United States
Department of
Agriculture

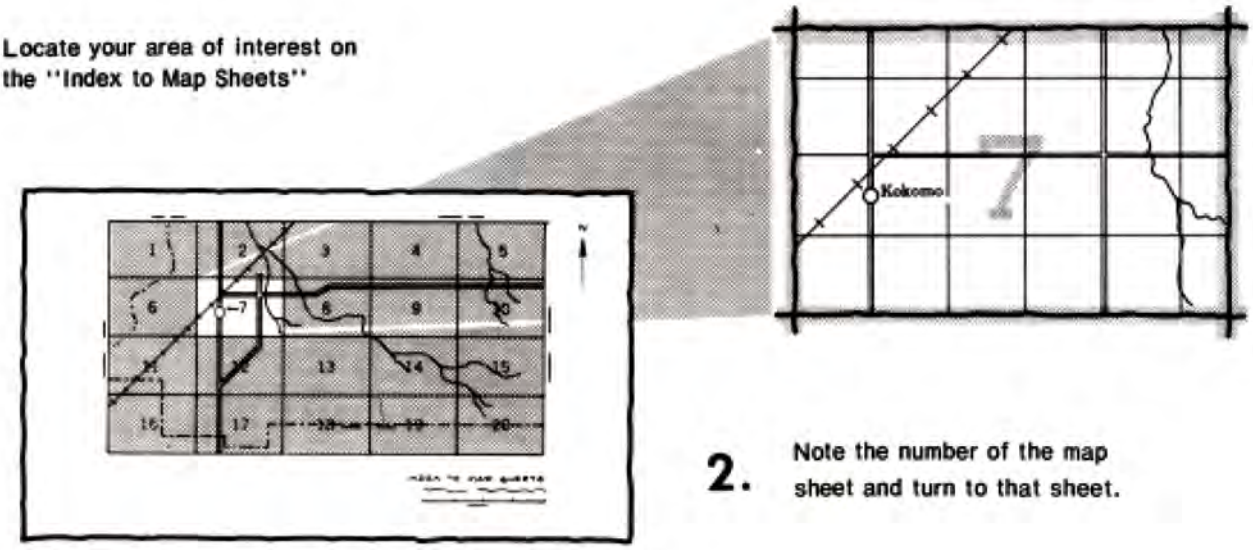
Soil
Conservation
Service

In Cooperation with
University of Wyoming
Agricultural
Experiment Station

Soil Survey of Washakie County Wyoming

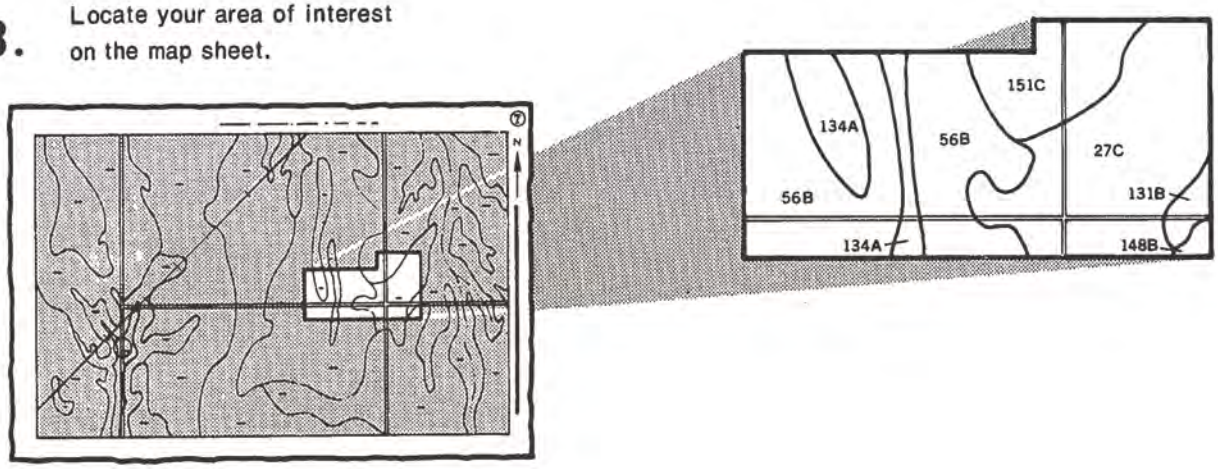
HOW TO USE

1. Locate your area of interest on the "Index to Map Sheets"

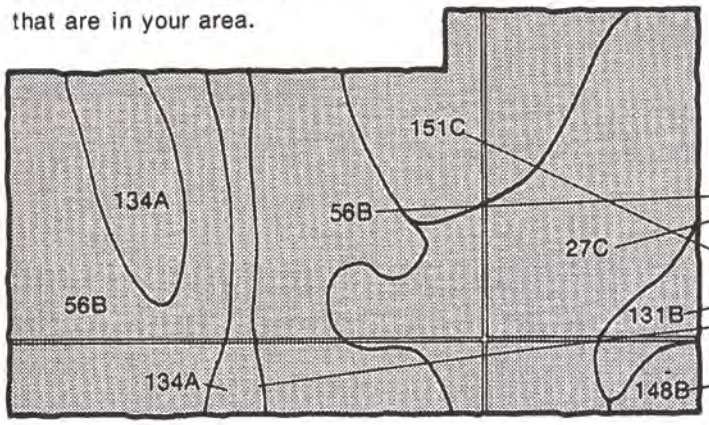


2. Note the number of the map sheet and turn to that sheet.

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



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



Symbols

27C
56B
131B
134A
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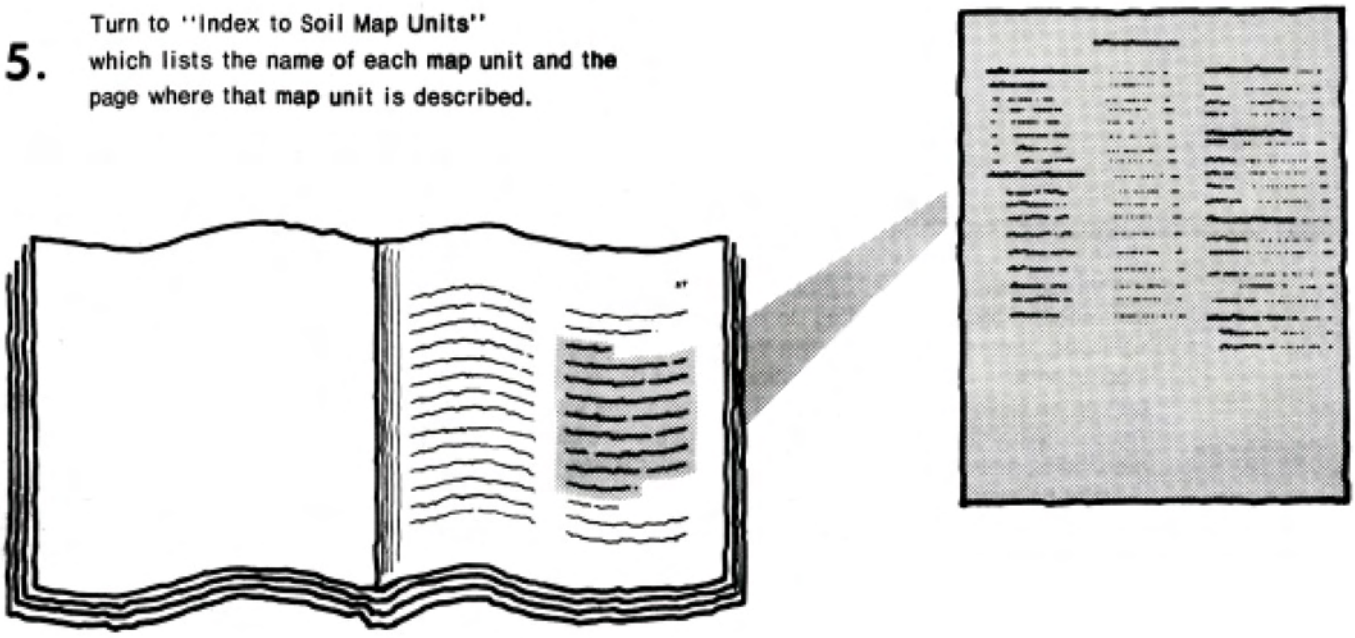
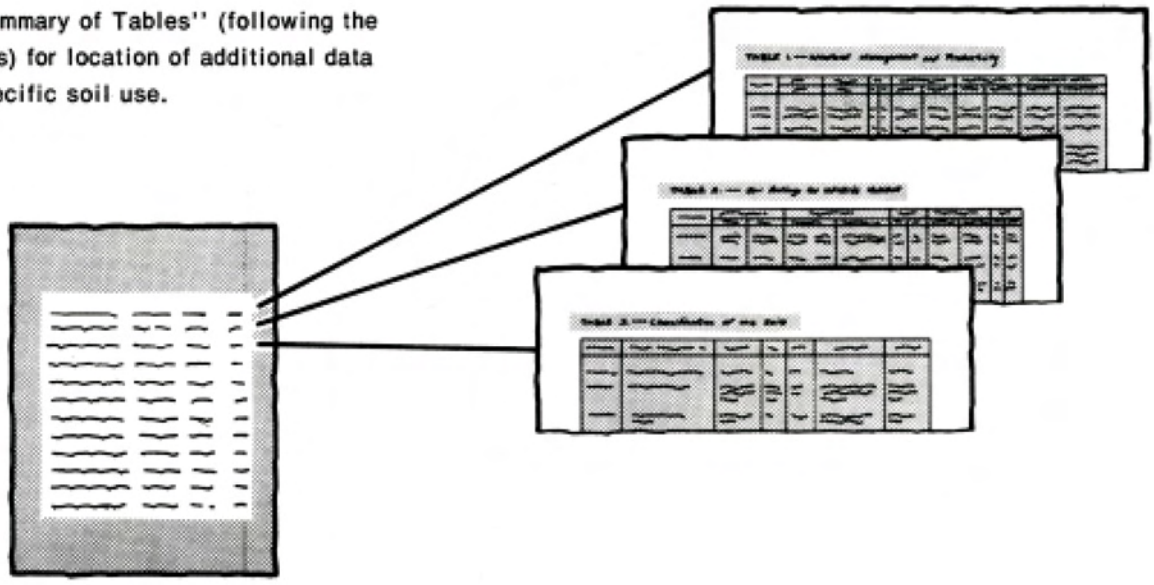
151C

THIS SOIL SURVEY

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



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



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

This 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 Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1972-76. Soil names and descriptions were approved in 1976. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1976. This survey was made cooperatively by the Soil Conservation Service, the Wyoming Agricultural Experiment Station; and the Wyoming Department of Revenue and Taxation. It is part of the technical assistance furnished to the Washakie and Nowood Conservation Districts.

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.

contents

soil series

Issued July 1983

index to map units

summary of tables

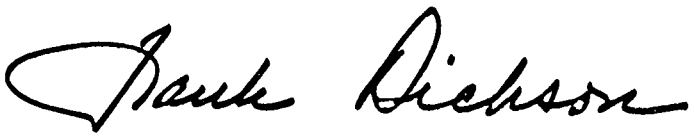
foreword

This soil survey contains information that can be used in land-planning programs in Washakie County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

