depth to water	1.00
6:							
Earlweed	60	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
		Slope	1.00				

Table 19.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6:							
Anasazi	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.88	Depth to water	1.00
		Depth to bedrock	0.88				
		Slope	0.32				
7:							
Farb	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00	Thin layer	1.00		
Pagina	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.95	Depth to water	1.00
		Slope	1.00				
		Depth to bedrock	0.23				
Rock outcrop	25	Not rated		Not rated		Not rated	
8:							
Gladel	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	Depth to water	1.00
		Slope	0.92				
Rock outcrop	30	Not rated		Not rated		Not rated	
9:							
Goblin	90	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00	Thin layer	1.00		
				Piping	1.00		
10:							
Jaconita family	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Atchee	40	Very limited		Very limited		Very limited	
		Slope	1.00	Seepage	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Thin layer	1.00		
11:							
Juanalo family	75	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	Depth to water	1.00
		Slope	1.00	Piping	0.32		
Rock outcrop	15	Not rated		Not rated		Not rated	
12:							
Kydestea	50	Very limited		Very limited		Very limited	
		Slope	1.00	Thin layer	1.00	Depth to water	1.00
		Depth to bedrock	1.00				
Rock outcrop	40	Not rated		Not rated		Not rated	

Table 19.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
13:							
Moenkopie	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00	Thin layer	1.00		
Rock outcrop	30	Not rated		Not rated		Not rated	
14:							
Moepitz family	55	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.16	Depth to water	1.00
		Slope	1.00				
		Depth to bedrock	0.16				
Moenkopie	25	Very limited		Very limited		Very limited	
		Slope	1.00	Seepage	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Thin layer	1.00		
Rock outcrop	15	Not rated		Not rated		Not rated	
15:							
Monue	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
Trail	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.90	Depth to water	1.00
Nepalto	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
16:							
Myton	95	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
17:							
Needle	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00	Thin layer	1.00		
Sheppard	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.08				
18:							
Oxyaquic Torrifluvents	80	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Depth to saturated zone	0.75	Cutbanks cave	1.00
						Slow refill	0.30
						Depth to saturated zone	0.11

Table 19.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
19:							
Oxyaquic Torripsamments	90	Very limited		Not limited		Very limited	
		Seepage	1.00			Cutbanks cave	1.00
						Depth to saturated zone	0.92
20:							
Pagina	65	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.74	Depth to water	1.00
		Slope	0.92				
		Depth to bedrock	0.05				
20:							
Denazar	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.85	Depth to water	1.00
		Slope	0.08				
21:							
Parkelei	65	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.55	Depth to water	1.00
Gladel	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	Depth to water	1.00
		Slope	1.00				
22:							
Pennell	85	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	Depth to water	1.00
		Slope	0.92	Seepage	0.48		
		Seepage	0.01				
23:							
Razito	55	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
Riverwash	40	Not rated		Not rated		Not rated	
24:							
Redhouse family	50	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.02	Depth to water	1.00
		Depth to bedrock	0.01	Thin layer	0.01		
Epikom family	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	Depth to water	1.00
		Slope	0.32	Piping	0.60		
25:							
Reef	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.08	Thin layer	1.00		

Table 19.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
25:							
Rock outcrop--------	15	Not rated		Not rated		Not rated	
26:							
Reef----------	65	Very limited		Very limited		Very limited	
		Slope	1.00	Seepage	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Thin layer	1.00		
				Large stones	0.08		
Rock outcrop--------	30	Not rated		Not rated		Not rated	
27:							
Remorris family-----	75	Very limited		Not limited		Very limited	
		Slope	1.00			Depth to water	1.00
		Seepage	0.63				
Rock outcrop--------	10	Not rated		Not rated		Not rated	
28:							
Rizno----------	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.92	Thin layer	1.00		
Rock outcrop--------	20	Not rated		Not rated		Not rated	
29:							
Rizno----------	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.32	Thin layer	1.00		
Rock outcrop--------	25	Not rated		Not rated		Not rated	
30:							
Rock outcrop--------	60	Not rated		Not rated		Not rated	
Arches----------	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	Depth to water	1.00
31:							
Rock outcrop--------	55	Not rated		Not rated		Not rated	
Atchee----------	35	Very limited		Very limited		Very limited	
		Slope	1.00	Thin layer	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Large stones	1.00		
32:							
Rock outcrop--------	60	Not rated		Not rated		Not rated	
Needle----------	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.92	Thin layer	1.00		

Table 19.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
33:							
Rock outcrop--------	60	Not rated		Not rated		Not rated	
Torriorthents-------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Thin layer	1.00	Depth to water	1.00
		Depth to bedrock	0.58				
34:							
Rock outcrop--------	50	Not rated		Not rated		Not rated	
Tsaya---------------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Seepage	1.00	Depth to water	1.00
		Depth to bedrock	1.00	Thin layer	1.00		
35:							
Sazi----------------	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.92	Depth to water	1.00
		Depth to bedrock	0.87				
		Slope	0.08				
Rizno---------------	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
				Thin layer	1.00		
36:							
Seeg----------------	95	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.92				
37:							
Sheppard------------	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.32				
38:							
Sheppard family-----	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.87	Depth to water	1.00
		Depth to bedrock	0.87	Seepage	0.50		
		Slope	0.32				
Tsaya family--------	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	Depth to water	1.00
		Slope	1.00				
Bluechief family----	20	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.99	Depth to water	1.00
		Depth to bedrock	0.99	Seepage	0.50		
		Slope	0.32				

Table 19.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
39:							
Somorent family-----	85	Somewhat limited		Very limited		Very limited	
		Slope	0.92	Seepage	1.00	Depth to water	1.00
		Depth to bedrock	0.92	Thin layer	1.00		
Rock outcrop--------	10	Not rated		Not rated		Not rated	
40:							
Torriorthents-------	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.77	Depth to water	1.00
		Slope	1.00				
		Depth to bedrock	0.77				
Rock outcrop--------	40	Not rated		Not rated		Not rated	
41:							
Torriorthents-------	45	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Large stones	0.95	Depth to water	1.00
		Seepage	0.70	Seepage	0.31		
Rock outcrop--------	35	Not rated		Not rated		Not rated	
Badland-------------	20	Not rated		Not rated		Not rated	
42:							
Tsaya---------------	65	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00	Thin layer	1.00		
				Large stones	0.46		
Rock outcrop--------	20	Not rated		Not rated		Not rated	
43:							
Tsaya family--------	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.08	Thin layer	1.00		
Moenkopie-----------	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to water	1.00
				Thin layer	1.00		
44:							
Ustic Torriorthents-	45	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.99	Depth to water	1.00
		Slope	1.00	Large stones	0.98		
		Depth to bedrock	0.99				
Rock outcrop--------	30	Not rated		Not rated		Not rated	
Badland-------------	25	Not rated		Not rated		Not rated	

Table 19.--Ponds and Embankments--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
45:							
Water	100	Not rated		Not rated		Not rated	
46:							
Westmion	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Thin layer	1.00	Depth to water	1.00
		Slope	0.68				
Rock outcrop	25	Not rated		Not rated		Not rated	

Table 20.--Engineering Properties

(Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash.)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
1:												
Arches----------	0-1	*Fine sand	*SM,	*A-2,	0	0	100	100	65-80	20-35	0-20	NP-5
	1-12	*Fine sand, Loamy fine sand, sand	*SM,	*A-2,	0	0	95-100	90-100	45-80	5-35	0-20	NP-5
	12-22	*Bedrock			---	---	---	---	---	---	---	---
Mido----------	0-1	*Fine sand	*SM,	*A-2,	0	0	100	100	65-80	20-35	0-20	NP-5
	1-16	*Fine sand, Sand	*SM,	*A-2,	0	0	100	100	50-80	5-35	0-20	NP-5
	16-60	*Fine sand, Sand	*SM,	*A-2,	0	0	100	100	50-80	5-35	0-20	NP-5
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
2:												
Bluechief-------	0-2	*Fine sand	*SM,	*A-2,	0	0	95-100	95-100	90-100	20-30	0-25	NP-5
	2-7	*Loamy fine sand	*SM,	*A-2,	0	0	95-100	95-100	90-100	30-40	15-25	2-5
	7-13	*Fine sandy loam, Sandy loam	*SC,	*A-2,	0	0	80-100	80-100	70-100	30-45	20-30	5-15
	13-34	*Gravelly fine sandy loam, Sandy loam, fine sandy loam	*SC,	*A-2,	0	0	75-100	70-100	65-95	25-45	20-30	5-15
	34-44	*Bedrock			---	---	---	---	---	---	---	---
Needle----------	0-5	*Fine sand, Loamy fine sand, loamy sand	*SP-SM,	*A-3,	0	0-5	95-100	95-100	85-100	10-25	0-25	NP-10
	5-15	*Bedrock			---	---	---	---	---	---	---	---
3:												
Claysprings-----	0-1	*Clay	*CH,	*A-7,	0	0	85-100	80-100	70-100	60-95	50-60	30-40
	1-7	*Clay, Clay loam	*CH,	*A-7,	0	0	85-100	80-100	70-100	55-95	40-60	25-40
	7-17	*Bedrock			---	---	---	---	---	---	---	---
Badland---------	---	---	---	---	---	---	---	---	---	---	---	---

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
6:												
Earlweed--------	0-1	*Loamy fine sand	*SM,	*A-2,	0	0	100	100	70-80	20-45	10-30	1-5
	1-13	*Loamy fine sand, Fine sand	*SC-SM,	*A-2,	0	0	100	100	70-80	20-45	10-30	1-5
	13-30	*Loamy fine sand, Fine sand	*SC-SM,	*A-2,	0	0	100	100	70-80	20-45	10-30	1-5
	30-44	*Loamy fine sand, Fine sand	*SC-SM,	*A-2,	0	0	100	100	70-80	20-45	10-30	1-5
	44-60	*Loamy fine sand, Fine sand	*SM,	*A-2,	0	0	100	100	70-80	20-45	10-30	1-5
Anasazi---------	0-1	*Fine sandy loam	*CL-ML,	*A-4,	0	0	95-100	90-100	75-85	50	20-30	5-10
	1-8	*Loamy fine sand, Fine sandy loam	*SC-SM,	*A-4,	0	0	95-100	90-100	55-85	20-50	20-30	5-10
	8-17	*Loamy fine sand, Fine sandy loam	*SC-SM,	*A-4,	0	0	80-100	75-100	50-85	20-50	20-30	5-10
	17-29	*Gravelly sandy loam, Gravelly fine sandy loam	*SC-SM,	*A-2,	0	0	55-100	50-100	35-70	20-40	20-30	5-10
	29-39	*Bedrock			---	---	---	---	---	---	---	---
7:												
Farb----------	0-1	*Fine sandy loam	*SC-SM,	*A-4,	0	0-10	80-100	75-100	55-85	30-50	10-30	1-10
	1-9	*Fine sandy loam, Sandy loam	*SC-SM,	*A-4,	0	0-10	80-100	75-100	40-85	25-50	10-30	5-10
	9-19	*Bedrock			---	---	---	---	---	---	---	---
Pagina----------	0-1	*Fine sandy loam	*SC-SM,	*A-4,	0	0	90-100	85-100	60-85	35-50	10-30	1-10
	1-8	*Fine sandy loam, Sandy loam	*SC-SM,	*A-4,	0	0	90-100	85-100	50-85	30-50	10-30	1-10
	8-12	*Sandy loam, Fine sandy loam	*SC,	*A-2,	0	0	85-100	80-100	50-85	30-50	20-30	5-15
	12-17	*Gravelly fine sandy loam, Sandy loam, fine sandy loam	*GC,	*A-6,	0	0	55-100	50-100	30-85	15-50	20-30	5-15
	17-26	*Gravelly fine sandy loam, Fine sandy loam, gravelly sandy loam	*GC,	*A-2,	0	0	55-90	50-85	30-70	15-50	20-30	5-15
	26-36	*Bedrock			---	---	---	---	---	---	---	---

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
7:												
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
8:												
Gladel----------	0-2	*Sandy loam	*SC-SM,	*A-4,	0	0	95-100	90-100	65-70	35-40	20-30	5-10
	2-16	*Sandy loam	*SC-SM,	*A-2,	0	0-10	80-100	75-100	45-70	30-40	20-30	5-10
	16-26	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
9:												
Goblin----------	0-3	*Very gravelly sandy loam, Extremely channery sandy loam, very gravelly fine sandy loam	*GC-GM,	*A-1,	0	0	25-55	20-55	15-45	5-20	20-30	5-10
	3-9	*Extremely channery sandy loam, Very gravelly fine sandy loam, very gravelly sandy loam	*GP-GC,	*A-2,	0	0	25-55	20-55	15-45	5-20	20-30	5-10
	9-19	*Bedrock			---	---	---	---	---	---	---	---
10:												
Jaconita family-	0-2	*Gravelly loamy sand	*SC-SM,	*A-1,	0	0	60-75	55-70	40-50	20	10-30	1-5
	2-12	*Very gravelly loamy sand	*GP-GC,	*A-1,	0	0	30-55	25-50	20-30	10-15	10-30	1-5
	12-28	*Extremely gravelly loamy coarse sand, Very gravelly loamy sand	*GP-GM,	*A-1,	0-30	10-40	20-60	15-55	15-30	0-10	10-30	1-5
	28-44	*Very gravelly loamy sand, Extremely gravelly loamy coarse sand	*GM,	*A-1,	0-30	10-40	20-60	15-55	15-40	5-20	10-30	1-5
	44-60	*Gravelly loamy sand	*SC-SM,	*A-1,	0	0	60-75	55-70	40-50	20	10-30	1-5

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
10:												
Atchee----------	0-2	*Gravelly sandy loam	*GC-GM,	*A-1,	0	0	55-80	50-75	35-50	20-30	20-30	5-10
	2-6	*Very gravelly sandy loam	*GC,	*A-2,	0	0	30-55	25-50	20-35	15-20	20-30	5-10
	6-16	*Very gravelly sandy loam	*GC-GM,	*A-2,	0	0-25	30-70	25-65	20-45	15-30	20-30	5-10
	16-26	*Bedrock			---	---	---	---	---	---	---	---
11:												
Juanalo family--	0-2	*Gravelly loam	*CL,	*A-6,	0	0	60-100	55-100	50-95	40-75	30-40	10-20
	2-10	*Gravelly loam, Sandy loam	*GC,	*A-6,	0	0	60-100	55-100	50-95	40-75	20-40	10-20
	10-18	*Coarse sandy loam, Loam	*SC,	*A-4,	0	0	85-100	80-100	40-95	15-75	20-30	5-15
	18-28	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
12:												
Kydestea--------	0-1	*Gravelly sandy loam	*SC,	*A-2,	0	0-10	65-80	60-75	40-50	25-30	20-30	5-10
	1-9	*Flaggy sandy clay loam, Very flaggy sandy clay loam	*SC,	*A-6,	0	15-30	55-85	50-80	45-70	30-45	30-50	15-20
	9-16	*Very flaggy sandy clay loam	*GC,	*A-2,	0	15-30	40-65	35-60	35-55	20-35	30-50	15-25
	16-26	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
13:												
Moenkopie-------	0-2	*Loamy fine sand	*SC-SM,	*A-2,	0	0	85-100	80-100	75-100	20-30	15-25	1-5
	2-5	*Loam, Fine sandy loam	*CL,	*A-6,	0	0	80-100	75-100	60-90	45-65	25-30	5-15
	5-8	*Gravelly sandy loam, Sandy loam	*SC-SM,	*A-2,	0	0	65-95	50-90	35-70	20-40	20-25	5-10
	8-18	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
14:												
Moepitz family--	0-1	*Very gravelly fine sandy loam	*GC,	*A-2,	0-15	0-25	30-65	25-60	20-50	10-35	20-30	1-10
	1-6	*Very gravelly fine sandy loam, Very gravelly sandy loam	*GC-GM,	*A-1,	0-15	0-25	30-65	25-60	15-50	10-35	20-30	1-10
	6-19	*Gravelly fine sandy loam, Gravelly sandy loam	*SC,	*A-2,	0-15	0-25	55-90	50-85	30-70	15-50	20-30	1-10
	19-31	*Sandy loam, Fine sandy loam	*SC-SM,	*A-4,	0	0	80-100	75-100	40-85	20-50	20-30	1-10
	31-48	*Sandy loam, Fine sandy loam	*SC-SM,	*A-4,	0	0	80-100	75-100	40-85	20-50	20-30	1-10
	48-58	*Bedrock			---	---	---	---	---	---	---	---
Moenkopie-------	0-1	*Gravelly fine sandy loam	*SC-SM,	*A-2,	0	0-5	55-80	50-75	35-65	20-45	20-30	1-10
	1-6	*Gravelly sandy loam, Gravelly fine sandy loam	*SC,	*A-2,	0	0-5	55-100	50-100	30-85	15-50	20-30	1-10
	6-16	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
15:												
Monue-----------	0-4	*Loamy very fine sand	*ML,	*A-4,	0	0	95-100	95-100	90-100	40-55	15-25	2-10
	4-31	*Very fine sandy loam, Fine sandy loam	*CL,	*A-4,	0	0	85-100	85-100	80-100	50-65	20-30	5-10
	31-60	*Gravelly sand, Loamy fine sand, very gravelly loamy sand	*SP-SM,	*A-3,	0	0	65-100	65-100	50-86	5-20	0-25	NP-5
Trail-----------	0-3	*Loamy fine sand	*SM,	*A-2,	0	0	100	100	95-100	30-35	15-25	2-5
	3-16	*Loamy fine sand, Loamy sand	*SM,	*A-2,	0	0	95-100	95-100	85-100	25-35	15-25	2-5
	16-43	*Loamy fine sand, Sand, fine sand, coarse sand	*SP-SM,	*A-2,	0	0	90-100	85-100	65-85	5-20	0-25	NP-5
	43-71	*Loamy fine sand, Coarse sand, fine sand, sand	*SM,	*A-2,	0	0	90-100	85-100	75-100	20-35	0-25	NP-5