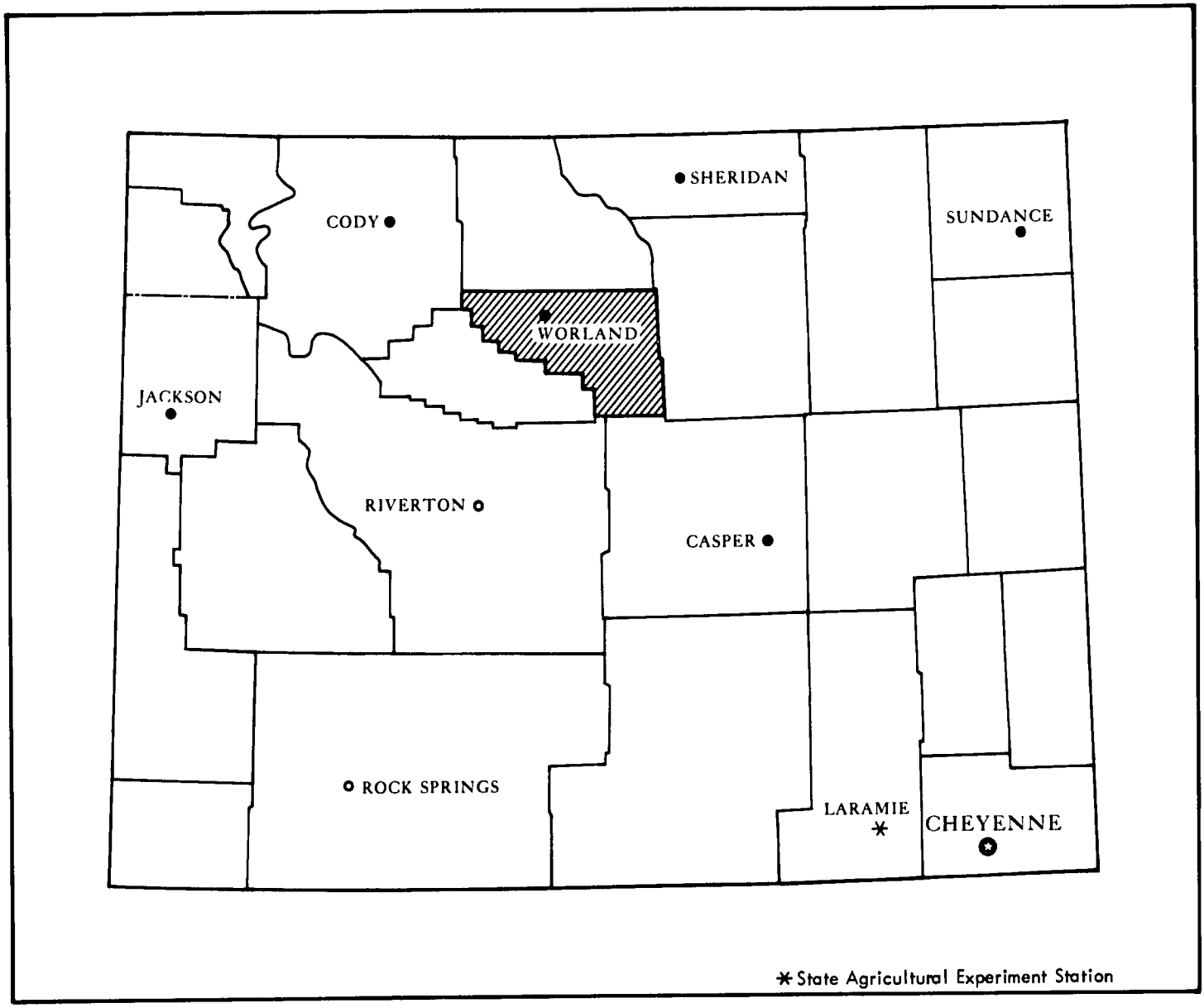
This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

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 soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.



Frank S. Dickson, Jr.
State Conservationist
Soil Conservation Service



Location of Washakie County in Wyoming.

soil survey of
Washakie County, Wyoming

By John E. Iiams, Soil Conservation Service

Fieldwork by John E. Iiams, Jack F. Young, and Robert L. Lebruska,
Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service
in cooperation with
University of Wyoming Agricultural Experiment Station

WASHAKIE COUNTY is in the north-central part of Wyoming. It has a total area of 1,447,680 acres, or about 2,262 square miles. Worland, the county seat, has a population of 6,200. (fig. 1) Ten Sleep, the only other town in the county, has a population of 370.

Descriptions, names, and delineations of soils in this soil survey do not fully agree with those on soil maps for adjacent survey areas. Differences are the result of better knowledge of soils, modifications in series concepts, intensity of mapping, or the extent of soils within the survey.

general nature of the survey area

This section is provided primarily for those who are not familiar with Washakie County. It gives information about climate; physiography, relief, and drainage; settlement and development; transportation and utilities; industry; water supply; and farming and ranching.

climate

Washakie County is in the central part of the Big Horn Basin. It is protected from strong winds by the Absaroka Mountains to the west and the Big Horn Mountains to the east. Frank's Peak, about 65 miles to the west, has an elevation of 13,140 feet. The protection provided by these mountain ranges results in very light winds or calm at Worland much of the time. It also has a pronounced effect on the temperature and precipitation at Worland. The air moves downslope into the basin from all directions. When moving downslope, the air is compressed and heated, warming at a rate of 5.5 degrees F for every 1,000 feet of descent. This warming of the air also contributes to the low relative humidity in the survey area.

Shallow cold airmasses approaching from Canada are largely blocked from Big Horn Basin by the Big Horn Mountains; however, deeper cold airmasses can spill into the basin. The cold air can be trapped in the basin, resulting in severely cold temperatures that persist for several days. Also, in winter a layer of cold air can form in the basin because of the loss of heat by radiation and the drainage of cold air from the surrounding mountains. This usually occurs during periods when winds are very light and the night sky is clear for several days. Moisture from the Pacific Ocean is largely blocked by the mountain chains between Worland and the west coast. The climate of the survey area is classified as semiarid.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Worland in the period 1931-60. In summer and winter, the daily maximum and minimum temperatures vary greatly. This is primarily because of the high elevation and low humidity, which permit rapid warming by solar radiation, and also because of the passage of both warm and cold airmasses. Thus, Worland is subject to wide and sometimes abrupt changes in temperature. The average annual air temperature is about 45 degrees. Some temperature extremes not included in the 30-year period covered by table 1 are a maximum of 104 degrees recorded in June 1919; a minimum of -51 degrees recorded in January 1930; and a minimum of 32 degrees recorded in August 1924. Ten Sleep had a maximum temperature of 102 degrees in June 1973 and a minimum of -45 degrees in January 1963.