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
15:												
Nepalto---------	0-4	*Sand, Loamy sand	*SM,	*A-2,	0	0	90-100	90-100	70-85	10-20	0-25	NP-5
	4-10	*Very gravelly sand, Gravelly loamy sand	*GP-GM,	*A-1,	0	0-10	40-60	35-60	30-50	5-10	0-20	NP-5
	10-60	*Very gravelly sand, Gravelly loamy sand	*GP-GM,	*A-1,	0	0-15	40-60	35-55	25-45	5-10	0-20	NP-5
16:												
Myton-----------	0-2	*Very gravelly sandy loam	*GC-GM,	*A-2,	0-15	0-15	40-55	35-50	25-35	15-20	10-30	1-15
	2-7	*Gravelly sandy loam, Very gravelly sandy loam	*SC-SM,	*A-1,	0-15	0-15	40-80	35-75	25-50	15-30	10-30	1-15
	7-30	*Extremely gravelly loamy sand, Very gravelly loamy coarse sand	*GW-GC,	*A-1,	0-15	10-15	30-55	25-50	15-35	5-15	10-30	1-15
	30-47	*Very gravelly loamy coarse sand, Extremely gravelly loamy sand	*SP-SM,	*A-1,	0-15	10-15	30-55	25-50	15-35	5-15	10-30	1-15
	47-60	*Very gravelly loam, Gravelly sandy loam	*GC,	*A-2,	0-15	0-15	40-80	35-75	25-65	15-55	10-30	1-15
	60-64	*Very stony sandy loam, Very gravelly loamy coarse sand	*GC-GM,	*A-2,	0-25	10-15	40-60	35-55	25-40	5-25	10-30	1-15
17:												
Needle----------	0-1	*Sand	*SP-SM,	*A-2,	0	0	100	95-100	50-70	5-15	0-30	NP-5
	1-11	*Sand, Fine sand	*SM,	*A-2,	0	0	100	95-100	50-80	5-35	0-20	NP-5
	11-21	*Bedrock			---	---	---	---	---	---	---	---
Sheppard--------	0-1	*Sand	*SP-SM,	*A-2,	0	0	100	95-100	50-70	5-15	0-30	NP-5
	1-8	*Sand, Fine sand	*SM,	*A-2,	0	0	100	95-100	50-80	5-35	0-20	NP-5
	8-21	*Sand, Fine sand	*SM,	*A-2,	0	0	100	95-100	50-80	5-35	0-20	NP-5
	21-60	*Sand, Fine sand	*SM,	*A-2,	0	0	100	95-100	50-80	5-35	0-20	NP-5

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
18:												
Oxyaquic Torrifluvents--	0-2	*Loamy fine sand	*SM,	*A-2,	0	0	95-100	90-100	85-100	30-40	0-25	NP-5
	2-8	*Very fine sandy loam, Sandy loam	*CL-ML,	*A-4,	0	0	95-100	90-100	85-100	45-60	20-30	3-10
	8-25	*Fine sand, Loamy sand	*SM,	*A-2,	0	0	95-100	90-100	85-100	10-20	0-20	NP-5
	25-32	*Loamy fine sand, Sandy loam	*SM,	*A-2,	0	0	95-100	90-100	85-100	30-40	0-25	NP-5
	32-60	*Loam, Fine sandy loam	*CL,	*A-6,	0	0	85-100	80-100	65-95	45-70	20-35	5-20
19:												
Oxyaquic Torripsamments-	0-1	*Loamy sand	*SM,	*A-2,	0	0	93-100	90-100	55-75	25-30	0-20	NP-5
	1-11	*Loamy sand, Sand	*SM,	*A-2,	0	0	80-100	75-100	55-75	15-30	0-20	NP-5
	11-31	*Loamy sand, Sand	*SM,	*A-2,	0	0	80-100	75-100	55-75	15-30	0-20	NP-5
	31-52	*Loamy sand, Sand	*SM,	*A-2,	0	0	80-100	75-100	55-75	15-30	0-20	NP-5
	52-65	*Loamy sand, Sandy loam	*SM,	*A-2,	0	0	80-100	75-100	55-75	25-30	0-30	NP-5
20:												
Pagina----------	0-1	*Loamy fine sand	*SC-SM,	*A-2,	0	0	95-100	90-100	55-80	25-45	0-30	NP-10
	1-12	*Loamy fine sand, Fine sandy loam	*SC-SM,	*A-2,	0	0	90-100	85-100	55-85	20-50	0-30	NP-10
	12-19	*Fine sandy loam, Loamy fine sand	*SC,	*A-2,	0	0	90-100	85-100	50-85	20-50	20-30	5-10
	19-27	*Fine sandy loam, Sandy loam	*CL,	*A-4,	0	0	90-100	85-100	50-85	25-50	20-30	5-15
	27-34	*Fine sandy loam, Sandy loam	*SC,	*A-4,	0	0	85-100	80-100	45-85	25-50	20-30	5-15
	34-44	*Bedrock			---	---	---	---	---	---	---	---
Denazar----------	0-1	*Sand	*SM,	*A-2,	0	0	95-100	90-100	65-70	15	0-30	NP-5
	1-21	*Sand, Sandy loam	*SM,	*A-2,	0	0	90-100	85-100	60-70	15	10-30	1-5
	21-27	*Sand, Loamy sand	*SM,	*A-2,	0	0	90-100	85-100	60-70	15	10-30	1-5
	27-41	*Loamy sand, Loamy sand	*SC-SM,	*A-2,	0	0	80-100	75-100	55-75	25-30	10-30	1-10
	41-60	*Loamy sand, Sandy loam	*SC-SM,	*A-2,	0	0	80-100	75-100	55-75	25-30	10-30	1-10

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
21:												
Parkelei---------	0-2	*Fine sandy loam	*SC,	*A-6,	0	0	85-100	75-100	70-90	35-55	20-35	5-15
	2-9	*Sandy loam, Fine sandy loam	*SC-SM,	*A-4,	0	0	85-100	75-100	70-85	40-55	20-35	5-15
	9-17	*Sandy loam, Loam	*SC,	*A-4,	0	0	85-100	75-100	55-80	30-50	20-35	5-15
	17-28	*Loam, Sandy loam	*CL,	*A-6,	0	0	85-100	75-100	60-100	40-75	30-45	10-25
	28-41	*Clay loam, Loam	*CL,	*A-6,	0	0	85-100	75-100	60-95	40-75	30-45	10-25
	41-60	*Loam, Clay loam	*CL,	*A-6,	0	0	85-100	75-100	65-100	45-80	30-45	10-25
Gladel----------	0-2	*Fine sandy loam	*CL-ML,	*A-4,	0	0	100	100	80-95	45-55	20-35	5-10
	2-9	*Sandy loam, Fine sandy loam	*SC-SM,	*A-4,	0	0	100	100	70-85	40-50	15-30	5-10
	9-17	*Sandy loam, Loam, fine sandy loam	*SC-SM,	*A-4,	0	0	85-100	75-100	55-85	30-50	15-30	5-10
	17-27	*Bedrock			---	---	---	---	---	---	---	---
22:												
Pennell---------	0-4	*Cobbly loam	*GC,	*A-2,	0	25-40	45-60	40-55	35-50	25-40	20-30	5-15
	4-7	*Sandy loam	*SC,	*A-2,	0	0-5	80-95	75-90	40-65	25-35	20-30	5-10
	7-14	*Very gravelly sandy loam	*GC,	*A-2,	0	0-5	45-55	40-50	25-35	10-20	20-30	5-10
	14-19	*Sandy loam	*SC,	*A-2,	0	0-5	80-95	75-90	40-65	25-35	20-30	5-10
	19-29	*Bedrock			---	---	---	---	---	---	---	---
23:												
Razito----------	0-1	*Sand	*SM,	*A-2,	0	0	85-100	80-100	60-85	10-20	0-25	NP-5
	1-5	*Sand, Fine sand, gravelly sand	*SM,	*A-2,	0	0	70-100	65-100	50-85	10-20	0-20	NP-5
	5-7	*Fine sand, Sand, gravelly sand	*SM,	*A-2,	0	0	70-100	65-100	60-100	10-25	0-20	NP-5
	7-36	*Fine sand, Sand, gravelly sand	*SM,	*A-2,	0	0	70-100	65-100	60-100	10-25	0-20	NP-5
	36-40	*Fine sand, Sand, gravelly sand	*SM,	*A-2,	0	0	70-100	65-100	60-100	10-25	0-20	NP-5
	40-60	*Sand, Fine sand, gravelly sand	*SM,	*A-2,	0	0	70-100	65-100	50-85	10-20	0-20	NP-5
Riverwash-------	---	---	---	---	---	---	---	---	---	---	---	---

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
24:												
Redhouse family-	0-1	*Loam	*CL,	*A-4,	0	0	100	100	85-95	55-65	20-35	5-10
	1-9	*Loam, Clay loam	*CL,	*A-6,	0	0	100	100	85-95	60-70	30-40	10-20
	9-19	*Clay loam, Loam	*CL,	*A-6,	0	0	100	100	80-95	60-75	35-45	15-25
	19-27	*Clay loam, Loam	*CL,	*A-6,	0	0	100	100	85-95	65-75	35-45	15-25
	27-46	*Loam, Clay loam	*CL,	*A-6,	0	0	100	100	85-100	65-75	35-45	15-25
	46-57	*Clay loam, Loam	*CL,	*A-6,	0	0	100	100	80-95	60-75	35-45	15-25
	57-67	*Bedrock			---	---	---	---	---	---	---	---
Epikom family---	0-1	*Loam	*CL,	*A-4,	0	0	100	80-100	65-95	45-70	20-35	5-15
	1-8	*Loam, Very fine sandy loam	*CL,	*A-6,	0	0	100	80-100	70-95	50-70	30-40	10-20
	8-11	*Loam, Very fine sandy loam	*CL,	*A-6,	0	0	100	80-100	70-95	50-70	30-40	10-20
	11-21	*Bedrock			---	---	---	---	---	---	---	---
25:												
Reef----------	0-4	*Very gravelly coarse sandy loam, Extremely channery sandy loam	*GP-GC,	*A-1,	0	0-35	35-70	25-60	15-40	5-20	20-30	5-10
	4-5	*Bedrock			---	---	---	---	---	---	---	---
	5-15	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
26:												
Reef----------	0-4	*Very channery loam, Very channery fine sandy loam, extremely channery fine sandy loam	*GC,	*A-4,	0	20-40	30-70	30-70	25-65	20-50	20-35	5-15
	4-13	*Bedrock			---	---	---	---	---	---	---	---
	13-23	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
27:												
Remorris family-	0-1	*Fine sandy loam	*CL,	*A-4,	0	0	100	100	85-95	50-75	20-30	5-15
	1-7	*Fine sandy loam, Loam, gravelly fine sandy loam	*CL,	*A-4,	0	0	75-100	70-100	60-95	40-75	20-30	5-15
	7-17	*Fine sandy loam, Loam, gravelly fine sandy loam	*CL,	*A-4,	0	0	65-100	60-100	40-95	35-75	20-30	5-15
	17-27	*Fine sandy loam, Loam, gravelly fine sandy loam	*CL,	*A-4,	0	0	65-100	60-100	40-95	35-75	20-30	5-15
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
28:												
Rizno----------	0-2	*Gravelly sandy loam	*SC-SM,	*A-1,	0	0	60-80	55-75	40-60	15-30	20-30	5-10
	2-4	*Channery sandy loam, Sandy loam	*SC,	*A-2,	0	0	65-90	60-90	45-70	20-35	20-30	5-15
	4-6	*Bedrock			---	---	---	---	---	---	---	---
	6-15	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
29:												
Rizno----------	0-1	*Fine sandy loam	*SC-SM,	*A-4,	0	0	95-100	95-100	80-90	30-40	20-30	5-10
	1-6	*Fine sandy loam, Sandy loam, very fine sandy loam	*SC,	*A-2,	0	0	95-100	95-100	65-75	30-35	20-30	5-10
	6-15	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
30:												
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
30:												
Arches----------	0-1	*Fine sand	*SM,	*A-2,	0	0	95-100	90-100	70-80	30-35	0-20	NP-5
	1-11	*Fine sand, Sand, loamy fine sand	*SM,	*A-2,	0	0	95-100	90-100	45-80	5-35	0-20	NP-5
	11-21	*Bedrock			---	---	---	---	---	---	---	---
31:												
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
Atchee----------	0-1	*Very channery sandy loam	*GC-GM,	*A-1,	0	10-25	35-65	30-65	20-45	10-30	20-30	5-10
	1-16	*Very cobbly sandy loam	*SC-SM,	*A-2,	0	25-60	40-75	35-70	25-50	15-30	20-30	5-10
	16-26	*Bedrock			---	---	---	---	---	---	---	---
32:												
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
Needle----------	0-1	*Sand	*SP-SM,	*A-2,	0	0	100	95-100	50-70	5-15	0-30	NP-5
	1-11	*Sand, Fine sand	*SM,	*A-2,	0	0	100	95-100	50-80	5-35	0-20	NP-5
	11-21	*Bedrock			---	---	---	---	---	---	---	---
33:												
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
Torriorthents---	0-2	*Channery loam	*GC,	*A-6,	0	0	60-80	55-75	50-75	40-55	20-40	10-15
	2-10	*Very flaggy coarse sandy loam	*GC-GM,	*A-1,	0	30-45	55-85	50-80	35-55	15-25	20-30	5-10
	10-17	*Extremely parachannery coarse sandy loam	*SC-SM,	*A-2,	0	0	100	100	55-65	25-35	20-30	5-10
	17-27	*Bedrock			---	---	---	---	---	---	---	---
34:												
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
34:												
Tsaya----------	0-2	*Gravelly loam	*GC,	*A-2,	0	0	55-80	50-75	40-70	30-55	30-40	10-20
	2-7	*Very gravelly clay loam, Very gravelly loam	*GC,	*A-2,	0	0	35-55	30-50	25-50	20-40	30-50	10-25
	7-13	*Extremely gravelly loam, Extremely gravelly clay loam	*GP-GC,	*A-2,	0	0-15	15-30	10-25	5-25	5-20	30-40	10-20
	13-23	*Bedrock			---	---	---	---	---	---	---	---
35:												
Sazi----------	0-4	*Fine sandy loam	*SC-SM,	*A-2,	0	0	100	100	85-90	30-35	15-25	2-6
	4-11	*Fine sandy loam, Fine sand	*SC-SM,	*A-2,	0	0	100	100	85-90	30-35	20-25	5-6
	11-28	*Sandy loam, Fine sandy loam	*SC,	*A-2,	0	0	95-100	90-100	65-75	25-30	20-30	5-10
	28-30	*Bedrock			---	---	---	---	---	---	---	---
	30-43	*Bedrock			---	---	---	---	---	---	---	---
Rizno----------	0-3	*Gravelly loamy coarse sand	*SP-SM,	*A-1,	0	0	70-95	65-95	35-60	5-25	0-31	NP-10
	3-10	*Sandy loam, Gravelly sandy loam, very gravelly sandy loam	*SC-SM,	*A-2,	0	0	55-90	50-85	35-70	15-35	18-27	4-10
	10-20	*Bedrock			---	---	---	---	---	---	---	---

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
36:												
Seeg----------	0-2	*Gravelly loam	*GC,	*A-6,	0	0-10	60-80	55-75	40-70	35-55	30-40	10-20
	2-11	*Very channery loam, Gravelly sandy loam, extremely gravelly sandy loam	*GC,	*A-2,	0	0-15	25-75	20-70	10-65	5-50	20-40	10-20
	11-29	*Extremely gravelly loam, Very channery loam, gravelly sandy loam	*GC,	*A-2,	0-10	10-15	20-75	15-70	10-65	5-50	20-30	5-15
	29-34	*Gravelly sandy loam, Very channery loam, extremely gravelly sandy loam	*SC,	*A-2,	0-10	0-15	35-80	30-75	15-70	10-55	20-30	5-15
	34-60	*Extremely gravelly sandy loam	*GP-GC,	*A-2,	0-10	0-25	15-30	10-25	5-20	0-15	20-30	5-15
37:												
Sheppard--------	0-1	*Sand	*SP-SM,	*A-2,	0	0	100	95-100	50-70	5-15	0-30	NP-5
	1-9	*Sand, Fine sand	*SM,	*A-2,	0	0	100	95-100	50-80	5-35	0-20	NP-5
	9-39	*Sand, Fine sand	*SM,	*A-2,	0	0	100	95-100	50-80	5-35	0-20	NP-5
	39-60	*Loamy sand, Sand	*SC-SM,	*A-2,	0	0	100	95-100	50-75	5-30	0-20	NP-5
38:												
Sheppard family-	0-4	*Fine sand	*SM,	*A-2,	0	0	100	100	90-100	10-20	0-25	NP-2
	4-20	*Loamy fine sand, Fine sand	*SC-SM,	*A-2,	0	0	80-100	80-100	70-100	20-30	0-25	NP-5
	20-30	*Loamy fine sand, Fine sand	*SC-SM,	*A-2,	0	0	80-100	80-100	70-95	20-35	0-25	NP-5
	30-39	*Bedrock			---	---	---	---	---	---	---	---
Tsaya family----	0-3	*Fine sandy loam	*SC-SM,	*A-2,	0	0	80-95	80-95	70-90	25-40	15-30	4-10
	3-10	*Very gravelly fine sandy loam, Very gravelly sandy loam	*GP-GC,	*A-1,	0	0-35	25-55	25-50	20-50	5-20	15-30	4-10
	10-20	*Bedrock			---	---	---	---	---	---	---	---