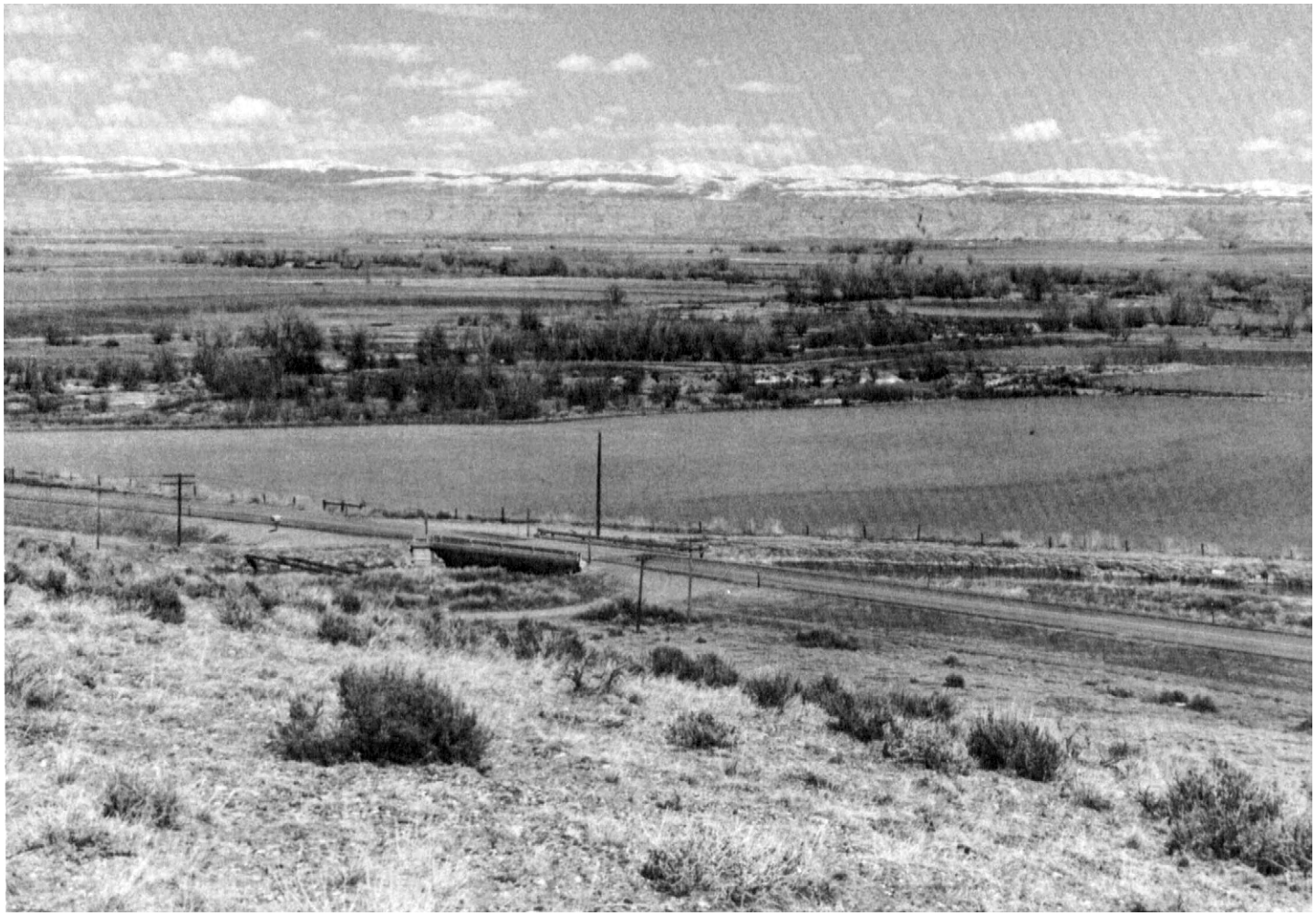


Figure 1.—Area of Washakie County, five miles north of Worland.

Freezes late in spring and early in fall are common. The average last occurrences of 32 degrees and 28 degrees in spring are May 13 and April 30, respectively. The average first occurrences of 32 degrees and 28 degrees in fall are September 23 and October 4, respectively. Thus, the average length of the growing season is 133 days at 32 degrees and 157 days at 28 degrees. Only 20 percent of the time is the temperature expected to drop to 32 degrees or lower after May 22 or to 28 degrees or lower after May 9. Also, only 20 percent of the time is the temperature expected to drop to 32 degrees or lower before September 13 or to 28 degrees or lower before September 24.

The average annual precipitation is about 8 inches at Worland and about 13 inches at Ten Sleep. Generally, the least amount of precipitation falls during December, January, and February; the amount increases rapidly to a peak in the latter part of May and the first part of June. Then the amount of precipitation decreases rapidly during the last part of June through August. Precipitation increases to a secondary peak in September, then decreases again to a low in winter. Normally, about 51 percent, or 3.93 inches, of the annual precipitation falls between the average 32-degree freeze-free dates, and about 61 percent, or 4.74 inches falls between the average 28-degree freeze-free dates. The greatest amount of precipitation measured in any single month was 4.74 inches during June 1945. The greatest snowfall measured in any single month was 19 inches during February 1933 at an elevation of 4,172 feet and 72 inches during 1965 at an elevation of 7,760 feet. Occasional thunderstorms are accompanied by hail, but most of the hail is light and is limited to small areas.

Sunshine is abundant in Washakie County, and there are few days during the year without some sunshine. It is estimated that Worland receives sunshine on the

average about 70 percent of the time possible annually, ranging from about 65 percent in winter and spring to about 75 percent in summer and fall.

physiography, relief, and drainage

Washakie County occupies the southeastern part of the Big Horn Basin, a large syncline extending about 100 miles from north to south and 120 miles from east to west (*3*). The Big Horn Mountains are to the east, the Bridger Mountains are to the south, and the Absaroka Mountains are to the west. The Big Horn Mountains are separated from the foothills by Nowood Creek. The basin is composed of uplands, alluvial fans, terraces, and badlands. The lowest point in Washakie County, about 3,950 feet above sea level, is where the Big Horn River leaves the county. The highest point, about 9,576 feet, is in the northeastern corner of the county. The elevation at Worland is 4,060 feet, and the elevation at Ten Sleep is 4,436 feet.