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
38:												
Bluechief family	0-4	*Gravelly sandy loam	*SC,	*A-2,	0	0	60-80	55-80	40-60	15-25	20-30	4-10
	4-22	*Channery sandy loam, Gravelly sandy loam	*SC,	*A-2,	0	0-20	50-100	50-100	35-75	15-35	20-30	5-10
	22-32	*Bedrock			---	---	---	---	---	---	---	---
39:												
Somorent family-	0-2	*Channery sandy loam	*SC,	*A-2,	0	0	60-80	55-75	35-50	15-30	20-40	5-20
	2-7	*Parachannery sandy loam, Loam, very parachannery loam	*SC,	*A-2,	0	0	85-100	80-100	55-95	25-90	20-40	5-20
	7-17	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
40:												
Torriorthents---	0-4	*Fine sandy loam, Gravelly coarse sand, gravelly loamy sand, sandy loam	*SC,	*A-2,	0	0	85-100	80-100	65-95	25-40	15-30	2-10
	4-16	*Fine sandy loam, Loamy coarse sand, loamy sand, very gravelly loamy coarse sand, sandy clay loam, sandy loam	*SC,	*A-6,	0	0-30	35-100	35-100	30-100	15-65	20-45	5-25
	16-33	*Gravelly fine sandy loam, Sandy loam, sandy clay loam, very gravelly loamy coarse sand, loamy sand, loamy coarse sand, fine sandy loam	*SC,	*A-2,	0-5	0-30	36-100	35-100	25-100	15-70	20-45	5-25
	33-43	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
41:												
Torriorthents---	0-1	*Very gravelly sandy clay loam	*SC,	*A-2,	0-20	0-45	45-100	40-95	20-90	5-55	30-50	15-25
	1-7	*Very cobbly sandy clay loam, Gravelly sandy loam	*SC,	*A-2,	0-30	0-45	45-85	40-80	20-75	5-45	30-50	5-25
	7-44	*Very stony sandy clay loam, Gravelly sandy loam	*GC,	*A-2,	0-45	0-60	30-75	25-70	15-65	0-40	30-50	5-25
	44-60	*Extremely stony sandy clay loam, Very gravelly sandy loam, very gravelly loamy sand	*GC,	*A-2,	0-45	10-60	25-70	20-65	5-60	0-40	20-50	1-25
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
Badland---------	---	---	---	---	---	---	---	---	---	---	---	---
42:												
Tsaya-----------	0-1	*Gravelly sandy clay loam	*SC,	*A-2,	0	3-10	70-95	55-85	40-75	20-45	30-50	15-25
	1-4	*Very cobbly clay loam, Very channery clay loam, very cobbly sandy clay loam	*GC,	*A-6,	10-20	20-45	50-75	30-70	25-70	15-50	30-45	15-25
	4-9	*Very cobbly sandy clay loam, Very channery clay loam, very cobbly clay loam	*GC,	*A-2,	0-20	20-45	50-75	30-65	25-60	10-35	30-50	15-25
	9-19	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
43:												
Tsaya family----	0-4	*Sandy loam	*SC-SM,	*A-2,	0	0	85-95	85-95	60-75	25-35	20-30	5-15
	4-9	*Coarse sandy loam, Extremely channery sandy loam, very channery coarse sandy loam, sandy loam	*SC,	*A-2,	0	0	20-85	15-85	10-60	5-35	20-35	5-15
	9-16	*Extremely channery sandy loam, Very channery sandy loam, very channery coarse sandy loam, very gravelly coarse sandy loam	*GC,	*A-2,	0	20-45	30-75	25-70	20-60	5-30	20-35	5-15
	16-26	*Bedrock			---	---	---	---	---	---	---	---
Moenkopie-------	0-2	*Loamy sand	*SC-SM,	*A-2,	0	0	80-90	80-85	65-75	20-30	20-30	5-15
	2-8	*Channery sandy loam, Very channery coarse sandy loam, coarse sandy loam	*SC,	*A-2,	0	0	35-90	30-85	20-70	10-35	20-30	5-15
	8-18	*Bedrock			---	---	---	---	---	---	---	---
44:												
Ustic Torriorthents--	0-1	*Cobbly sandy loam	*SC,	*A-2,	0	0-30	75-95	60-90	45-70	20-35	20-30	5-10
	1-8	*Cobbly sandy loam	*SC-SM,	*A-2,	0-15	10-30	75-95	60-90	45-75	20-40	20-30	5-10
	8-23	*Very stony sandy loam	*SC,	*A-2,	25-55	10-30	70-95	50-90	35-70	15-35	20-30	5-15
	23-33	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---
Badland---------	---	---	---	---	---	---	---	---	---	---	---	---
45:												
Water-----------	---	---	---	---	---	---	---	---	---	---	---	---

Table 20.--Engineering Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
46:												
Westmion--------	0-1	*Gravelly sandy loam	*SC,	*A-2,	0	0-5	65-95	50-85	35-70	15-40	25-40	10-20
	1-7	*Clay, Sandy clay	*CH,	*A-7,	0	0	85-100	65-100	55-95	45-85	45-60	25-35
	7-14	*Clay loam, Sandy clay loam, loam	*SC,	*A-7,	0	0-5	80-90	60-85	45-80	25-55	30-55	15-35
	14-24	*Bedrock			---	---	---	---	---	---	---	---
Rock outcrop----	---	---	---	---	---	---	---	---	---	---	---	---

Table 21.--Physical Soil Properties

Sand, silt and clay values show ranges where populated, otherwise a representative value (rv) is shown. Absence of an entry, either blank or marked with --- indicates that data were not estimated. Soil properties are measured or inferred from direct observations in the field or laboratory.)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	in/hr	In/In	Pct	Pct
1:									
Arches ---	0-1	95	1	3-6	1.45-1.60	5.9-20.0	0.05-0.08	0.0-2.9	0.2-1.0
	1-12	94	1	3-6	1.45-1.60	5.9-20.0	0.05-0.08	0.0-2.9	0.0-0.5
	12-22				---	0.0-0.2	---	---	---
Mido ---	0-1	96	1	3-6	1.45-1.60	5.9-20.0	0.05-0.08	0.0-2.9	0.2-1.0
	1-16	96	1	3-6	1.45-1.60	5.9-20.0	0.05-0.08	0.0-2.9	0.0-0.5
	16-60	95	1	3-6	1.45-1.60	5.9-20.0	0.05-0.08	0.0-2.9	0.0-0.5
2:									
Bluechief ---	0-2	92	6	2-8	1.45-1.60	6.0-20.0	0.05-0.08	0.0-2.9	0.0-1.0
	2-7	80	14	5-10	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.0-1.0
	7-13	73	14	12-18	1.35-1.50	2.0-6.0	0.08-0.14	0.0-2.9	0.0-1.0
	13-34	70	15	12-18	1.35-1.50	2.0-6.0	0.06-0.11	0.0-2.9	0.0-0.5
	34-44				---	0.0-0.2	---	---	---
Needle ---	0-5	97	2	1-12	1.45-1.60	6.0-20.0	0.05-0.08	0.0-2.9	0.0-1.0
	5-15				---	0.0-0.2	---	---	---
3:									
Claysprings ---	0-1	25	30	40-55	1.15-1.30	0.1-0.2	0.14-0.16	3.0-5.9	0.5-1.5
	1-7	25	30	35-55	1.15-1.30	0.1-0.2	0.14-0.16	3.0-5.9	0.2-1.0
	7-17				---	0.0-0.2	---	---	---
4:									
Cowboy ---	0-2	40	26	30-38	1.20-1.35	0.2-0.6	0.17-0.21	6.0-9.0	0.2-1.0
	2-6	60	10	28-38	1.25-1.40	0.6-2.0	0.13-0.18	6.0-9.0	0.0-0.5
	6-19	55	11	28-45	1.25-1.40	0.6-2.0	0.13-0.17	6.0-9.0	0.0-0.5
	19-47	30	25	36-50	1.15-1.30	0.1-0.2	0.14-0.16	6.0-9.0	0.0-0.5
	47-56	40	22	36-50	1.20-1.35	0.2-0.6	0.16-0.20	6.0-9.0	0.0-0.5
	56-60	30	25	36-50	1.15-1.30	0.1-0.2	0.13-0.15	6.0-9.0	0.0-0.5
5:									
Dient ---	0-2	45	29	15-27	1.25-1.40	0.6-2.0	0.08-0.11	3.0-5.9	0.5-1.5
	2-7	45	29	15-27	1.25-1.40	0.6-2.0	0.08-0.11	3.0-5.9	0.2-1.0
	7-15	55	26	15-27	1.35-1.50	2.0-6.0	0.04-0.07	3.0-5.9	0.2-1.0
	15-22	60	22	12-27	1.35-1.50	2.0-6.0	0.04-0.07	3.0-5.9	0.2-1.0
	22-60	60	22	12-27	1.35-1.50	2.0-6.0	0.04-0.07	3.0-5.9	0.2-1.0

Table 21.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	in/hr	In/In	Pct	Pct
5:									
Claysprings ----	0-2	55	20	20-32	1.25-1.40	0.6-2.0	0.12-0.16	3.0-5.9	0.5-1.5
	2-6	40	25	30-50	1.20-1.35	0.2-0.6	0.16-0.20	3.0-5.9	0.2-1.0
	6-11	30	30	30-50	1.15-1.30	0.1-0.2	0.14-0.16	6.0-8.9	0.2-1.0
	11-18	30	30	30-50	1.15-1.30	0.1-0.2	0.14-0.16	6.0-8.9	0.2-1.0
	18-28	30	30	30-50	1.15-1.30	0.0-0.2	0.14-0.16	6.0-8.9	0.2-1.0
6:									
Earlweed -------	0-1	85	8	4-10	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.2-1.0
	1-13	85	7	4-10	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.0-0.5
	13-30	85	7	4-10	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.0-0.5
	30-44	85	7	4-10	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.0-0.5
	44-60	85	9	4-10	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.0-0.5
Anasazi --------	0-1	70	22	6-12	1.35-1.50	2.0-6.0	0.08-0.15	0.0-2.9	0.2-1.0
	1-8	78	15	6-12	1.35-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.0-0.5
	8-17	78	15	6-12	1.35-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.0-0.5
	17-29	68	20	10-14	1.35-1.50	2.0-6.0	0.06-0.10	0.0-2.9	0.0-0.5
	29-39				---	0.0-0.2	---	---	---
7:									
Farb -----------	0-1	65	25	6-12	1.35-1.50	2.0-6.0	0.08-0.14	0.0-2.9	0.2-1.0
	1-9	65	25	8-16	1.35-1.50	2.0-6.0	0.08-0.14	0.0-2.9	0.0-0.5
	9-19				---	0.0-0.2	---	---	---
Pagina ---------	0-1	70	19	6-12	1.35-1.50	2.0-6.0	0.08-0.15	0.0-2.9	0.2-1.0
	1-8	65	23	6-14	1.35-1.50	2.0-6.0	0.08-0.15	0.0-2.9	0.0-0.5
	8-12	60	26	8-18	1.35-1.50	2.0-6.0	0.07-0.11	0.0-2.9	0.0-0.5
	12-17	68	14	10-18	1.35-1.50	2.0-6.0	0.06-0.11	0.0-2.9	0.0-0.5
	17-26	68	16	10-18	1.35-1.50	2.0-6.0	0.06-0.11	0.0-2.9	0.0-0.5
	26-36				---	0.0-0.2	---	---	---
8:									
Gladel ---------	0-2	67	23	8-14	1.35-1.50	2.0-6.0	0.08-0.13	0.0-2.9	1.0-2.0
	2-16	68	20	10-16	1.35-1.50	2.0-6.0	0.07-0.12	0.0-2.9	0.2-1.0
	16-26				---	0.0-0.2	---	---	---
9:									
Goblin ---------	0-3	78	12	10-15	1.35-1.50	2.0-6.0	0.05-0.08	0.0-2.9	0.0-2.0
	3-9	75	14	10-15	1.35-1.50	2.0-6.0	0.04-0.07	0.0-2.9	0.0-0.5
	9-19				---	0.0-0.2	---	---	---

Table 21.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	in/hr	In/In	Pct	Pct
10:									
Jaconita family	0-2	83	9	5-10	1.45-1.60	6.0-20.0	0.04-0.06	0.0-2.9	0.5-1.5
	2-12	83	9	5-10	1.45-1.60	6.0-20.0	0.03-0.04	0.0-2.9	0.0-0.5
	12-28	83	11	4-10	1.45-1.60	6.0-20.0	0.03-0.04	0.0-2.9	0.0-0.5
	28-44	78	16	4-10	1.45-1.60	6.0-20.0	0.03-0.04	0.0-2.9	0.0-0.5
	44-60	83	9	5-10	1.45-1.60	6.0-20.0	0.04-0.05	0.0-2.9	0.0-0.5
Atchee	0-2	67	23	8-12	1.35-1.50	2.0-6.0	0.06-0.09	0.0-2.9	0.2-1.0
	2-6	67	19	8-14	1.35-1.50	2.0-6.0	0.05-0.08	0.0-2.9	0.0-0.5
	6-16	67	21	8-14	1.35-1.50	2.0-6.0	0.04-0.07	0.0-2.9	0.0-0.5
	16-26				---	0.0-0.2	---	---	---
11:									
Juanalo family	0-2	35	39	15-26	1.25-1.35	0.6-2.0	0.10-0.14	0.0-2.9	0.5-1.5
	2-10	40	38	15-26	1.25-1.35	0.6-2.0	0.10-0.14	0.0-2.9	0.2-1.0
	10-18	60	25	12-18	1.35-1.45	2.0-6.0	0.06-0.11	0.0-2.9	0.2-1.0
	18-28				---	0.0-0.2	---	---	---
12:									
Kydestea	0-1	67	19	10-16	1.35-1.50	2.0-6.0	0.06-0.10	0.0-2.9	1.0-2.0
	1-9	56	18	20-30	1.25-1.40	0.6-2.0	0.10-0.13	3.0-5.9	0.2-1.0
	9-16	54	14	20-35	1.25-1.40	0.6-2.0	0.09-0.12	3.0-5.9	0.2-1.0
	16-26				---	0.0-0.2	---	---	---
13:									
Moenkopie	0-2	84	9	4-10	1.45-1.60	2.0-6.0	0.08-0.11	0.0-2.9	0.2-1.0
	2-5	43	40	12-18	1.25-1.40	0.6-2.0	0.12-0.17	0.0-2.9	0.0-0.5
	5-8	68	20	10-14	1.35-1.50	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5
	8-18				---	0.0-0.2	---	---	---
14:									
Moepitz family	0-1	72	16	8-15	1.35-1.50	2.0-6.0	0.05-0.10	3.0-5.9	0.2-1.0
	1-6	72	18	8-15	1.35-1.50	2.0-6.0	0.05-0.09	3.0-5.9	0.0-0.5
	6-19	72	16	8-15	1.35-1.50	2.0-6.0	0.06-0.11	3.0-5.9	0.0-0.5
	19-31	72	18	8-15	1.35-1.50	2.0-6.0	0.07-0.11	3.0-5.9	0.0-0.5
	31-48	72	18	8-15	1.35-1.50	2.0-6.0	0.07-0.12	3.0-5.9	0.0-0.5
	48-58				---	0.0-0.2	---	---	---
Moenkopie	0-1	72	18	8-15	1.35-1.50	2.0-6.0	0.06-0.11	3.0-5.9	0.2-1.0
	1-6	72	16	8-15	1.35-1.50	2.0-6.0	0.06-0.10	3.0-5.9	0.0-0.5
	6-16				---	0.0-0.2	---	---	---

Table 21.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	in/hr	In/In	Pct	Pct
15:									
Monue ----------	0-4	86	9	5-12	1.45-1.60	2.0-6.0	0.09-0.16	0.0-2.9	0.0-1.0
	4-31	60	27	10-15	1.35-1.50	0.6-2.0	0.14-0.16	0.0-2.9	0.0-0.5
	31-60	94	5	1-10	1.45-1.60	20.0-99.9	0.04-0.07	0.0-2.9	0.0-0.5
Trail ----------	0-3	84	10	5-10	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.0-1.0
	3-16	84	9	5-10	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.0-1.0
	16-43	88	6	1-10	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.0-0.5
	43-71	84	10	1-10	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.0-0.5
Nepalto --------	0-4	90	6	2-8	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.0-1.0
	4-10	90	6	2-8	1.45-1.60	20.0-99.9	0.03-0.06	0.0-2.9	0.0-0.5
	10-60	90	6	2-8	1.45-1.60	20.0-99.9	0.03-0.06	0.0-2.9	0.0-0.5
16:									
Myton ----------	0-2	75	13	4-18	1.35-1.50	2.0-6.0	0.05-0.08	0.0-2.9	0.5-1.5
	2-7	75	15	4-18	1.35-1.50	2.0-6.0	0.06-0.10	0.0-2.9	0.2-1.0
	7-30	80	12	4-18	1.45-1.60	6.0-20.0	0.03-0.04	0.0-2.9	0.2-1.0
	30-47	82	11	4-18	1.45-1.60	6.0-20.0	0.03-0.04	0.0-2.9	0.2-1.0
	47-60	50	34	4-18	1.25-1.40	0.6-2.0	0.08-0.11	0.0-2.9	0.2-1.0
	60-64	75	13	4-18	1.35-1.50	2.0-6.0	0.05-0.09	0.0-2.9	0.2-1.0
17:									
Needle ---------	0-1	90	4	2-7	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.2-1.0
	1-11	90	4	2-7	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.0-0.5
	11-21				---	0.0-0.2	---	---	---
Sheppard -------	0-1	90	4	2-7	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.2-1.0
	1-8	90	4	2-7	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.0-0.5
	8-21	90	4	2-7	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.0-0.5
	21-60	90	4	2-7	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.0-0.5
18:									
Oxyaquic torrifluvents -	0-2	78	16	3-10	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.2-1.0
	2-8	64	24	6-15	1.35-1.50	0.6-2.0	0.13-0.17	0.0-2.9	0.0-0.5
	8-25	95	1	3-8	1.45-1.60	6.0-20.0	0.05-0.08	0.0-2.9	0.0-0.5
	25-32	78	16	3-10	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.0-0.5
	32-60	43	38	10-20	1.25-1.40	0.6-2.0	0.13-0.18	0.0-2.9	0.0-0.5

Table 21.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	in/hr	In/In	Pct	Pct
19:									
Oxyaquic torripsamments	0-1	79	17	3-8	1.45-1.60	6.0-20.0	0.05-0.07	0.0-2.9	0.2-1.0
	1-11	79	17	3-8	1.45-1.60	6.0-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	11-31	79	17	3-8	1.45-1.60	6.0-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	31-52	79	17	3-8	1.45-1.60	6.0-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	52-65	78	16	3-10	1.45-1.60	6.0-20.0	0.05-0.07	0.0-2.9	0.0-0.5
20:									
Pagina ---------	0-1	83	9	2-15	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.5-1.5
	1-12	82	8	2-15	1.45-1.60	2.0-6.0	0.08-0.11	0.0-2.9	0.0-0.5
	12-19	70	18	8-15	1.35-1.50	2.0-6.0	0.07-0.14	3.0-5.9	0.0-0.5
	19-27	70	18	8-20	1.35-1.50	2.0-6.0	0.08-0.15	3.0-5.9	0.0-0.5
	27-34	70	18	8-20	1.35-1.50	2.0-6.0	0.08-0.14	3.0-5.9	0.0-0.5
	34-44				---	0.0-0.2	---	---	---
Denazar --------	0-1	92	2	2-10	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.5-1.5
	1-21	92	2	5-10	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.0-0.5
	21-27	91	2	5-10	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.0-0.5
	27-41	83	9	5-15	1.45-1.60	6.0-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	41-60	83	9	5-15	1.45-1.60	6.0-20.0	0.05-0.07	0.0-2.9	0.0-0.5
21:									
Parkelei -------	0-2	60	30	10-18	1.35-1.50	2.0-6.0	0.08-0.15	0.0-2.9	1.0-2.0
	2-9	60	28	10-18	1.35-1.50	2.0-6.0	0.08-0.13	0.0-2.9	0.2-1.0
	9-17	60	24	12-24	1.35-1.50	2.0-6.0	0.07-0.11	0.0-2.9	0.2-1.0
	17-28	45	31	18-30	1.25-1.40	0.6-2.0	0.12-0.17	3.0-5.9	0.2-1.0
	28-41	40	32	18-30	1.20-1.35	0.2-0.6	0.16-0.20	3.0-5.9	0.2-1.0
	41-60	40	38	18-30	1.25-1.40	0.6-2.0	0.12-0.17	3.0-5.9	0.2-1.0
Gladel ---------	0-2	60	30	6-18	1.35-1.50	2.0-6.0	0.08-0.15	0.0-2.9	1.0-2.0
	2-9	60	28	6-18	1.35-1.50	2.0-6.0	0.08-0.13	0.0-2.9	0.2-1.0
	9-17	60	28	6-18	1.35-1.50	2.0-6.0	0.07-0.12	0.0-2.9	0.2-1.0
	17-27				---	0.0-0.2	---	---	---
22:									
Pennell --------	0-4	44	41	10-20	1.25-1.40	0.6-2.0	0.09-0.12	0.0-2.9	0.2-1.0
	4-7	67	20	10-15	1.35-1.50	2.0-6.0	0.07-0.11	0.0-2.9	0.0-0.5
	7-14	67	20	10-15	1.35-1.50	2.0-6.0	0.05-0.08	0.0-2.9	0.0-0.5
	14-19	67	20	10-15	1.35-1.50	2.0-6.0	0.07-0.11	0.0-2.9	0.0-0.5
	19-29				---	0.0-0.6	---	---	---

Table 21.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	in/hr	In/In	Pct	Pct
23:									
Razito ---	0-1	90	7	1-8	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.2-1.0
	1-5	90	7	1-8	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.0-0.5
	5-7	90	6	1-8	1.45-1.60	6.0-20.0	0.05-0.08	0.0-2.9	0.0-0.5
	7-36	90	7	1-8	1.45-1.60	6.0-20.0	0.05-0.08	0.0-2.9	0.0-0.5
	36-40	90	7	1-8	1.45-1.60	6.0-20.0	0.05-0.08	0.0-2.9	0.0-0.5
	40-60	90	8	1-8	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.0-0.5
24:									
Redhouse family	0-1	45	40	10-18	1.25-1.40	0.6-2.0	0.13-0.18	3.0-5.9	0.2-1.0
	1-9	40	35	18-27	1.25-1.40	0.6-2.0	0.13-0.18	3.0-5.9	0.0-0.5
	9-19	35	32	23-35	1.20-1.35	0.2-0.6	0.17-0.21	3.0-5.9	0.0-0.5
	19-27	35	36	23-35	1.20-1.35	0.2-0.6	0.17-0.21	3.0-5.9	0.0-0.5
	27-46	40	34	23-35	1.25-1.40	0.6-2.0	0.13-0.18	3.0-5.9	0.0-0.5
	46-57	35	31	23-35	1.20-1.40	0.2-0.6	0.17-0.21	3.0-5.9	0.0-0.5
	57-67				---	0.0-0.2	---	---	---
Epikom family --	0-1	45	39	12-24	1.25-1.40	0.6-2.0	0.12-0.17	0.0-2.9	0.2-1.0
	1-8	40	38	18-27	1.25-1.40	0.6-2.0	0.13-0.18	3.0-5.9	0.0-0.5
	8-11	43	38	18-27	1.25-1.40	0.6-2.0	0.12-0.17	3.0-5.9	0.0-0.5
	11-21				---	0.0-0.2	---	---	---
25:									
Reef ---	0-4	78	12	9-14	1.35-1.50	2.0-6.0	0.05-0.08	0.0-2.9	0.0-2.0
	4-5				---	0.2-0.6	---	---	---
	5-15				---	0.0-0.2	---	---	---
26:									
Reef ---	0-4	46	39	8-18	1.25-1.40	0.6-2.0	0.07-0.10	0.0-2.9	0.0-2.0
	4-13				---	0.2-2.0	---	---	---
	13-23				---	0.0-0.2	---	---	---
27:									
Remorris family	0-1	68	16	12-18	1.35-1.50	2.0-6.0	0.08-0.15	0.0-2.9	0.2-1.0
	1-7	68	16	12-18	1.35-1.50	2.0-6.0	0.08-0.15	0.0-2.9	0.0-0.5
	7-17	68	16	12-18	1.35-1.50	2.0-6.0	0.08-0.15	0.0-2.9	0.0-0.5
	17-27	68	16	12-18	1.35-1.50	0.2-2.0	0.08-0.15	0.0-2.9	0.0-0.5
28:									
Rizno ---	0-2	75	15	8-15	1.35-1.50	2.0-6.0	0.06-0.10	0.0-2.9	0.0-2.0
	2-4	69	15	10-18	1.35-1.50	2.0-6.0	0.07-0.11	0.0-2.9	0.0-1.0
	4-6				---	0.2-0.6	---	---	---
	6-15				---	0.0-0.2	---	---	---

Table 21.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	in/hr	In/In	Pct	Pct
29:									
Rizno----------	0-1	73	15	8-12	1.35-1.50	2.0-6.0	0.08-0.15	0.0-2.9	0.0-2.0
	1-6	71	15	10-15	1.35-1.50	2.0-6.0	0.08-0.15	0.0-2.9	0.0-0.5
	6-15				---	0.0-0.2	---	---	---
30:									
Arches ---------	0-1	95	1	3-6	1.45-1.60	5.9-20.0	0.05-0.08	0.0-2.9	0.2-1.0
	1-11	94	1	3-6	1.45-1.60	5.9-20.0	0.05-0.08	0.0-2.9	0.0-0.5
	11-21				---	0.0-0.2	---	---	---
31:									
Atchee ---------	0-1	67	23	8-12	1.35-1.50	2.0-6.0	0.05-0.09	0.0-2.9	0.5-1.5
	1-16	67	23	8-12	1.35-1.50	2.0-6.0	0.04-0.07	0.0-2.9	0.2-1.0
	16-26				---	0.0-0.2	---	---	---
32:									
Needle ---------	0-1	90	4	2-7	1.45-1.60	20.0-99.9	0.05-0.08	0.0-5.0	0.2-1.0
	1-11	90	4	2-7	1.45-1.60	20.0-99.9	0.05-0.08	0.0-5.0	0.0-0.5
	11-21				---	0.0-0.2	---	---	---
33:									
Torriorthents --	0-2	43	39	14-20	1.25-1.40	0.6-2.0	0.09-0.13	0.0-2.9	0.5-1.5
	2-10	68	22	8-12	1.35-1.50	2.0-6.0	0.04-0.07	0.0-2.9	0.2-1.0
	10-17	68	22	8-12	1.35-1.50	2.0-6.0	0.07-0.12	0.0-2.9	0.2-1.0
	17-27				---	0.0-0.2	---	---	---
34:									
Tsaya ----------	0-2	39	37	16-28	1.25-1.40	0.6-2.0	0.09-0.13	3.0-5.9	0.5-1.5
	2-7	34	36	18-32	1.20-1.35	0.2-0.6	0.10-0.12	3.0-5.9	0.2-1.0
	7-13	41	37	16-28	1.25-1.40	0.6-2.0	0.07-0.09	3.0-5.9	0.2-1.0
	13-23				---	0.0-0.2	---	---	---
35:									
Sazi ----------	0-4	75	15	5-10	1.35-1.50	2.0-6.0	0.08-0.15	0.0-2.9	0.0-2.0
	4-11	75	15	5-10	1.35-1.50	2.0-6.0	0.08-0.15	0.0-2.9	0.0-1.0
	11-28	75	10	10-15	1.35-1.50	2.0-6.0	0.08-0.13	0.0-2.9	0.0-1.0
	28-30				---	0.2-0.6	---	---	---
	30-43				---	0.0-0.2	---	---	---
Rizno ----------	0-3	84	14	2-15	1.45-1.60	6.0-20.0	0.04-0.06	0.0-2.9	0.0-2.0
	3-10	75	17	8-15	1.35-1.50	2.0-6.0	0.07-0.12	0.0-2.9	0.0-0.5
	10-20				---	0.0-0.2	---	---	---

Table 21.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	in/hr	In/In	Pct	Pct
36:									
Seeg ----------	0-2	43	31	18-27	1.25-1.40	0.6-2.0	0.09-0.13	0.0-2.9	0.2-1.0
	2-11	48	28	15-25	1.25-1.40	0.6-2.0	0.07-0.09	0.0-2.9	0.0-0.5
	11-29	48	36	12-20	1.25-1.40	0.6-2.0	0.07-0.09	0.0-2.9	0.0-0.5
	29-34	60	26	12-20	1.35-1.45	2.0-6.0	0.06-0.09	0.0-2.9	0.0-0.5
	34-60	70	16	12-20	1.35-1.45	2.0-6.0	0.04-0.07	0.0-2.9	0.0-0.5
37:									
Sheppard -------	0-1	90	4	2-7	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.2-1.0
	1-9	90	4	2-7	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.0-0.5
	9-39	90	4	2-7	1.45-1.60	20.0-99.9	0.05-0.08	0.0-2.9	0.0-0.5
	39-60	83	9	2-8	1.45-1.60	6.0-20.0	0.05-0.07	0.0-2.9	0.0-0.5
38:									
Sheppard family	0-4	95	4	1-5	1.45-1.60	6.0-20.0	0.05-0.08	0.0-2.9	0.0-2.0
	4-20	85	8	2-10	1.45-1.60	2.0-6.0	0.08-0.12	0.0-2.9	0.0-0.5
	20-30	81	10	2-10	1.45-1.60	2.0-6.0	0.07-0.10	0.0-2.9	0.0-0.5
	30-39				---	0.0-0.2	---	---	---
Tsaya family ---	0-3	75	14	8-15	1.35-1.50	2.0-6.0	0.05-0.14	0.0-2.9	0.0-1.0
	3-10	78	13	8-15	1.35-1.50	2.0-6.0	0.04-0.08	0.0-2.9	0.0-0.5
	10-20				---	0.0-0.2	---	---	---
Bluechief family --------	0-4	75	10	8-15	1.35-1.50	2.0-6.0	0.06-0.12	0.0-2.9	0.0-1.0
	4-22	75	12	10-15	1.35-1.50	2.0-6.0	0.06-0.10	0.0-2.9	0.0-0.5
	22-32				---	0.0-0.2	---	---	---
39:									
Somorent family	0-2	70	13	12-28	1.35-1.50	2.0-6.0	0.06-0.10	0.0-2.9	0.5-1.5
	2-7	70	15	12-28	1.35-1.50	2.0-6.0	0.08-0.12	0.0-2.9	0.2-1.0
	7-17				---	0.0-0.2	---	---	---
40:									
Torriorthents --	0-4	73	13	5-15	1.35-1.50	2.0-6.0	0.08-0.15	0.0-2.9	0.0-1.0
	4-16	62	21	10-35	1.35-1.50	2.0-6.0	0.07-0.13	0.0-2.9	0.0-0.5
	16-33	58	23	10-35	1.35-1.50	2.0-6.0	0.06-0.11	0.0-2.9	0.0-0.5
	33-43				---	0.0-0.2	---	---	---
41:									
Torriorthents --	0-1	65	9	18-34	1.25-1.40	0.6-2.0	0.09-0.13	3.0-5.9	0.5-1.5
	1-7	60	10	12-34	1.25-1.50	0.6-2.0	0.09-0.12	3.0-5.9	0.2-1.0
	7-44	60	7	12-34	1.25-1.50	0.6-2.0	0.08-0.10	3.0-5.9	0.2-1.0
	44-60	60	10	10-34	1.25-1.60	0.6-2.0	0.07-0.10	3.0-5.9	0.2-1.0

Table 21.--Physical Soil Properties--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	in/hr	In/In	Pct	Pct
42:									
Tsaya ----------	0-1	60	9	20-35	1.25-1.40	0.6-2.0	0.11-0.15	3.0-5.9	0.2-1.0
	1-4	45	26	20-35	1.20-1.40	0.2-0.6	0.11-0.13	3.0-5.9	0.0-0.5
	4-9	65	9	20-35	1.20-1.40	0.6-2.0	0.08-0.11	3.0-5.9	0.0-0.5
	9-19				---	0.0-0.2	---	---	---
43:									
Tsaya family ---	0-4	76	13	8-18	1.35-1.50	2.0-6.0	0.07-0.12	0.0-2.9	0.0-1.0
	4-9	70	16	10-20	1.35-1.50	2.0-6.0	0.07-0.11	0.0-2.9	0.0-0.5
	9-16	70	15	10-20	1.35-1.50	2.0-6.0	0.04-0.07	0.0-2.9	0.0-0.5
	16-26				---	0.0-0.2	---	---	---
Moenkopie ------	0-2	82	9	8-18	1.50-1.65	6.0-20.0	0.05-0.07	0.0-2.9	0.0-1.0
	2-8	73	14	10-18	1.50-1.60	2.0-6.0	0.06-0.10	0.0-2.9	0.0-0.5
	8-18				---	0.0-0.2	---	---	---
44:									
Ustic torriorthents -	0-1	67	19	10-16	1.35-1.50	2.0-6.0	0.06-0.10	0.0-2.9	0.5-1.5
	1-8	68	20	10-16	1.35-1.50	2.0-6.0	0.06-0.10	0.0-2.9	0.2-1.0
	8-23	65	19	12-25	1.35-1.50	2.0-6.0	0.04-0.07	0.0-2.9	0.2-1.0
	23-33				---	0.0-0.2	---	---	---
46:									
Westmion -------	0-1	67	15	14-25	1.35-1.50	2.0-6.0	0.06-0.10	0.0-2.9	0.2-1.0
	1-7	24	30	35-50	1.15-1.30	0.1-0.2	0.14-0.16	3.0-6.0	0.0-0.5
	7-14	45	17	20-45	1.25-1.40	0.2-0.6	0.15-0.19	3.0-6.0	0.0-0.5
	14-24				---	0.0-0.2	---	---	---

Table 22.--Erosion Properties of Soils

(Entries under "Erosion factors" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer)

Map symbol and soil name	Depth Inches	Erosion factors			Wind erodibility group	Wind erodibility index
		Kw	Kf	T		
1:						
Arches	0-1	.20	.20	1	1	250
	1-12	.20	.20			
	12-22	---	---			
Mido	0-1	.10	.10	5	1	250
	1-16	.10	.10			
	16-60	.10	.10			
Rock outcrop	---	---	---	-	---	---
2:						
Bluechief	0-2	.17	.17	2	1	250
	2-7	.32	.32			
	7-13	.24	.24			
	13-34	.15	.24			
	34-44	---	---			
Needle	0-5	.20	.20	1	1	250
	5-15	---	---			
3:						
Claysprings	0-1	.24	.24	1	4	86
	1-7	.28	.28			
	7-17	---	---			
Badland	---	---	---	-	---	---
4:						
Cowboy	0-2	.28	.28	5	4L	86
	2-6	.20	.20			
	6-19	.20	.20			
	19-47	.24	.24			
	47-56	.28	.28			
	56-60	.24	.24			
5:						
Dient	0-2	.10	.28	5	6	48
	2-7	.10	.28			
	7-15	.05	.24			
	15-22	.05	.24			
	22-60	.02	.24			
Claysprings	0-2	.20	.28	2	6	48
	2-6	.24	.24			
	6-11	.28	.28			
	11-18	.28	.28			
	18-28	.28	.28			
6:						
Earlweed	0-1	.24	.24	5	2	134
	1-13	.24	.24			
	13-30	.24	.24			
	30-44	.24	.24			
	44-60	.32	.32			