The relief of the county is typical of that of intermountain desertic basins. The relief is the result of geologic processes that began with mountain building. After the mountains were thrust up, the Tertiary Willwood Formation was deposited in the basin. This was followed by a period of erosion. Next, a valley-filling formation of stratified sand and gravel was deposited. The shaping of the present landscape began during the erosional cycle that followed. West of the Big Horn River, most of the terrace material and much of the underlying shale and sandstone were carried away and the gravel-capped pediments of the basin were formed. Where the shale and sandstone have been eroded, badlands occur. The stratified sand and gravel deposits originated primarily as outwash from the Absaroka, Shoshone, and Owl Creek Mountains to the west. East of the Big Horn River, the landscape is dominated by monoclinal backslopes, uplands, narrow alluvial deposits along intermittent drainageways, badlands, and mountain fronts.

As the uplands eroded, alluvial fans were built along the valleys and alluvium was deposited along the streams. Most of the irrigated farmland in the county is made up of alluvial deposits of the Big Horn River and Nowood Creek and adjacent alluvial fans. Remnants of the older terraces are Schuster Flat and Dutch Nick Flat, which rise about 700 feet above the lower terrace at Worland.

The Big Horn River and Nowood Creek are the major drainage systems in the survey area. The Big Horn River flows from south to north, and most of the water is already in the river when it enters the county. Drainage from the western part of the county comes from the intermittent, downcutting Cottonwood, Gooseberry, Fifteen Mile, and Tenmile Creeks. The intermittent, downcutting Nowater Creek drains the badlands to the east. It receives most of its water from streams flowing west out of the Big Horn Mountains. The Nowood Creek enters the Big Horn River at Manderson, Wyoming, just north of the county line.

settlement and development

Washakie County was organized in 1911 as a division of Big Horn County, which included all of Big Horn Basin and Yellowstone Park. It was named in honor of the Shoshone Indian Chief "Washakie." Worland and Ten Sleep are the only towns in the county.

In 1903 a pioneer camp was established on the west bank of the Big Horn River, at its confluence with Fifteen Mile Creek. The camp was on the Bridger Trail, a road established by mountain man Jim Bridger for miners enroute to the goldfields of Montana. Charles H. Worland, a nursery salesman, selected this location as a halfway point between Basin City and Thermopolis, and the town located here now bears his name. The camp became an overnight stop for stagecoaches and freighters and provided them with supplies. Some irrigated farms were in the Neiber area, and several ranches were also in operation. In 1904 C. F. Robertson, representing a group of Iowa businessmen, was named general manager of the Hanover Canal Company. In 1905 survey crews for the Burlington Northern Railroad arrived.

Educational facilites in the survey area are good. Worland and Ten Sleep have several churches. Farm groups are well organized, and their community buildings are scattered throughout the county. Fire protection is provided by volunteer fire departments in Worland and Ten Sleep and by rural fire protection groups.

transportation and utilities

The county is served by the Burlington Northern Railroad, and several freight trains pass through the area each day. Direct connections to major farm markets in the midwest and northwest are provided.

Farm-to-market transportation facilities are good. U.S. Highway 20 crosses the county from north to south, and U.S. Highway 16 enters the northeast corner of the county, passes through Ten Sleep, and joins U.S. Highway 20 at Worland. State secondary roads and well maintained county roads serve the major parts of the county and the farming and ranching communities.

A major airline provides feeder airline service to the county. Charter airlines are also available. A busline provides daily service from north to south.

Electricity is provided in Worland by the Pacific Power and Light Company and, along the Big Horn River, by the Hot Springs Rural Electric Association. The Ten Sleep and Nowood Creek areas receive electricity from the Big Horn Rural Electric Association. Natural gas is available along the Big Horn River. Telephone service is available in most of the county.

industry

A variety of industries operate in the county. Many residents find employment in the mining and processing

of minerals and the providing of related services. Oil and gas are produced from several fields in the county. Bentonite, mined west of Ten Sleep, is processed in Worland.

Sulfur extraction and liquid gas processing are conducted 8 miles north of Worland, and a grain buying, processing, and storage plant is located 3 miles north of Worland.

In Worland there is a sugar factory, a large welding and beet equipment plant, a packing company, feedyards, and a soft drink bottling company. Timber from the Big Horn Mountains is sawed and planed at Ten Sleep.

water supply

Irrigation water from the Big Horn River is diverted into the Big Horn and Bluff Canals on the west side of the river and into the Hanover Canal on the east side. Water for the Worland Valley area comes as direct flow from the Big Horn River; however, additional water is stored in Boysen Reservoir.

Irrigation water for the Nowood and Gooseberry areas is supplied by several small ditch companies diverting water from Nowood, Ten Sleep, Gooseberry, and Cottonwood Creeks and their tributaries. The irrigation water supply usually is very limited from mid-July through the rest of the growing season. Artesian wells supply water for several isolated sprinkler systems just east of Nowood Creek.

farming and ranching

The survey area includes 1,447,680 acres, of which about 23 percent is privately owned and 77 percent is federally administered. About 20 percent of the privately owned land is irrigated cropland, 78 percent is rangeland, and 2 percent is woodland. The federally administered land is mainly rangeland, but about 4 percent is woodland.

Irrigated farming began in the Nowood area about 1885 and in the Worland area about 1901. About 45,000 acres is irrigated along the Big Horn River (fig. 2), about

Figure 2.—Aerial view of the Big Horn River Valley. The valley is used for irrigated farming.

22,000 acres along Nowood Creek, and 2,500 acres along the smaller drainageways in the county and in isolated areas irrigated by sprinkler systems.