Table 22.--Erosion Properties of Soils--Continued

Map symbol and soil name	Depth Inches	Erosion factors			Wind erodibility group	Wind erodibility index
		Kw	Kf	T		
6:						
Anasazi	0-1	.32	.32	2	3	86
	1-8	.32	.32			
	8-17	.32	.32			
	17-29	.20	.32			
	29-39	---	---			
7:						
Farb	0-1	.37	.37	1	3	86
	1-9	.37	.37			
	9-19	---	---			
Pagina	0-1	.28	.28	3	3	86
	1-8	.32	.32			
	8-12	.37	.37			
	12-17	.17	.32			
	17-26	.15	.32			
	26-36	---	---			
Rock outcrop	---	---	---	-	---	---
8:						
Gladel	0-2	.32	.32	1	3	86
	2-16	.32	.32			
	16-26	---	---			
Rock outcrop	---	---	---	-	---	---
9:						
Goblin	0-3	.10	.28	1	6	48
	3-9	.05	.28			
	9-19	---	---			
10:						
Jaconita Family	0-2	.10	.15	5	2	134
	2-12	.05	.15			
	12-28	.02	.15			
	28-44	.10	.24			
	44-60	.10	.15			
Atchee	0-2	.17	.37	1	5	56
	2-6	.10	.32			
	6-16	.10	.32			
	16-26	---	---			
11:						
Juanalo Family	0-2	.24	.37	1	5	56
	2-10	.20	.43			
	10-18	.32	.32			
	18-28	---	---			
Rock outcrop	---	---	---	-	---	---
12:						
Kydestea	0-1	.17	.28	1	5	56
	1-9	.15	.28			
	9-16	.10	.24			
	16-26	---	---			

Table 22.--Erosion Properties of Soils--Continued

Map symbol and soil name	Depth Inches	Erosion factors			Wind erodibility group	Wind erodibility index
		Kw	Kf	T		
12:						
Rock outcrop	---	---	---	-	---	---
13:						
Moenkopie	0-2	.32	.32	1	2	134
	2-5	.49	.49			
	5-8	.15	.32			
	8-18	---	---			
Rock outcrop	---	---	---	-	---	---
14:						
Moepitz Family	0-1	.10	.24	3	6	48
	1-6	.10	.32			
	6-19	.15	.28			
	19-31	.24	.24			
	31-48	.32	.32			
	48-58	---	---			
Moenkopie	0-1	.20	.37	1	5	56
	1-6	.17	.28			
	6-16	---	---			
Rock outcrop	---	---	---	-	---	---
15:						
Monue	0-4	.55	.55	3	2	134
	4-31	.49	.49			
	31-60	.05	.10			
Trail	0-3	.28	.28	5	2	134
	3-16	.28	.28			
	16-43	.28	.28			
	43-71	.32	.32			
Nepalto	0-4	.10	.10	5	1	220
	4-10	.02	.10			
	10-60	.02	.10			
16:						
Myton	0-2	.05	.20	5	6	48
	2-7	.15	.24			
	7-30	.05	.17			
	30-47	.05	.17			
	47-60	.15	.37			
	60-64	.05	.20			
17:						
Needle	0-1	.20	.20	1	1	220
	1-11	.20	.20			
	11-21	---	---			
Sheppard	0-1	.10	.10	5	1	220
	1-8	.10	.10			
	8-21	.10	.10			
	21-60	.10	.10			

Table 22.--Erosion Properties of Soils--Continued

Map symbol and soil name	Depth Inches	Erosion factors			Wind erodibility group	Wind erodibility index
		Kw	Kf	T		
18:						
Oxyaquic Torrifluvents	0-2	.37	.37	5	2	134
	2-8	.49	.49			
	8-25	.15	.15			
	25-32	.37	.37			
	32-60	.37	.37			
19:						
Oxyaquic Torripsamments	0-1	.24	.24	5	2	134
	1-11	.24	.24			
	11-31	.24	.24			
	31-52	.24	.24			
	52-65	.24	.24			
20:						
Pagina	0-1	.24	.24	3	2	134
	1-12	.24	.24			
	12-19	.28	.28			
	19-27	.37	.37			
	27-34	.37	.37			
	34-44	---	---			
Denazar	0-1	.05	.05	5	1	220
	1-21	.10	.10			
	21-27	.10	.10			
	27-41	.15	.15			
	41-60	.15	.15			
21:						
Parkelei	0-2	.37	.37	5	3	86
	2-9	.32	.32			
	9-17	.28	.28			
	17-28	.32	.32			
	28-41	.32	.32			
	41-60	.37	.37			
Gladel	0-2	.32	.32	1	3	86
	2-9	.37	.37			
	9-17	.37	.37			
	17-27	---	---			
22:						
Pennell	0-4	.20	.43	1	6	48
	4-7	.28	.28			
	7-14	.10	.28			
	14-19	.28	.28			
	19-29	---	---			
23:						
Razito	0-1	.10	.10	5	1	220
	1-5	.10	.10			
	5-7	.15	.15			
	7-36	.15	.15			
	36-40	.15	.15			
	40-60	.10	.10			
Riverwash	---	---	---	-	---	---

Table 22.--Erosion Properties of Soils--Continued

Map symbol and soil name	Depth Inches	Erosion factors			Wind erodibility group	Wind erodibility index
		Kw	Kf	T		
24:						
Redhouse Family	0-1	.43	.43	3	4L	86
	1-9	.37	.37			
	9-19	.32	.32			
	19-27	.32	.32			
	27-46	.37	.37			
	46-57	.32	.32			
	57-67	---	---			
24:						
Epikom Family	0-1	.43	.43	1	4L	86
	1-8	.43	.43			
	8-11	.43	.43			
	11-21	---	---			
25:						
Reef	0-4	.05	.24	1	6	48
	4-5	---	---			
	5-15	---	---			
Rock outcrop	---	---	---	-	---	---
26:						
Reef	0-4	.15	.49	1	7	38
	4-13	---	---			
	13-23	---	---			
Rock outcrop	---	---	---	-	---	---
27:						
Remorris Family	0-1	.32	.32	2	3	86
	1-7	.32	.32			
	7-17	.32	.32			
	17-27	.32	.32			
Rock outcrop	---	---	---	-	---	---
28:						
Rizno	0-2	.15	.24	1	5	56
	2-4	.17	.28			
	4-6	---	---			
	6-15	---	---			
Rock outcrop	---	---	---	-	---	---
29:						
Rizno	0-1	.24	.24	1	3	86
	1-6	.28	.28			
	6-15	---	---			
Rock outcrop	---	---	---	-	---	---
30:						
Rock outcrop	---	---	---	-	---	---
Arches	0-1	.20	.20	1	1	250
	1-11	.20	.20			
	11-21	---	---			

Table 22.--Erosion Properties of Soils--Continued

Map symbol and soil name	Depth Inches	Erosion factors			Wind erodibility group	Wind erodibility index
		Kw	Kf	T		
31:						
Rock outcrop	---	---	---	-	---	---
Atchee	0-1	.15	.32	1	6	48
	1-16	.10	.37			
	16-26	---	---			
32:						
Rock outcrop	---	---	---	-	---	---
Needle	0-1	.20	.20	1	1	220
	1-11	.20	.20			
	11-21	---	---			
33:						
Rock outcrop	---	---	---	-	---	---
Torriorthents	0-2	.17	.37	2	7	38
	2-10	.10	.32			
	10-17	.32	.32			
	17-27	---	---			
34:						
Rock outcrop	---	---	---	-	---	---
Tsaya	0-2	.17	.37	1	7	38
	2-7	.10	.37			
	7-13	.05	.43			
	13-23	---	---			
35:						
Sazi	0-4	.28	.28	2	3	86
	4-11	.28	.28			
	11-28	.24	.24			
	28-30	---	---			
	30-43	---	---			
Rizno	0-3	.17	.28	1	2	134
	3-10	.32	.32			
	10-20	---	---			
36:						
Seeg	0-2	.15	.32	5	5	56
	2-11	.10	.32			
	11-29	.05	.37			
	29-34	.15	.28			
	34-60	.02	.20			
37:						
Sheppard	0-1	.10	.10	5	1	220
	1-9	.10	.10			
	9-39	.10	.10			
	39-60	.15	.15			
38:						
Sheppard Family	0-4	.15	.15	2	1	250
	4-20	.24	.24			
	20-30	.32	.32			
	30-39	---	---			

Table 22.--Erosion Properties of Soils--Continued

Map symbol and soil name	Depth Inches	Erosion factors			Wind erodibility group	Wind erodibility index
		Kw	Kf	T		
38:						
Tsaya Family	0-3	.28	.28	1	3	86
	3-10	.10	.32			
	10-20	---	---			
Bluechief Family	0-4	.10	.17	2	5	56
	4-22	.15	.28			
	22-32	---	---			
39:						
Somorent Family	0-2	.15	.24	1	5	56
	2-7	.28	.28			
	7-17	---	---			
Rock outcrop	---	---	---	-	---	---
40:						
Torriorthents	0-4	.24	.24	2	3	86
	4-16	.28	.28			
	16-33	.20	.37			
	33-43	---	---			
Rock outcrop	---	---	---	-	---	---
41:						
Torriorthents	0-1	.05	.17	5	6	48
	1-7	.05	.17			
	7-44	.05	.15			
	44-60	.02	.17			
Rock outcrop	---	---	---	-	---	---
Badland	---	---	---	-	---	---
42:						
Tsaya	0-1	.10	.20	1	5	56
	1-4	.10	.32			
	4-9	.10	.24			
	9-19	---	---			
Rock outcrop	---	---	---	-	---	---
43:						
Tsaya Family	0-4	.28	.28	1	3	86
	4-9	.28	.28			
	9-16	.05	.28			
	16-26	---	---			
Moenkopie	0-2	.24	.24	1	2	134
	2-8	.17	.28			
	8-18	---	---			
44:						
Ustic Torriorthents	0-1	.15	.20	2	5	56
	1-8	.15	.24			
	8-23	.10	.28			
	23-33	---	---			

Table 22.--Erosion Properties of Soils--Continued

Map symbol and soil name	Depth Inches	Erosion factors			Wind erodibility group	Wind erodibility index
		Kw	Kf	T		
44:						
Rock outcrop	---	---	---	-	---	---
Badland	---	---	---	-	---	---
45:						
Water	---	---	---	-	---	---
46:						
Westmion	0-1	.15	.24	1	5	56
	1-7	.24	.24			
	7-14	.24	.24			
	14-24	---	---			
Rock outcrop	---	---	---	-	---	---

Table 23.--Chemical Soil Properties

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation exchange capacity	Soil Reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	Inches	meq/100 g	pH	Pct	Pct	mmhos/cm	
1:							
Arches	0-1	2.0-5.0	7.9-8.4	0-2	0	0.0-2.0	0-1
	1-12	2.0-5.0	7.9-8.4	0	0	0.0-2.0	0-1
	12-22	---	---	---	---	---	---
Mido	0-1	2.0-5.0	7.4-7.8	0	0	0.0-2.0	0-1
	1-16	2.0-5.0	7.4-7.8	0-2	0	0.0-2.0	0-1
	16-60	2.0-5.0	7.9-8.4	0	0	0.0-2.0	0-1
Rock outcrop	---	---	---	---	---	---	---
2:							
Bluechief	0-2	2.0-7.0	7.9-8.4	0-2	0	0	0
	2-7	4.0-9.0	7.9-8.4	0-5	0	0	0
	7-13	9.0-15	7.9-9.0	5-15	0	0	0-5
	13-34	9.0-15	7.9-9.0	15-35	0	0	0-5
	34-44	---	---	---	---	---	---
Needle	0-5	1.0-10	7.9-8.4	0-2	0	0	0
	5-15	---	---	---	---	---	---
3:							
Claysprings	0-1	20-29	7.9-8.4	0-5	0-5	0.0-2.0	0-1
	1-7	18-29	7.9-8.4	0-5	0-5	0.0-2.0	0-1
	7-17	---	---	---	---	---	---
Badland	---	---	---	---	---	---	---
4:							
Cowboy	0-2	22-29	7.9-8.4	0-5	0	0.0-2.0	0-1
	2-6	19-28	7.9-8.4	0-5	0-3	0.0-2.0	0-1
	6-19	19-33	7.9-8.4	0-15	1-5	4.0-15.0	0-1
	19-47	24-36	7.9-8.4	0-15	1-15	4.0-15.0	0-1
	47-56	24-36	7.9-8.4	0-5	1-5	0.0-2.0	0-1
	56-60	24-36	7.9-9.0	0-5	1-5	0.0-2.0	0-1
5:							
Dient	0-2	11-22	7.9-8.4	0-5	0	0.0-2.0	0-1
	2-7	11-21	7.9-8.4	0-5	0	0.0-2.0	0-1
	7-15	11-21	7.9-8.4	0-5	0	0.0-2.0	0-1
	15-22	8.9-21	7.9-8.4	0-5	0	0.0-2.0	0-1
	22-60	8.9-21	7.9-8.4	0-5	0	0.0-2.0	0-1
Claysprings	0-2	10-17	7.4-8.4	0-2	0	0.0-2.0	0-1
	2-6	15-26	7.4-8.4	0-2	0-5	0.0-2.0	0-1
	6-11	15-26	7.4-8.4	0-2	0-5	0.0-2.0	0-1
	11-18	15-26	7.4-8.4	0-2	0-5	0.0-2.0	0-1
	18-28	22-38	7.4-8.4	0-2	0-5	0.0-2.0	0-1
6:							
Earlweed	0-1	4.0-8.0	7.9-8.4	0-2	0	0.0-2.0	0-1
	1-13	3.0-8.0	7.9-8.4	0-2	0	0.0-2.0	0-1
	13-30	3.0-8.0	7.9-8.4	0-2	0	0.0-2.0	0-1
	30-44	3.0-8.0	7.9-8.4	5-20	0	0.0-2.0	0-1
	44-60	3.0-8.0	7.9-8.4	5-20	0	0.0-2.0	0-1

Table 23.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil Reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	pH	Pct	Pct	mmhos/cm	
6:							
Anasazi	0-1	7.0-11	7.9-8.4	0-2	0	0.0-2.0	0-1
	1-8	6.0-10	7.9-8.4	0-5	0	0.0-2.0	0-1
	8-17	6.0-10	7.9-8.4	5-20	0	0.0-2.0	0-1
	17-29	8.0-12	7.9-8.4	5-20	0	0.0-2.0	0-1
	29-39	---	---	---	---	---	---
7:							
Farb	0-1	5.0-10	7.9-8.4	0-2	0	0.0-2.0	0-1
	1-9	6.0-13	7.9-8.4	0-5	0	0.0-2.0	0-1
	9-19	---	---	---	---	---	---
Pagina	0-1	5.0-11	7.4-8.4	0-5	0	0.0-2.0	0-1
	1-8	5.0-12	7.9-8.4	0-5	0	0.0-2.0	0-1
	8-12	6.0-15	7.9-8.4	5-20	0	0.0-2.0	0-1
	12-17	8.0-15	7.9-8.4	5-30	0	0.0-2.0	0-1
	17-26	8.0-15	7.9-8.4	5-30	0	0.0-2.0	0-1
	26-36	---	---	---	---	---	---
7:							
Rock outcrop	---	---	---	---	---	---	---
8:							
Gladel	0-2	7.0-12	7.4-7.8	0-2	0	0.0-2.0	0-1
	2-16	8.0-14	7.9-8.4	0-5	0	0.0-2.0	0-1
	16-26	---	---	---	---	---	---
Rock outcrop	---	---	---	---	---	---	---
9:							
Goblin	0-3	2.0-8.0	7.9-8.4	1-5	20-40	2.0-8.0	0
	3-9	5.0-8.0	7.9-8.4	1-5	20-40	2.0-8.0	0
	9-19	---	---	---	---	---	---
10:							
Jaconita family	0-2	5.0-9.0	7.9-8.4	0-2	0	0.0-2.0	0-1
	2-12	5.0-8.0	7.9-8.4	0-5	0	0.0-2.0	0-1
	12-28	3.0-8.0	7.9-8.4	5-15	0	0.0-2.0	0-1
	28-44	3.0-8.0	7.9-8.4	5-15	0	0.0-2.0	0-1
	44-60	4.0-8.0	7.9-8.4	0-5	0	0.0-2.0	0-1
Atchee	0-2	4.0-7.0	7.9-8.4	0-2	0	0.0-2.0	0-1
	2-6	4.0-8.0	7.9-8.4	0-5	0	0.0-2.0	0-1
	6-16	4.0-8.0	7.9-8.4	0-5	0	0.0-2.0	0-1
	16-26	---	---	---	---	---	---
11:							
Juanalo family	0-2	12-21	7.4-8.4	0-5	0	0.0-2.0	0-1
	2-10	11-20	7.4-8.4	0-5	0-5	0.0-2.0	0-1
	10-18	8.9-15	7.4-8.4	5-15	5-15	0.0-2.0	0-1
	18-28	---	---	---	---	---	---
Rock outcrop	---	---	---	---	---	---	---

Table 23.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil Reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	Inches	meq/100 g	pH	Pct	Pct	mmhos/cm	
12:							
Kydestea	0-1	9.0-14	7.4-7.8	0-2	0	0.0-2.0	0-1
	1-9	16-24	7.9-8.4	0-5	0	0.0-2.0	0-1
	9-16	16-28	7.9-8.4	0-5	0	0.0-2.0	0-1
	16-26	---	---	---	---	---	---
Rock outcrop	---	---	---	---	---	---	---
13:							
Moenkopie	0-2	4.0-9.0	7.4-7.8	0-5	0	0.0-2.0	0-1
	2-5	9.0-15	7.9-8.4	0-5	0	0.0-2.0	0-1
	5-8	8.0-12	7.9-8.4	0-5	0	0.0-2.0	0-1
	8-18	---	---	---	---	---	---
Rock outcrop	---	---	---	---	---	---	---
14:							
Moepitz family	0-1	5.0-14	7.9-8.4	0-2	0	0.0-2.0	0-1
	1-6	5.0-14	7.9-8.4	0-5	0	0.0-2.0	0-1
	6-19	5.0-14	7.9-8.4	5-40	0	0.0-2.0	0-1
	19-31	5.0-14	7.9-8.4	5-40	0	0.0-2.0	0-1
	31-48	5.0-14	7.9-8.4	5-40	0	0.0-2.0	0-1
	48-58	---	---	---	---	---	---
Moenkopie	0-1	5.0-14	7.9-8.4	0-5	0	0.0-2.0	0-1
	1-6	4.0-14	7.9-8.4	5-35	0	0.0-2.0	0-1
	6-16	---	---	---	---	---	---
Rock outcrop	---	---	---	---	---	---	---
15:							
Monue	0-4	4.0-11	7.9-8.4	5-10	0	0.0-2.0	0
	4-31	8.0-13	7.9-8.4	10-15	0	0.0-2.0	0
	31-60	1.0-9.0	7.9-8.4	10-20	0	0.0-2.0	0
Trail	0-3	3.0-8.0	7.9-8.4	0-5	0	0.0-2.0	0
	3-16	3.0-8.0	7.9-8.4	0-5	0	0.0-2.0	0
	16-43	1.0-7.0	7.9-8.4	0-5	0	0.0-2.0	0
	43-71	1.0-7.0	7.9-8.4	0-5	0	0.0-2.0	0
Nepalto	0-4	1.0-6.0	7.9-8.4	5-10	0	0.0-2.0	0
	4-10	1.0-6.0	7.9-8.4	5-10	0	0.0-2.0	0
	10-60	1.0-6.0	7.9-8.4	5-10	0	0.0-2.0	0
16:							
Myton	0-2	4.0-15	7.4-8.4	0-2	0	0.0-2.0	0-1
	2-7	4.0-15	7.4-8.4	0-2	0	0.0-2.0	0-1
	7-30	4.0-15	7.4-8.4	0-5	0	0.0-2.0	0-1
	30-47	4.0-15	7.4-8.4	0-5	0	0.0-2.0	0-1
	47-60	4.0-15	7.4-8.4	0-2	0	0.0-2.0	0-1
	60-64	4.0-15	7.4-8.4	0-2	0	0.0-2.0	0-1
17:							
Needle	0-1	2.0-6.0	7.4-8.4	0-2	0	0.0-2.0	0-1
	1-11	1.0-5.0	7.4-8.4	0-2	0	0.0-2.0	0-1
	11-21	---	---	---	---	---	---

Table 23.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil Reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	pH	Pct	Pct	mmhos/cm	
17:							
Sheppard	0-1	1.7-5.7	7.4-8.4	0	0	0.0-2.0	0-1
	1-8	1.4-5.4	7.4-8.4	0	0	0.0-2.0	0-1
	8-21	1.4-5.4	7.4-8.4	0	0	0.0-2.0	0-1
	21-60	1.4-5.4	7.4-8.4	0-2	0	0.0-2.0	0-1
18:							
Oxyaquic Torrifluvents	0-2	2.0-8.0	7.9-8.4	0-2	0	0.0-2.0	0-1
	2-8	4.0-11	7.9-8.4	0-2	0	0.0-2.0	0-1
	8-25	2.0-6.0	7.9-8.4	0-2	0	0.0-2.0	0-1
	25-32	2.0-7.0	7.9-8.4	0-2	0	0.0-2.0	0-1
	32-60	6.0-16	7.9-8.4	0-5	0	0.0-2.0	0-1
19:							
Oxyaquic Torripsamments	0-1	2.0-6.0	7.4-7.8	0-5	0	0.0-2.0	0-1
	1-11	2.0-6.0	7.4-7.8	0-5	0	0.0-2.0	0-1
	11-31	2.0-6.0	7.4-7.8	0-5	0	0.0-2.0	0-1
	31-52	2.0-6.0	7.4-7.8	0-5	0	0.0-2.0	0-1
	52-65	2.0-7.0	7.9-8.4	0-5	0	0.0-2.0	0-1
20:							
Pagina	0-1	2.0-12	7.4-8.4	0-2	0	0.0-2.0	0-1
	1-12	2.0-12	7.4-8.4	0-2	0	0.0-2.0	0-1
	12-19	6.0-12	7.9-8.4	5-20	0	0.0-2.0	0-1
	19-27	6.0-16	7.9-8.4	5-30	0	0.0-2.0	0-1
	27-34	6.0-16	7.9-8.4	5-30	0	0.0-2.0	0-1
	34-44	---	---	---	---	---	---
Denazar	0-1	2.0-13	7.4-8.4	0	0	0.0-2.0	0-1
	1-21	4.1-12	7.4-8.4	0-2	0	0.0-2.0	0-1
	21-27	4.1-12	7.9-8.4	0-2	0	0.0-2.0	0-1
	27-41	4.1-12	7.9-8.4	5-20	0	0.0-2.0	0-1
	41-60	4.1-12	7.4-8.4	5-20	0	0.0-2.0	0-1
21:							
Parkelei	0-2	9.0-18	6.6-7.8	0	0	0.0-1.0	0-1
	2-9	8.0-17	6.6-7.8	0	0	0.0-1.0	0-1
	9-17	8.0-17	7.4-7.8	0	0	0.0-1.0	0-1
	17-28	14-27	7.4-7.8	0	0	0.0-1.0	0-1
	28-41	14-27	7.4-7.8	0	0	0.0-1.0	0-1
	41-60	14-27	7.4-7.8	0	0	0.0-1.0	0-1
Gladel	0-2	5.0-13	7.4-8.4	0-2	0	0.0-2.0	0-1
	2-9	4.0-12	7.4-8.4	0-2	0	0.0-2.0	0-1
	9-17	4.0-12	7.4-8.4	0-2	0	0.0-2.0	0-1
	17-27	---	---	---	---	---	---
22:							
Pennell	0-4	8.0-16	7.9-8.4	0-2	0	0.0-2.0	0-1
	4-7	8.0-13	7.9-8.4	0-5	0	0.0-2.0	0-1
	7-14	8.0-13	7.9-8.4	5-15	0	0.0-2.0	0-1
	14-19	8.0-13	7.9-8.4	5-15	0	0.0-2.0	0-1
	19-29	---	---	---	---	---	---

Table 23.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil Reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	Inches	meq/100 g	pH	Pct	Pct	mmhos/cm	
23:							
Razito	0-1	0.8-6.4	7.4-8.4	0-2	0	0.0-2.0	0-1
	1-5	0.8-6.1	7.9-8.4	0-2	0	0.0-2.0	0-1
	5-7	0.8-6.1	7.9-8.4	0-5	0	0.0-2.0	0-1
	7-36	0.8-6.1	7.9-8.4	0-5	0	0.0-2.0	0-1
	36-40	0.8-6.1	7.9-8.4	0-5	0	0.0-2.0	0-1
	40-60	0.8-6.1	7.9-8.4	0-5	0	0.0-2.0	0-1
Riverwash	---	---	---	---	---	---	---
24:							
Redhouse family	0-1	8.0-15	7.4-8.4	0-5	0	0.0-2.0	0-1
	1-9	13-21	7.9-8.4	0-5	0	0.0-2.0	0-1
	9-19	16-27	7.9-8.4	5-30	0	0.0-2.0	0-1
	19-27	16-27	7.9-8.4	5-30	0	0.0-2.0	0-1
	27-46	16-27	7.9-8.4	5-30	0	0.0-2.0	0-1
	46-57	16-27	7.9-8.4	5-35	0	0.0-2.0	0-1
	57-67	---	---	---	---	---	---
Epikom family	0-1	10-20	7.4-8.4	0-5	0	0.0-2.0	0-1
	1-8	13-21	7.9-8.4	5-15	0	0.0-2.0	0-1
	8-11	13-21	7.9-8.4	5-30	0	0.0-2.0	0-1
	11-21	---	---	---	---	---	---
25:							
Reef	0-4	7.0-12	7.9-9.0	0-15	0	0	0-5
	4-5	---	---	---	---	---	---
	5-15	---	---	---	---	---	---
Rock outcrop	---	---	---	---	---	---	---
26:							
Reef	0-4	6.0-16	7.9-8.4	0-2	0	0	0
	4-13	---	---	---	---	---	---
	13-23	---	---	---	---	---	---
Rock outcrop	---	---	---	---	---	---	---
27:							
Remorris family	0-1	10-15	7.9-8.4	0-20	0	0.0-2.0	0-1
	1-7	9.0-15	7.9-8.4	1-20	0	0.0-2.0	0-1
	7-17	9.0-15	7.9-8.4	1-20	0	0.0-2.0	0-1
	17-27	9.0-15	7.9-8.4	1-20	0	0.0-2.0	0-1
Rock outcrop	---	---	---	---	---	---	---
28:							
Rizno	0-2	6.0-13	7.9-8.4	0-5	0	0	0
	2-4	8.0-15	7.9-8.4	0-15	0	0	0
	4-6	---	---	---	---	---	---
	6-15	---	---	---	---	---	---
Rock outcrop	---	---	---	---	---	---	---
29:							
Rizno	0-1	6.0-11	7.9-8.4	1-5	0	0	0
	1-6	8.0-13	7.9-8.4	3-5	0	0	0
	6-15	---	---	---	---	---	---
Rock outcrop	---	---	---	---	---	---	---

Table 23.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil Reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	Inches	meq/100 g	pH	Pct	Pct	mmhos/cm	
30:							
Rock outcrop	---	---	---	---	---	---	---
Arches	0-1	2.0-5.0	7.4-7.8	0-2	0	0.0-2.0	0-1
	1-11	2.0-5.0	7.4-7.8	0	0	0.0-2.0	0-1
	11-21	---	---	---	---	---	---
31:							
Rock outcrop	---	---	---	---	---	---	---
Atchee	0-1	4.2-6.5	7.9-8.4	0-2	0	0.0-2.0	0-1
	1-16	4.1-6.4	7.9-8.4	5-25	0	0.0-2.0	0-1
	16-26	---	---	---	---	---	---
32:							
Rock outcrop	---	---	---	---	---	---	---
Needle	0-1	2.0-6.0	7.4-8.4	0-2	0	0.0-2.0	0-1
	1-11	1.0-5.0	7.4-8.4	0-2	0	0.0-2.0	0-1
	11-21	---	---	---	---	---	---
33:							
Rock outcrop	---	---	---	---	---	---	---
Torriorthents	0-2	9.0-14	7.4-8.4	0-2	0	0.0-2.0	0-1
	2-10	5.0-9.0	7.4-8.4	0-2	0	0.0-2.0	0-1
	10-17	5.4-8.6	7.4-8.4	0-5	0	0.0-2.0	0-1
	17-27	---	---	---	---	---	---
34:							
Rock outcrop	---	---	---	---	---	---	---
Tsaya	0-2	13-23	7.9-8.4	0-2	0	0.0-2.0	0-1
	2-7	14-25	7.9-8.4	0-2	0	0.0-2.0	0-1
	7-13	13-22	7.9-8.4	0-2	0	0.0-2.0	0-1
	13-23	---	---	---	---	---	---
35:							
Sazi	0-4	1.0-9.0	7.9-8.4	5-10	0	0	0-1
	4-11	1.0-9.0	7.9-9.0	5-15	0	0	0-1
	11-28	4.0-13	7.9-9.0	10-40	0	0	0-1
	28-30	---	---	---	---	---	---
	30-43	---	---	---	---	---	---
Rizno	0-3	1.0-12	7.9-8.4	0-5	0	0	0-1
	3-10	5.0-12	7.9-9.0	0-5	0	0	0-1
	10-20	---	---	---	---	---	---
36:							
Seeg	0-2	14-22	7.4-8.4	0-5	0	0.0-2.0	0-1
	2-11	11-20	7.4-8.4	0-5	0	0.0-2.0	0-1
	11-29	9.0-16	7.4-8.4	5-20	0	0.0-2.0	0-1
	29-34	9.0-16	7.4-8.4	5-20	0	0.0-2.0	0-1
	34-60	9.0-16	7.4-8.4	5-20	0-5	0.0-2.0	0-1
37:							
Sheppard	0-1	2.0-6.0	7.4-8.4	0-2	0	0.0-2.0	0-1
	1-9	1.0-5.0	7.4-8.4	0-2	0	0.0-2.0	0-1
	9-39	1.0-5.0	7.4-8.4	0-2	0	0.0-2.0	0-1
	39-60	1.0-5.0	7.4-8.4	0-2	0	0.0-2.0	0-1

Table 23.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil Reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	Inches	meq/100 g	pH	Pct	Pct	mmhos/cm	
38:							
Sheppard family------	0-4	1.0-5.0	7.9-8.4	5-25	0	0.0-2.0	0
	4-20	1.0-8.0	7.9-8.4	5-25	0	0.0-2.0	0
	20-30	1.0-8.0	7.9-8.4	5-25	0	0.0-2.0	0
	30-39	---	---	---	---	---	---
Tsaya family---------	0-3	6.0-13	7.9-8.4	5-15	0-3	0.0-2.0	0
	3-10	6.0-13	7.9-8.4	5-15	0-3	0.0-2.0	0
	10-20	---	---	---	---	---	---
Bluechief family-----	0-4	6.0-13	7.9-8.4	5-10	1-4	0.0-2.0	0
	4-22	8.0-13	7.9-8.4	10-15	1-4	0.0-2.0	0
	22-32	---	---	---	---	---	---
39:							
Somorent family------	0-2	10-22	7.4-8.4	0-2	0	0.0-2.0	0-1
	2-7	9.0-22	7.4-8.4	0-5	0-5	0.0-2.0	0-1
	7-17	---	---	---	---	---	---
Rock outcrop---------	---	---	---	---	---	---	---
40:							
Torriorthents--------	0-4	3.0-11	7.9-8.4	5-15	0	0.0-2.0	0-5
	4-16	6.0-22	7.9-9.0	10-25	0	0.0-2.0	0-5
	16-33	6.0-21	7.9-9.0	10-25	0	0.0-2.0	0-5
	33-43	---	---	---	---	---	---
Rock outcrop---------	---	---	---	---	---	---	---
41:							
Torriorthents--------	0-1	14-23	7.9-8.4	0-5	0	0.0-2.0	0-1
	1-7	10-23	7.9-8.4	0-5	0	0.0-2.0	0-1
	7-44	10-23	7.9-8.4	0-5	0-5	0.0-2.0	0-1
	44-60	4.0-23	7.9-8.4	0-5	0-5	0.0-2.0	0-1
Rock outcrop---------	---	---	---	---	---	---	---
Badland--------------	---	---	---	---	---	---	---
42:							
Tsaya----------------	0-1	16-28	7.9-8.4	0-5	0	0.0-2.0	0-1
	1-4	14-27	7.9-8.4	0-5	0	0.0-2.0	0-1
	4-9	14-27	7.9-8.4	0-5	0	0.0-2.0	0-1
	9-19	---	---	---	---	---	---
Rock outcrop---------	---	---	---	---	---	---	---
43:							
Tsaya family---------	0-4	6.0-15	7.9-8.4	0-5	0	0.0-4.0	0-2
	4-9	8.0-16	7.9-8.4	0-5	0	0.0-4.0	0-2
	9-16	8.0-16	7.9-8.4	0-5	0	0.0-4.0	0-2
	16-26	---	---	---	---	---	---
Moenkopie------------	0-2	8.0-15	7.9-8.4	0-10	0	0.0-4.0	0-2
	2-8	8.0-15	7.9-8.4	0-5	0	0.0-4.0	0-2
	8-18	---	---	---	---	---	---

Table 23.--Chemical Soil Properties--Continued

Map symbol and soil name	Depth	Cation exchange capacity	Soil Reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	Inches	meq/100 g	pH	Pct	Pct	mmhos/cm	
44:							
Ustic Torriorthents--	0-1	7.0-12	7.4-7.8	0-5	0	0.0-2.0	0-1
	1-8	7.0-12	7.9-8.4	0-5	0-5	0.0-2.0	0-1
	8-23	8.0-12	7.9-8.4	0-5	0-5	0.0-2.0	0-1
	23-33	---	---	---	---	---	---
Rock outcrop---	---	---	---	---	---	---	---
Badland---	---	---	---	---	---	---	---
45:							
Water---	---	---	---	---	---	---	---
46:							
Westmion---	0-1	11-20	7.9-8.4	0-5	0	0.0-2.0	0-1
	1-7	23-37	7.9-8.4	0-5	0	0.0-2.0	0-1
	7-14	14-34	7.9-8.4	0-5	0	0.0-2.0	0-1
	14-24	---	---	---	---	---	---
Rock outcrop---	---	---	---	---	---	---	---

Table 24.--Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding		Flooding	
			Upper limit	Lower limit	Surface water depth	Frequency	Duration	Frequency
			Ft	Ft	Ft			
1:								
Arches	D							
		Jan-Dec	---	---	---	None	---	None
Mido	A							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop	---							
2:								
Bluechief	B							
		Jan-Dec	---	---	---	None	---	None
Needle	D							
		Jan-Dec	---	---	---	None	---	None
3:								
Claysprings	D							
		Jan-Dec	---	---	---	None	---	None
Badland	---							
4:								
Cowboy	C							
		Jan-Dec	---	---	---	None	---	None
5:								
Dient	B							
		Jan-Dec	---	---	---	None	---	None
Claysprings	D							
		Jan-Dec	---	---	---	None	---	None
6:								
Earlweed	A							
		Jan-Dec	---	---	---	None	---	None
Anasazi	B							
		Jan-Dec	---	---	---	None	---	None
7:								
Farb	D							
		Jan-Dec	---	---	---	None	---	None
Pagina	B							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop	---							
8:								
Gladel	D							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop	---							
9:								
Goblin	D							
		Jan-Dec	---	---	---	None	---	None