The principal crops in the survey area are sugar beets, barley, alfalfa, and corn. Other important crops are dry beans, oats, and pasture. Both cattle and sheep graze the rangeland. Timber products are harvested from the woodland.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, rangeland and woodland managers, engineers, planners, developers and builders, home buyers, and others.

general soil map units

The general soil map at the back of 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, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units 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 planning the management of a farm or field or 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.

map unit descriptions

1. Lostwells-Youngston

Deep, well drained, nearly level to moderately sloping soils; on alluvial fans, terraces, and flood plains and in valleys

This map unit is in areas along the Big Horn River and Nowood Creek. Slope is 0 to 10 percent. The vegetation in areas not cultivated is mainly grass and shrubs. Elevation is 3,900 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is 45 degrees F, and the average frost-free season is 120 to 130 days.

This unit makes up about 6 percent of the survey area. It is about 30 percent Lostwells soils and 25 percent Youngston soils. The remaining 45 percent is components of minor extent.

Lostwells soils are on alluvial fans and valley floors. These soils are deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is light brownish gray sandy clay loam about 3 inches thick. Below this to a depth of 60 inches or more is light brownish gray sandy clay loam.

Youngston soils are on alluvial fans, terraces, and flood plains and in valleys. These soils are deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is pale brown silty clay loam about 4 inches thick. Below this to a depth of 60 inches or more is pale brown, stratified clay loam.

Of minor extent in this unit are somewhat poorly drained Dobent soils, moderately well drained Glenton soils, and well drained Barnum, Baroid, Finnerty, Garland, Griffy, Neville, and Stutzman soils.

This unit is used for irrigated crops, livestock grazing, wildlife habitat, homesites, and recreational development.

If this unit is used as homesites and for recreational development, the main limitations are the moderately slow permeability of the Youngston soils.

This unit provides food and cover for deer, small mammals, small birds, pheasants, and chukar partridge.

2. Spearfish-Neville-Travessilla

Shallow, very shallow, and deep, well drained, nearly level to steep soils; on ridges, hillsides, and alluvial fans

This map unit is along the base of the mountain front, east of Nowood Creek. Slope is 1 to 60 percent. The vegetation in areas not cultivated is mainly grass, shrubs, and small trees. Elevation is 4,200 to 7,200 feet. The average annual precipitation is about 11 inches, the average annual air temperature is 45 degrees F, and the average frost-free season is 110 to 130 days.

This unit makes up about 10 percent of the survey area. It is about 30 percent Spearfish soils, 20 percent Neville soils, and 10 percent Travessilla soils. The remaining 40 percent is components of minor extent.

Spearfish soils are on steep hillsides and ridges. These soils are shallow and well drained. They formed in loamy material derived dominantly from red siltstone. The surface layer is light reddish brown loam about 4 inches thick. Below this is reddish yellow loam 9 inches thick. Weathered red siltstone is at a depth of 13 inches.

Neville soils are on nearly level to sloping alluvial fans. These soils are deep and well drained. They formed in alluvium derived dominantly from red siltstone or sandstone. The surface layer is reddish brown loam about 7 inches thick. Below this to a depth of 60 inches or more is light red loam.

Travessilla soils are on steep hillsides and ridges. These soils are very shallow and well drained. They formed in loamy parent material derived dominantly from brown sandstone. The surface layer is brown loam about 1 inch thick. Below this is brown channery loam about 9 inches thick. Unweathered sandstone is at a depth of 10 inches.

Of minor extent in this unit are Vale, Rekop, Gystrum, and Tensleep soils.

This unit is used for irrigated forage crops, as rangeland, and for wildlife habitat.

This unit provides food and cover for antelope, deer, small birds, sage grouse, and chukar partridge.

3. Persayo-Rock outcrop-Youngston

Shallow and deep, well drained, nearly level to steep soils, and Rock outcrop; on hills, ridges, escarpments, fans, and terraces

This map unit is east of the Big Horn River. Slope is 0 to 45 percent. The vegetation in areas not cultivated is mainly grasses and shrubs. Elevation is 3,900 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is 45 degrees F, and the average frost-free season is 120 to 130 days.

This unit makes up about 31 percent of the survey area. It is about 30 percent Persayo soils, 25 percent Rock outcrop, and 10 percent Youngston soils. The remaining 35 percent is components of minor extent.

Persayo soils are on steep, dissected hillsides and ridges. These soils are shallow and well drained. They formed in calcareous material derived dominantly from shale. The soils are pale brown clay loam and are underlain by shale at a depth of 13 inches.

Rock outcrop consists of areas of exposed shale and sandstone. It is mainly on hilltops and escarpments.

Youngston soils are on nearly level to sloping alluvial fans and terraces. These soils are deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is pale brown silty clay loam about 4 inches thick. Below this to a depth of 60 inches or more is pale brown, stratified clay loam.

Of minor extent in this unit are Clifterson, Fruita, Greybull, Rairdent, Stutzman, and Wallson soils.

This unit is used as rangeland and for wildlife habitat.

This unit provides food and cover for antelope, deer, small mammals, small birds, sage grouse, and chukar partridge.

4. Kishona-Shingle-Rock outcrop

Shallow and deep, well drained, gently sloping to steep soils, and Rock outcrop; on alluvial fans, uplands, and escarpments

This map unit is along Nowood Creek. Slope is 3 to 40 percent. The vegetation is mainly grass and shrubs. Elevation is 4,500 to 5,700 feet. The average annual precipitation is about 11 inches, the average annual air temperature is 45 degrees F, and the average frost-free season is 110 to 130 days.

This unit makes up about 4 percent of the survey area. It is about 30 percent Kishona soils, 20 percent Shingle soils, and 20 percent Rock outcrop. The remaining 30 percent is components of minor extent.

Kishona soils are on sloping alluvial fans. These soils are deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is light brownish gray loam about 4 inches thick. Below this to a depth of 60 inches or more is yellowish brown loam.