Table 24.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding		Flooding	
			Upper limit	Lower limit	Surface water depth	Frequency	Duration	Frequency
			Ft	Ft	Ft			
10:								
Jaconita Family-------	A							
		Jan-Dec	---	---	---	None	---	None
Atchee----------	D							
		Jan-Dec	---	---	---	None	---	None
11:								
Juanalo Family--------	D							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop----------	---							
12:								
Kydestea----------	D							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop----------	---							
13:								
Moenkopie----------	D							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop----------	---							
14:								
Moepitz Family--------	A							
		Jan-Dec	---	---	---	None	---	None
Moenkopie----------	D							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop----------	---							
15:								
Monue----------	B							
		July	---	---	---	None	---	Very rare
		August	---	---	---	None	---	Very rare
		September	---	---	---	None	---	Very rare
		October	---	---	---	None	---	Very rare
Trail----------	A							
		July	---	---	---	None	---	Rare
		August	---	---	---	None	---	Rare
		September	---	---	---	None	---	Rare
		October	---	---	---	None	---	Rare
Nepalto----------	A							
		July	---	---	---	None	---	Very rare
		August	---	---	---	None	---	Very rare
		September	---	---	---	None	---	Very rare
		October	---	---	---	None	---	Very rare
16:								
Myton----------	A							
		Jan-Dec	---	---	---	None	---	None
17:								
Needle----------	D							
		Jan-Dec	---	---	---	None	---	None

Table 24.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding		Flooding	
			Upper limit	Lower limit	Surface water depth	Frequency	Duration	Frequency
			Ft	Ft	Ft			
17:								
Sheppard	A							
		Jan-Dec	---	---	---	None	---	None
18:								
Oxyaquic Torrifluvents	C							
		March	2.7-5.0	---	---	None	---	None
		April	2.7-5.0	---	---	None	---	None
		May	2.7-5.0	---	---	None	---	None
		June	2.7-5.0	---	---	None	---	None
		July	---	---	---	None	Very brief	Occasional
		August	---	---	---	None	Very brief	Occasional
		September	---	---	---	None	Very brief	Occasional
		October	---	---	---	None	Very brief	Occasional
19:								
Oxyaquic Torripsaments	A							
		March	3.3-5.0	---	---	None	---	None
		April	3.3-5.0	---	---	None	---	None
		May	3.3-5.0	---	---	None	---	None
		June	3.3-5.0	---	---	None	---	None
		July	---	---	---	None	Very brief	Occasional
		August	---	---	---	None	Very brief	Occasional
		September	---	---	---	None	Very brief	Occasional
		October	---	---	---	None	Very brief	Occasional
20:								
Pagina	B							
		Jan-Dec	---	---	---	None	---	None
Denazar	A							
		Jan-Dec	---	---	---	None	---	None
21:								
Parkelei	C							
		Jan-Dec	---	---	---	None	---	None
Gladel	D							
		Jan-Dec	---	---	---	None	---	None
22:								
Pennell	D							
		Jan-Dec	---	---	---	None	---	None
23:								
Razito	A							
		January	---	---	---	None	---	Rare
		February	---	---	---	None	---	Rare
		March	---	---	---	None	---	Rare
		April	---	---	---	None	---	Rare
		May	---	---	---	None	---	Rare
		June	---	---	---	None	---	Rare
		July	---	---	---	None	---	Rare
		August	---	---	---	None	---	Rare
		September	---	---	---	None	---	Rare
		October	---	---	---	None	---	Rare
		November	---	---	---	None	---	Rare
		December	---	---	---	None	---	Rare
Riverwash	---							

Table 24.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding		Flooding	
			Upper limit	Lower limit	Surface water depth	Frequency	Duration	Frequency
			Ft	Ft	Ft			
24:								
Redhouse Family	C							
		Jan-Dec	---	---	---	None	---	None
Epikom Family	D							
		Jan-Dec	---	---	---	None	---	None
25:								
Reef	D							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop	---							
26:								
Reef	D							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop	---							
27:								
Remorris Family	D							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop	---							
28:								
Rizno	D							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop	---							
29:								
Rizno	D							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop	---							
30:								
Rock outcrop	---							
Arches	D							
		Jan-Dec	---	---	---	None	---	None
31:								
Rock outcrop	---							
Atchee	D							
		Jan-Dec	---	---	---	None	---	None
32:								
Rock outcrop	---							
		---	---	---	---	---	---	---
Needle	D							
		Jan-Dec	---	---	---	None	---	None
33:								
Rock outcrop	---							
		---	---	---	---	---	---	---
Torriorthents	D							
		Jan-Dec	---	---	---	None	---	None

Table 24.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding		Flooding	
			Upper limit	Lower limit	Surface water depth	Frequency	Duration	Frequency
			Ft	Ft	Ft			
34:								
Rock outcrop----------	---							
Tsaya----------	D							
		Jan-Dec	---	---	---	None	---	None
35:								
Sazi----------	C							
		Jan-Dec	---	---	---	None	---	None
Rizno----------	D							
		Jan-Dec	---	---	---	None	---	None
36:								
Seeg----------	B							
		Jan-Dec	---	---	---	None	---	None
37:								
Sheppard----------	A							
		Jan-Dec	---	---	---	None	---	None
38:								
Sheppard Family-------	B							
		Jan-Dec	---	---	---	None	---	None
Tsaya Family----------	D							
		Jan-Dec	---	---	---	None	---	None
Bluechief Family------	B							
		Jan-Dec	---	---	---	None	---	None
39:								
Somorent Family-------	D							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop----------	---							
40:								
Torriorthents---------	B							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop----------	---							
		Jan-Dec	---	---	---	None	---	None
41:								
Torriorthents---------	B							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop----------	---							
		---	---	---	---	---	---	---
Badland----------	---							
42:								
Tsaya----------	D							
		Jan-Dec	---	---	---	None	---	None
Rock outcrop----------	---							
		Jan-Dec	---	---	---	None	---	None
43:								
Tsaya Family----------	D							
		Jan-Dec	---	---	---	None	---	None
Moenkopie----------	D							
		Jan-Dec	---	---	---	None	---	None

Table 24.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding		Flooding	
			Upper limit	Lower limit	Surface water depth	Frequency	Duration	Frequency
			Ft	Ft	Ft			
44:								
Ustic Torriorthents	B	Jan-Dec	---	---	---	None	---	None
Rock outcrop	---							
Badland	---							
45:								
Water	---							
46:								
Westmion	D	Jan-Dec	---	---	---	None	---	None
Rock outcrop	---							

Table 25.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that data were not populated. Components with no data in all columns will not display.)

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
1:							
Arches	Lithic bedrock	7-12	---	Indurated	Low	Low	Low
Mido	No restriction	---	---	---	Low	Low	Low
2:							
Bluechief	Lithic bedrock	20-40	---	Indurated	Moderate	Low	Low
Needle	Lithic bedrock	5-20	---	Indurated	Low	Low	Low
3:							
Claysprings	Paralithic bedrock	4-20	---	Weakly cemented	Low	Moderate	High
4:							
Cowboy	No restriction	---	---	---	Low	Moderate	High
5:							
Dient	No restriction	---	---	---	Moderate	Moderate	Low
Claysprings	Dense material	7-20	---	Weakly cemented	Low	Moderate	High
6:							
Earlweed	No restriction	---	---	---	Low	Low	Low
Anasazi	Lithic bedrock	20-35	---	Indurated	Moderate	Low	Low
7:							
Farb	Lithic bedrock	5-19	---	Very strongly cemented	Moderate	Moderate	Low
Pagina	Paralithic bedrock	26-39	---	Moderately cemented	Moderate	Low	Low
8:							
Gladel	Lithic bedrock	9-17	---	Indurated	Moderate	Moderate	Low

Table 25.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
9:							
Goblin	Lithic bedrock	6-16	---	Indurated	Moderate	Moderate	High
10:							
Jaconita Family	No restriction	---	---	---	Low	Low	Low
Atchee	Lithic bedrock	6-17	---	Indurated	Moderate	Moderate	Low
11:							
Juanalo Family	Lithic bedrock	4-19	---	Strongly cemented	Moderate	Moderate	High
12:							
Kydestea	Lithic bedrock	9-18	---	Indurated	Moderate	Moderate	Low
13:							
Moenkopie	Lithic bedrock	4-14	---	Indurated	Moderate	Moderate	Low
14:							
Moepitz Family	Lithic bedrock	40-60	---	Indurated	Moderate	Low	Low
Moenkopie	Lithic bedrock	4-12	---	Indurated	Moderate	Moderate	Low
15:							
Monue	No restriction	---	---	---	Moderate	Low	Low
Trail	No restriction	---	---	---	Low	Low	Low
Nepalto	No restriction	---	---	---	Low	Low	Low
16:							
Myton	No restriction	---	---	---	Moderate	Moderate	Low
17:							
Needle	Lithic bedrock	10-17	---	Indurated	Low	Low	Low
Sheppard	No restriction	---	---	---	Low	Low	Low
18:							
Oxyaquic Torrifluvents	No restriction	---	---	---	Low	Low	Low

Table 25.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
19:							
Oxyaquic Torripsamments	No restriction	---	---	---	Low	Low	Low
20:							
Pagina	Paralithic bedrock	26-38	---	Moderately cemented	Moderate	Low	Low
Denazar	No restriction	---	---	---	Low	Low	Low
21:							
Parkelei	No restriction	---	---	---	Moderate	Moderate	Low
Gladel	Lithic bedrock	12-18	---	Indurated	Moderate	Moderate	Low
22:							
Pennell	Lithic bedrock	10-20	---	Indurated	Moderate	Moderate	Low
23:							
Razito	No restriction	---	---	---	Low	Low	Low
24:							
Redhouse Family	Lithic bedrock	41-60	---	Indurated	Moderate	Moderate	Low
Epikom Family	Lithic bedrock	3-18	---	Indurated	Moderate	Moderate	Low
25:							
Reef	Paralithic bedrock	4-5	1-8	Moderately cemented	Moderate	Moderate	Low
	Lithic bedrock	4-20		Indurated			
26:							
Reef	Lithic bedrock	4-20	---	Indurated	Moderate	Moderate	Low
27:							
Remorris Family	Dense material	5-19	---	Noncemented	Moderate	Moderate	Low
28:							
Rizno	Paralithic bedrock	4-10	---	Moderately cemented	Moderate	Moderate	Low
	Lithic bedrock	5-20		Indurated			

Table 25.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
29:							
Rizno	Lithic bedrock	4-20	---	Indurated	Moderate	Moderate	Low
30:							
Arches	Lithic bedrock	4-11	---	Indurated	Low	Low	Low
31:							
Atchee	Lithic bedrock	4-17	---	Indurated	Moderate	Moderate	Low
32:							
Needle	Lithic bedrock	4-12	---	Indurated	Low	Low	Low
33:							
Torriorthents	Paralithic bedrock	4-20	---	Moderately cemented	Low	Low	Low
34:							
Tsaya	Lithic bedrock	11-20	---	Indurated	Moderate	Moderate	Low
35:							
Sazi	Lithic bedrock Paralithic bedrock	20-40 20-30	---	Indurated Moderately cemented	Moderate	Low	Low
Rizno	Lithic bedrock	4-20	---	Indurated	Low	Low	Low
36:							
Seeg	No restriction	---	---	---	Moderate	Moderate	High
37:							
Sheppard	No restriction	---	---	---	Low	Low	Low
38:							
Sheppard Family	Lithic bedrock	20-40	---	Indurated	Low	Low	Low
Tsaya Family	Lithic bedrock	4-20	---	Indurated	Moderate	Moderate	Low
Bluechief Family	Lithic bedrock	20-40	---	Indurated	Moderate	Low	Low

Table 25.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
39:							
Somorent Family	Paralithic bedrock	7-15	---	Weakly cemented	Moderate	Moderate	High
40:							
Torriorthents	Lithic bedrock	4-40	---	Indurated	Low	Low	Low
41:							
Torriorthents	No restriction	---	---	---	Moderate	Moderate	High
42:							
Tsaya	Lithic bedrock	6-16	---	Indurated	Moderate	Moderate	Low
43:							
Tsaya Family	Lithic bedrock	10-20	---	Indurated	Moderate	Moderate	Low
Moenkopie	Lithic bedrock	8-20	---	Indurated	Moderate	Moderate	Low
44:							
Ustic Torriorthents	Lithic bedrock	20-40	---	Indurated	Low	Low	High
46:							
Westmion	Lithic bedrock	4-16	---	Indurated	Low	Moderate	Low

Table 26.--Landscape, Parent Material and Ecosite ID

Map symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Geomorphic position	Parent material	Ecological site
	Pct	Pct	Ft	In				
1:								
Arches----------	40	2-15	4593-5249	10-14	Plateau	occurs on interfluves on hills, mesas, and structural benches as sandsheets	Eolian sands and/or residuum weathered from sandstone	Semidesert Shallow Sand (Utah Juniper-Pinyon), R035XY227UT
Mido----------	35	2-15	4593-5249	10-14	Plateau	occurs on interfluves on hills, mesas, and structural benches as dunes	Eolian sands derived from sandstone and/or alluvium derived from sandstone	Semidesert Sand (Fourwing Saltbush), R035XY212UT
Rock outcrop-------	20	4-15	4593-5249	10-14	None assigned		None assigned	None assigned
2:								
Bluechief----------	45	2-8	3937-5298	6-10	Plateau	occurs on side slopes on structural benches	Eolian deposits derived from sandstone and/or residuum weathered from sandstone	Desert Sandy Loam (Blackbrush), R035XY121UT
Needle----------	40	2-15	3937-5298	6-10	Plateau	occurs on side slopes on structural benches	Eolian sands derived from sandstone	Desert Shallow Sandy Loam (Blackbrush), R035XY133UT
3:								
Claysprings--------	65	2-40	3871-5052	6-10	Plateau	occurs on base slopes on hills and benches	Residuum weathered from calcareous shale	Desert Shallow Clay (Mat Saltbush), R035XY124UT
Badland----------	30	4-60	3871-5052	6-10	None assigned		None assigned	None assigned
4:								
Cowboy----------	85	3-10	3839-4593	6-10	Plateau	occurs on base slopes on hills and structural benches.	Alluvium and/or slope alluvium derived from calcareous shale	Desert Shallow Clay (Mat Saltbush), R035XY124UT

Table 26.--Landscape, Parent Material and Ecosite ID--Continued

Map symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Geomorphic position	Parent material	Ecological site
	Pct	Pct	Ft	In				
5:								
Dient	65	5-65	3970-5545	6-10	Plateau	occurs on base slopes on alluvial fans and fan remnants	Colluvium and/or slope alluvium derived from sandstone and shale	Desert Stony Loam (Blackbrush), R035XY139UT
Claysprings	30	5-65	3970-5545	6-10	Plateau	occurs on base slopes on alluvial fans and fan remnants	Gravelly colluvium derived from sandstone and shale over clayey residuum weathered from calcareous shale	Desert Shallow Clay (Mat Saltbush), R035XY124UT
6:								
Earlweed	60	5-22	5676-5905	10-14	Plateau	occurs on interfluves on hills, mesas, and structural benches as coppice mounds and dunes	Eolian deposits	Semidesert Sand (Fourwing Saltbush), R035XY212UT
Anasazi	30	5-22	5676-5905	10-14	Plateau	occurs on interfluves on hills, mesas, and structural benches	Eolian deposits and/or residuum weathered from sandstone	Semidesert Sandy Loam (Blackbrush), R035XY218UT
7:								
Farb	35	4-20	3674-5315	6-10	Plateau	occurs on interfluves on hills, mesas, and structural benches	Eolian sands derived from sandstone and/or residuum weathered from sandstone	Desert Shallow Sandy Loam (Blackbrush), R035XY133UT

Table 26.--Landscape, Parent Material and Ecosite ID--Continued

Map symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Geomorphic position	Parent material	Ecological site
	Pct	Pct	Ft	In				
7:								
Pagina----------	30	4-20	3674-5315	6-10	Plateau	occurs on interfluves on hills, mesas, and structural benches	Eolian sands derived from sandstone and/or residuum weathered from sandstone and shale	Desert Sandy Loam (Blackbrush), R035XY121UT
Rock outcrop-------	25	6-20	3674-5315	6-10	None assigned		None assigned	None assigned
8:								
Gladel----------	50	4-22	7218-7546	14-18	Plateau	occurs on interfluves on bedrock controlled surfaces.	Eolian sands and/or residuum weathered from sandstone	Upland Shallow Loam (Pinyon-Utah Juniper), R035XY315UT
Rock outcrop-------	30	8-22	7218-7546	14-18	None assigned		None assigned	None assigned
9:								
Goblin----------	90	6-45	3937-5216	6-10	Plateau	occurs on side slopes on hills and structural benches	Gypsiferous residuum weathered from sandstone	Desert Very Shallow Gypsum (Torrey's Jointfir), R035XY142UT
10:								
Jaconita family----	50	8-60	4101-6726	10-14	Plateau	occurs on base slopes on fan remnants and structural benches	Colluvium and/or slope alluvium derived from sandstone	Semidesert Stony Loam (Utah Juniper-Pinyon), R035XY246UT
Atchee----------	40	8-60	4101-6726	10-14	Plateau	occurs on base slopes on fan remnants and structural benches	Colluvium and/or residuum weathered from sandstone	Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper), R035XY263UT
11:								
Juanalo family-----	75	4-28	3839-4593	6-10	Plateau	occurs on interfluves on structural benches.	Colluvium and/or residuum weathered from sandstone	Desert Shallow Sandy Loam (Shadscale), R035XY130UT