Shingle soils are on sloping to steep hills and ridges of uplands. These soils are shallow and well drained. They formed in material derived dominantly from calcareous shale. The soils are grayish brown clay loam and are underlain by shale at a depth of 17 inches.

Rock outcrop consists of areas of exposed shale and sandstone. It is mainly on buttes, escarpments, and ledges.

Of minor extent in this unit are Arvada, Bidman, Bondman, Forkwood, Kyle, and Mughut soils.

This unit is used for livestock grazing and wildlife habitat.

This unit provides food and cover for antelope, deer, small mammals, small birds, sage grouse, and chukar partridge.

5. Wallson-Griffy-Uffens

Deep, well drained, nearly level to steep soils; on alluvial fans and terraces

This map unit is on Schuster, Dutch Nick, and Banjo Flats. Slope is 0 to 30 percent. The vegetation is mainly grass and shrubs. Elevation is 4,000 to 5,700 feet. The average annual precipitation is about 8 inches, the average annual air temperature is 45 degrees F, and the average frost-free season is 120 to 130 days.

This unit makes up about 9 percent of the survey area. It is about 25 percent Wallson soils, 15 percent Griffy soils, and 15 percent Uffens soils. The remaining 45 percent is components of minor extent.

Wallson soils are on alluvial fans. These soils are deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is light brownish gray sandy loam about 7 inches thick. The subsoil is brown sandy loam about 8 inches thick. Below this to a depth of 60 inches or more is pale brown and light yellowish brown sandy loam.

Griffy soils are on alluvial fans and terraces. These soils are deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is light brownish gray sandy loam about 3 inches thick. The subsoil is brown sandy clay loam about 16 inches thick. Below this to a depth of 60 inches or more is pale brown sandy loam.

Uffens soils are on alluvial terraces. These soils are deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is pale brown loam about 1 inch thick. The subsoil is pinkish gray clay loam about 11 inches thick. Below this to a depth of 60 inches or more are pale brown sandy clay loam and clay loam. These soils are strongly affected by salt and alkali.

Of minor extent in this unit are Clifterson, Fruita, Greybull, Lostwells, Neiber, Muff, Persayo, Rairdent, and Youngston soils.

This unit is used for livestock grazing and wildlife habitat.

This unit provides food and cover for antelope, deer, small mammals, small birds, and chukar partridge.

6. Kishona-Shingle-Forkwood

Deep and shallow, well drained, gently sloping to steep soils; on alluvial fans and uplands

This map unit is between the Big Horn River and Nowood Creek. Slope is 3 to 40 percent. The vegetation is mainly grasses and shrubs. Elevation is 4,500 to 5,700 feet. The average annual precipitation is about 11 inches, the average annual air temperature is 45 degrees F, and the average frost-free season is 110 to 130 days.

This unit makes up about 21 percent of the survey area. It is about 25 percent Kishona soils, 15 percent Shingle soils, and 15 percent Forkwood soils. The remaining 45 percent is components of minor extent.

Kishona soils are on alluvial fans. These soils are deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is light brownish gray loam about 4 inches thick. Below this to a depth of 60 inches or more is light yellowish brown loam.

Shingle soils are on low hills of uplands. These soils are shallow and well drained. They formed in material derived dominantly from shale. The soils are grayish brown clay loam and are underlain by shale at a depth of 17 inches.

Forkwood soils are on alluvial fans. These soils are deep and well drained. They formed in alluvium derived from mixed sources. The surface layer is light brownish gray very fine sandy loam about 2 inches thick. The subsoil is brown clay loam about 14 inches thick. Below this to a depth of 60 inches or more is light gray loam.

Of minor extent in this unit are Arvada, Bidman, Bondman, Haverdad, Heldt, Kyle, Larim, Olney, Mughut, Renohill, and Worf soils.

This unit is used for livestock grazing and wildlife habitat.

This unit provides food and cover for antelope, deer, small mammals, small birds, sage grouse, and chukar partridge.

7. Rock outcrop-Lakehelen-Meadowlake

Rock outcrop, and moderately deep, well drained, sloping to steep soils; on escarpments and mountainsides

This map unit is in the northeastern part of the county. Slope is 5 to 35 percent. The vegetation is mainly grass, shrubs, and pine trees. Elevation is 8,000 to 9,500 feet. The average annual precipitation is about 22 inches, the average annual air temperature is 37 degrees F, and the average frost-free season is 30 to 90 days.

This unit makes up about 2 percent of the survey area. It is about 25 percent Rock outcrop, 20 percent Lakehelen soils, and 15 percent Meadowlake soils. The remaining 40 percent is components of minor extent.

Rock outcrop consists of exposed areas of granite and sandstone on escarpments.

Lakehelen soils are on mountainsides. These soils are moderately deep and well drained. They formed in material derived dominantly from granite. The surface is covered with a mat of forest duff about 1 inch thick. From 3 to 10 percent of the surface is covered with stones. The surface layer is pale brown stony sandy loam about 19 inches thick. The subsoil is strong brown very cobbly sandy clay loam about 18 inches thick. Unweathered granite is at a depth of 37 inches.

Meadowlake soils are on mountainsides. These soils are moderately deep and well drained. They formed in material derived dominantly from sandstone. The surface is covered with a mat of grass litter about 1 inch thick. The surface layer is pinkish gray very flaggy sandy loam about 15 inches thick. The subsoil is weak red very flaggy loamy sand about 6 inches thick. Unweathered sandstone is at a depth of 21 inches.

Of minor extent in this unit are well drained Castino Variant, Granile, Lymanson, Starman, and Turk soils and somewhat excessively drained Tine soils.

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

This unit provides food and cover for antelope, deer, elk, small mammals, small birds, sage grouse, blue grouse, and ruffed grouse.

8. Rock outcrop-Clayburn-Chittum

Rock outcrop, and shallow and deep, well drained, gently sloping to steep soils; on hogbacks, ridges, escarpments, and mountainsides

This map unit is in the eastern part of the survey area. Slope is 2 to 25 percent. The vegetation is mainly grass and shrubs. Elevation is 6,500 to 9,000 feet. The average annual precipitation is about 19 inches, the average annual air temperature is 41 degrees F, and the average frost-free season is 60 to 90 days.