Table 26.--Landscape, Parent Material and Ecosite ID--Continued

Map symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Geomorphic position	Parent material	Ecological site
	Pct	Pct	Ft	In				
11:								
Rock outcrop-------	15	8-28	3839-4593	6-10	None assigned		None assigned	None assigned
12:								
Kydestea-----------	50	15-60	6890-7546	14-18	Plateau	occurs on side slopes on bedrock controlled surfaces.	Colluvium derived from sandstone and/or residuum weathered from sandstone	Upland Stony Loam (Pinyon-Utah Juniper), R035XY321UT
Rock outcrop-------	40	30-80	6890-7546	14-18	None assigned		None assigned	None assigned
13:								
Moenkopie----------	60	3-24	3674-5840	6-10	Plateau	occurs on interfluves on hills, mesas, and structural benches	Eolian sands derived from sandstone and/or residuum weathered from sandstone and shale	Desert Shallow Sandy Loam (Shadscale), R035XY130UT
Rock outcrop-------	30	3-24	3674-5840	6-10	None assigned		Sandstone and shale	None assigned
14:								
Moepitz family-----	55	12-64	3871-5315	6-10	Plateau	occurs on talus slopes	Sandy and gravelly colluvium derived from limestone, sandstone, and shale	Desert Stony Loam (Blackbrush), R035XY139UT
Moenkopie----------	25	12-64	3871-5315	6-10	Plateau	occurs on talus slopes and structural benches	Sandy and gravelly colluvium and/or residuum weathered from limestone and sandstone	Desert Shallow Sandy Loam (Shadscale), R035XY130UT
Rock outcrop-------	15	20-100	3871-5315	6-10	None assigned		None assigned	None assigned

Table 26.--Landscape, Parent Material and Ecosite ID--Continued

Map symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Geomorphic position	Parent material	Ecological site
	Pct	Pct	Ft	In				
15:								
Monue	30	1-6	3871-4757	6-10	Flood plain	occurs on stream terraces	Alluvium derived from sandstone	Alkali Bottom (Greasewood), R035XY003UT
Trail	30	1-6	3871-4757	6-10	Flood plain	occurs on flood plain steps	Alluvium derived from sandstone and/or slope alluvium derived from sandstone	Desert Sandy Loam (Fourwing Saltbush), R035XY118UT
Nepalto	25	1-6	3871-4757	6-10	Flood plain	occurs on flood plain steps	Slope alluvium derived from sandstone	Desert Stony Loam (Shadscale-Bud Sagebrush), R035XY136UT
16:								
Myton	95	5-18	3150-4003	6-10	Plateau	occurs on base slopes on fan remnants	Colluvium and/or slope alluvium derived from sandstone and shale	Desert Stony Loam (Shadscale-Bud Sagebrush), R035XY136UT
17:								
Needle	50	2-12	3674-5315	6-10	Plateau	occurs on interfluves on hills, mesas, and structural benches as sandsheets	Eolian sands and/or residuum weathered from sandstone	Sandstone Rockland 6-10" p.z., R035XB255AZ
Sheppard	40	2-12	3674-5315	6-10	Plateau	Occurs on interfluves on hills, mesas, and structural benches as dunes	Eolian sands derived from sandstone and/or alluvium derived from sandstone	Desert Sand (Sand Sagebrush), R035XY115UT
18:								
Oxyaquic Torrifluvents	80	1-4	4003-4790	10-14	Flood plain	occurs on flood plains	Alluvium	Semiwet Saline Streambank (Fremont Cottonwood), R035XY012UT

Table 26.--Landscape, Parent Material and Ecosite ID--Continued

Map symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Geomorphic position	Parent material	Ecological site
	Pct	Pct	Ft	In				
19:								
Oxyaquic Torripsamments----	90	1-3	3773-4495	6-10	Flood plain	occurs on flood plains	Sandy alluvium	Semiwet Saline Streambank (Fremont Cottonwood), R035XY012UT
20:								
Pagina----------	65	2-14	3674-5315	6-10	Plateau	occurs on interfluves on hills, mesas, and structural benches	Eolian sands derived from sandstone and/or residuum weathered from sandstone and shale	Desert Sandy Loam (Blackbrush), R035XY121UT
Denazar----------	30	2-14	3674-5315	6-10	Plateau	occurs on interfluves on hills, mesas, and structural benches as coppice mounds and dunes	Eolian sands derived from sandstone and/or alluvium derived from sandstone	Desert Sand (Sand Sagebrush), R035XY115UT
21:								
Parkelei----------	65	2-12	7316-7513	14-18	Plateau	occurs on drainageways and swales between hills and mesas.	Eolian deposits and/or slope alluvium derived from sandstone	Upland Loam (Basin Big Sagebrush), R035XY306UT
Gladel----------	25	2-12	7316-7513	14-18	Plateau	occurs on drainageways and swales between hills and mesas.	Slope alluvium and/or residuum weathered from sandstone	Upland Shallow Loam (Pinyon-Utah Juniper), R035XY315UT
22:								
Pennell----------	85	3-10	3117-3609	6-10	Plateau	occurs on interfluves on hills and structural benches	Slope alluvium and/or residuum weathered from limestone and sandstone	Desert Shallow Loam (Shadscale), R035XY122UT

Table 26.--Landscape, Parent Material and Ecosite ID--Continued

Map symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Geomorphic position	Parent material	Ecological site
	Pct	Pct	Ft	In				
23:								
Razito----------	55	1-4	3150-4462	6-10	Flood plain	occurs on flood plains.	Sandy alluvium	Sandy Wash 6-10" p.z., R035XB216AZ
Riverwash----------	40	1-4	3150-4462	6-10	None assigned		None assigned	None assigned
24:								
Redhouse family----	50	2-14	4199-5413	6-10	Plateau	occurs on interfluves on hills, mesas, and structural benches	Eolian deposits and/or slope alluvium over residuum weathered from sandstone and shale	Desert Sandy Loam (Blackbrush), R035XY121UT
Epikom family------	35	2-14	4199-5413	6-10	Plateau	occurs on interfluves on hills, mesas, and structural benches	Eolian deposits and/or residuum weathered from sandstone and shale	Desert Shallow Loam (Shadscale), R035XY122UT
25:								
Reef----------	60	2-30	4888-5971	10-14	Plateau	occurs on side slopes and interfluves on hills, mesas and structural benches	Residuum weathered from sandstone and shale	Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush), R035XY236UT
Rock outcrop-------	15	8-100	4888-5971	10-14	None assigned		None assigned	None assigned
26:								
Reef----------	65	30-60	4954-7185	10-14	Plateau	occurs on talus slopes	Sandy and gravelly talus derived from sandstone and shale	Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper), R035XY263UT
26:								
Rock outcrop-------	30	35-100	4954-7185	10-14	None assigned		None assigned	None assigned

Table 26.--Landscape, Parent Material and Ecosite ID--Continued

Map symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Geomorphic position	Parent material	Ecological site
	Pct	Pct	Ft	In				
27:								
Remorris family----	75	4-35	5413-5905	10-14	Plateau	occurs on interfluves on hills, mesas, and structural benches	Residuum weathered from sandstone and shale	Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush), R035XY236UT
Rock outcrop-------	10	8-20	5413-5905	10-14	None assigned		None assigned	None assigned
28:								
Rizno--------------	60	1-25	4429-6398	10-14	Plateau	occurs on interfluves on hills, mesas, and structural benches	Residuum weathered from sandstone	Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush), R035XY236UT
Rock outcrop-------	20	2-45	4429-6398	10-14	None assigned		None assigned	None assigned
29:								
Rizno--------------	40	2-15	5151-6988	10-14	Plateau	occurs on interfluves on hills, mesas, and structural benches	Residuum weathered from sandstone and/or slope alluvium derived from sandstone	Semidesert Shallow Sandy Loam (Utah Juniper-Blackbrush), R035XY236UT
Rock outcrop-------	25	2-15	5151-6988	10-14	None assigned		None assigned	None assigned
30:								
Rock outcrop-------	60	6-60	4593-5577	10-14	None assigned		None assigned	None assigned
Arches-------------	30	2-60	4593-5577	10-14	Plateau	occurs on interfluves on hills, mesas, and structural benches as sandsheets	Eolian sands and/or residuum weathered from sandstone	Semidesert Shallow Sand (Utah Juniper-Pinyon), R035XY227UT
31:								
Rock outcrop-------	55	30-80	5413-7546	10-14	None assigned		None assigned	None assigned

Table 26.--Landscape, Parent Material and Ecosite ID--Continued

Map symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Geomorphic position	Parent material	Ecological site
	Pct	Pct	Ft	In				
31:								
Atchee	35	24-60	5413-7546	10-14	Plateau	occurs on talus slopes and ledges on escarpments	Gravelly talus derived from sandstone	Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper), R035XY263UT
32:								
Rock outcrop	60	4-30	3674-5315	6-10	None assigned		None assigned	None assigned
Needle	35	2-30	3674-5315	6-10	Plateau	occurs on interfluves on hills, mesas, and structural benches as sandsheets	Eolian sands derived from sandstone	Sandstone Rockland 6-10" p.z., R035XB255AZ
33:								
Rock outcrop	60	30-100	3117-4199	6-10	None assigned		None assigned	None assigned
Torriorthents	40	20-65	3117-4199	6-10	Plateau	occurs on talus slopes	Sandy and gravelly talus derived from sandstone and shale	Talus Slope (Blackbrush-Shadscale), R035XY018UT
34:								
Rock outcrop	50	15-80	4167-5577	6-10	None assigned		None assigned	None assigned
Tsaya	40	15-60	4167-5577	6-10	Plateau	occurs on talus slopes and ledges on escarpments	Gravelly talus derived from sandstone and shale	Desert Very Steep Stony Loam (Shadscale), R035XY146UT
35:								
Sazi	50	2-15	4150-6266	10-14	Plateau	occurs on interfluves on hills, mesas, and structural benches	Eolian deposits	Semidesert Sandy Loam (Blackbrush), R035XY218UT

Table 26.--Landscape, Parent Material and Ecosite ID--Continued

Map symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Geomorphic position	Parent material	Ecological site
	Pct	Pct	Ft	In				
35:								
Rizno	30	2-6	4150-6266	10-14	Plateau	occurs on interfluves on hills, mesas, and structural benches	Eolian deposits and/or residuum weathered from sandstone	Semidesert Shallow Sandy Loam (Blackbrush), R035XY233UT
36:								
Seeg	95	4-24	3839-4593	6-10	Plateau	occurs on base slopes on fan remnants.	Colluvium and/or slope alluvium derived from sandstone and shale	Desert Stony Loam (Shadscale-Bud Sagebrush), R035XY136UT
37:								
Sheppard	85	2-15	3674-5315	6-10	Plateau	occurs on interfluves on hills, mesas, and structural benches as dunes	Eolian sands derived from sandstone and/or alluvium derived from sandstone	Desert Sand (Sand Sagebrush), R035XY115UT
38:								
Sheppard family	30	2-15	3970-5216	6-10	Plateau	occurs on side slopes on structural benches	Eolian sands derived from sandstone	Desert Sandy Loam (Blackbrush), R035XY121UT
Tsaya family	30	2-15	3970-5216	6-10	Plateau	occurs on side slopes on structural benches	Residuum weathered from sandstone	Desert Shallow Sandy Loam (Blackbrush), R035XY133UT
Bluechief family	20	2-8	3970-5216	6-10	Plateau	occurs on side slopes on structural benches	Residuum weathered from sandstone	Desert Shallow Sandy Loam (Blackbrush), R035XY133UT

Table 26.--Landscape, Parent Material and Ecosite ID--Continued

Map symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Geomorphic position	Parent material	Ecological site
	Pct	Pct	Ft	In				
39:								
Somorent family----	85	5-12	3117-4003	6-10	Plateau	occurs on interfluves on hills, mesas, structural benches	Eolian sands and/or residuum weathered from sandstone and shale	Desert Shallow Sandy Loam (Shadscale), R035XY130UT
Rock outcrop-------	10	5-12	3117-4003	6-10	None assigned		None assigned	None assigned
40:								
Torriorthents------	50	35-70	3740-5577	6-10	Plateau	occurs on talus slopes	Sandy and gravelly colluvium derived from limestone, sandstone, and shale	Desert Very Steep Stony Loam (Shadscale), R035XY146UT
Rock outcrop-------	40	35-100	3740-5577	6-10	None assigned		None assigned	None assigned
41:								
Torriorthents------	45	4-70	3576-5709	6-10	Plateau	occurs on talus slopes, side slopes and structural benches	Slope alluvium and/or colluvium derived from sandstone and shale	Desert Very Steep Stony Loam (Shadscale), R035XY146UT
Rock outcrop-------	35	50-100	3576-5709	6-10	None assigned		None assigned	None assigned
Badland------------	20	35-100	3576-5709	6-10	None assigned		Interbedded sedimentary rock	None assigned
42:								
Tsaya--------------	65	2-18	3182-5249	6-10	Plateau	occurs on interfluves on hills, mesas, and structural benches	Gravelly residuum weathered from sandstone and shale	Desert Shallow Sandy Loam (Blackbrush), R035XY133UT
Rock outcrop-------	20	5-18	3182-5249	6-10	None assigned		Arkose	None assigned

Table 26.--Landscape, Parent Material and Ecosite ID--Continued

Map symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Geomorphic position	Parent material	Ecological site
	Pct	Pct	Ft	In				
43:								
Tsaya family-------	50	2-15	3921-5381	6-10	Plateau	occurs on side slopes on hills and structural benches	Residuum weathered from sandstone and/or slope alluvium derived from sandstone	Desert Shallow Sandy Loam (Shadscale), R035XY130UT
Moenkopie----------	40	2-15	3921-5381	6-10	Plateau	ccurs on side slopes on hills and structural benches	Slope alluvium and/or residuum weathered from sandstone	Desert Shallow Sandy Loam (Shadscale), R035XY130UT
44:								
Ustic Torriorthents	45	4-54	4199-7054	10-14	Plateau	occurs on talus slopes, side slopes, and structural benches	Colluvium and/or slope alluvium derived from sandstone and shale Residuum weathered from sandstone and shale	Semidesert Very Steep Stony Loam (Pinyon-Utah Juniper), R035XY263UT
Rock outcrop-------	30	25-100	4199-7054	10-14	None assigned		Arkose	None assigned
Badland------------	25	15-80	4199-7054	10-14	None assigned		Interbedded sedimentary rock	None assigned
45:								
Water--------------	100	None assigned	3133-3701	6-10	None assigned		None assigned	None assigned
46:								
Westmion-----------	60	4-18	5085-6726	10-14	Plateau	occurs on interfluves on hills and structural benches	Residuum weathered from sandstone and/or slope alluvium derived from sandstone and shale	Semidesert Shallow Clay (Shadscale-Utah Juniper), R035XY239UT
Rock outcrop-------	25	4-18	5085-6726	10-14	None assigned		None assigned	None assigned

Table 27.--Taxonomic Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series.)

Soil name	Family or higher taxonomic class
Anasazi	Coarse-loamy, mixed, superactive, mesic Ustic Haplocalcids
Arches	Mixed, mesic Lithic Torripsamments
*Atchee	Loamy-skeletal, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents
Bluechief	Coarse-loamy, mixed, superactive, mesic Typic Haplocalcids
Bluechief family	Coarse-loamy, mixed, superactive, mesic Typic Haplocalcids
*Claysprings	Clayey, mixed, superactive, calcareous, mesic, shallow Typic Torriorthents
*Cowboy	Fine, smectitic, mesic Typic Haplogypsids
Denazar	Sandy, mixed, mesic Typic Haplocalcids
Dient	Loamy-skeletal, mixed, superactive, calcareous, mesic Typic Torriorthents
Earlweed	Sandy, mixed, mesic Ustic Haplocalcids
Epikom family	Loamy, mixed, superactive, mesic Lithic Haplocambids
Farb	Loamy, mixed, superactive, calcareous, mesic Lithic Torriorthents
Gladel	Loamy, mixed, superactive, mesic Aridic Lithic Haplustepts
*Goblin	Loamy-skeletal, gypsic, mesic Lithic Haplogypsids
Jaconita family	Sandy-skeletal, mixed, mesic Ustic Haplocalcids
Juanalo family	Loamy, mixed, superactive, calcareous, mesic Lithic Torriorthents
*Kydestea	Loamy-skeletal, mixed, superactive, calcareous, mesic Aridic Lithic Haplustepts
Mido	Mixed, mesic Ustic Torripsamments
Moenkopie	Loamy, mixed, superactive, calcareous, mesic Lithic Torriorthents
Moepitz family	Coarse-loamy, mixed, superactive, calcareous, mesic Typic Torriorthents
Monue	Coarse-loamy, mixed, superactive, mesic Typic Haplocambids
Myton	Loamy-skeletal, mixed, superactive, calcareous, mesic Typic Torriorthents
Needle	Mixed, mesic Lithic Torripsamments
Nepalto	Sandy-skeletal, mixed, mesic Typic Torriorthents
Oxyaquic Torrifluvents	Oxyaquic Torrifluvents
Oxyaquic Torripsamments	Oxyaquic Torripsamments
Pagina	Coarse-loamy, mixed, superactive, mesic Typic Haplocalcids
Parkelei	Fine-loamy, mixed, superactive, mesic Aridic Haplustalfs
Pennell	Loamy, mixed, superactive, mesic Lithic Haplocalcids
Razito	Mixed, mesic Typic Torripsamments
Redhouse family	Fine-loamy, mixed, superactive, mesic Typic Haplocalcids
Reef	Loamy-skeletal, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents
Remorris family	Loamy, mixed, superactive, calcareous, mesic, shallow Ustic Torriorthents
Rizno	Loamy, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents
Sazi	Coarse-loamy, mixed, superactive, mesic Ustic Haplocalcids
Seeg	Loamy-skeletal, mixed, superactive, mesic Typic Haplocalcids
Sheppard	Mixed, mesic Typic Torripsamments
Sheppard family	Mixed, mesic Typic Torripsamments
Somorent family	Loamy, mixed, superactive, calcareous, mesic, shallow Typic Torriorthents
Torriorthents	Torriorthents
Trail	Sandy, mixed, mesic Typic Torrifluvents
Tsaya	Loamy-skeletal, mixed, superactive, calcareous, mesic Lithic Torriorthents
Tsaya family	Loamy-skeletal, mixed, superactive, calcareous, mesic Lithic Torriorthents
Ustic Torriorthents	Ustic Torriorthents
*Westmion	Clayey, mixed, superactive, calcareous, mesic Lithic Ustic Torriorthents

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