This unit makes up about 9 percent of the survey area. It is about 27 percent Rock outcrop, 15 percent Clayburn soils, and 10 percent Chittum soils. The remaining 48 percent is components of minor extent.

Rock outcrop consists of areas of exposed sandstone on ridges and escarpments.

Clayburn soils are on mountainsides. These soils are deep and well drained. They formed in alluvium derived dominantly from sandstone. The surface layer is dark grayish brown loam about 18 inches thick. The subsoil is dark brown clay loam about 18 inches thick. Below this to a depth of 60 inches or more is yellowish brown gravelly clay loam.

Chittum soils are on hogbacks. These soils are shallow and well drained. They formed in material derived dominantly from sandstone. The surface layer is dark brown gravelly loam about 5 inches thick. The upper part of the subsoil is reddish brown gravelly loam about 6 inches thick, and the lower part is yellowish red gravelly clay loam about 6 inches thick. Unweathered sandstone is at a depth of 17 inches.

Of minor extent in this unit are well drained Bachus, Burnette, Greenman, Limber, Lucky Star, Nathrop, Splitro, Starman, Starley, and Stubbs soils and somewhat excessively drained Whaley soils.

This unit is used for livestock grazing and wildlife habitat.

This unit provides food and cover for antelope, deer, elk, small mammals, small birds, sage grouse, blue grouse, ruffed grouse, and chukar partridge.

9. Rock outcrop-Woosley-Starley

Rock outcrop, and moderately deep and shallow, well drained, nearly level to steep soils; on ridges, escarpments, hilltops, and mountainsides

This map unit is in the eastern part of the survey area. Slope is 1 to 35 percent. The vegetation is mainly grass and shrubs. Elevation is 6,500 to 9,000 feet. The average annual precipitation is about 19 inches, the average annual air temperature is 41 degrees F, and the average frost-free season is 50 to 90 days.

This unit makes up about 8 percent of the survey area. It is about 25 percent Rock outcrop, 14 percent Woosley soils, and 11 percent Starley soils. The remaining 50 percent is components of minor extent.

Rock outcrop consists of areas of exposed limestone on ridges and escarpments.

Woosley soils are on mountainsides. These soils are moderately deep and well drained. They formed in material derived dominantly from limestone. The surface layer is dark grayish brown loam about 13 inches thick. The subsoil is light brownish gray clay loam about 9 inches thick. Unweathered limestone is at a depth of 22 inches.

Starley soils are on mountainsides, hilltops, and ridges. These soils are shallow and well drained. They formed in material derived dominantly from limestone. The surface layer is dark grayish brown very channery loam about 6 inches thick. Below this is pinkish gray very channery loam about 8 inches thick. Unweathered limestone is at a depth of 14 inches.

Of minor extent in this unit are well drained Burnette, Clayburn, Coutis, Decross, Greenman, Lucky Star, Mulgon, Nathrop, and Starman soils and somewhat excessively drained Whaley and Billycreek soils.

This unit is used mainly for livestock grazing and wildlife habitat. It is also used for recreational development.

This unit provides food and cover for antelope, deer, elk, small mammals, small birds, sage grouse, blue grouse, ruffed grouse, and chukar partridge.

detailed soil map units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and management of the soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil, a brief description of the soil profile, and a listing of the principal hazards and limitations to be considered in planning management.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, 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, Neville loam, wet, 0 to 3 percent slopes, is one of several phases in the Neville series.

Some map units are made up of two or more major soils. These map units are called soil complexes or soil associations.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Billycreek-Wetterhorn complex, 6 to 60 percent slopes, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Vale-Tensleep association is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Riverwash is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 2 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

map unit descriptions

1—Absted-Forkwood association. This map unit is on fans, in valleys, and on uplands. Slope is 1 to 25 percent. The native vegetation is mainly grass and shrubs. Elevation is 4,250 to 5,500 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 46 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 35 percent Absted very fine sandy loam that has slopes of 1 to 10 percent and 30 percent Forkwood very fine sandy loam that has slopes of 1 to 10 percent. Also in this unit is about 10 percent Shingle clay loam that has slopes of 2 to 25 percent. The Absted soil is on fans, the Forkwood soil is in convex areas of fans and in valleys, and the Shingle soil is on upland ridges.

Included in this unit are small areas of Fruita, Kishona, Neville, and Uffens soils. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Absted soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light grayish brown very fine sandy loam about 4 inches thick. The subsoil is brown clay loam about 17 inches thick. The substratum to a depth of 60 inches or more is light

yellowish brown sandy clay loam. The substratum is very strongly alkaline.

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

The Forkwood soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray very fine sandy loam about 2 inches thick. The subsoil is brown clay loam about 17 inches thick. The substratum to a depth of 60 inches or more is light gray loam.

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

The Shingle soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is grayish brown clay loam about 4 inches thick. The underlying material is grayish brown clay loam about 13 inches thick. Soft bedrock is at a depth of about 17 inches.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Absted and Forkwood soils is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama, threadleaf sedge, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Shingle soil is mainly bluebunch wheatgrass, Indian ricegrass, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, rhizomatous wheatgrasses and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 700 pounds in favorable years to 350 pounds in unfavorable years.

Uniform distribution of grazing is difficult to achieve on this unit because of the steepness of slope or the lack of permanent water developments, or both.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Absted and Forkwood soils are in capability subclass VIe, dryland, and in Loamy range site, 10- to 14-inch precipitation zone. The Shingle soil is in capability subclass VIIe, dryland, and in Shallow Clayey range site, 10- to 14-inch precipitation zone.

2—Apron sandy loam, 0 to 3 percent slopes. This deep, well drained soil is on fans. It formed in alluvium derived dominantly from sandstone. Slope ranges from 0 to 3 percent but is commonly about 2 percent. The native vegetation is mainly grass and shrubs. Elevation is 3,950 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the soil is brown sandy loam to a depth of 60 inches or more.

Included in this unit are small areas of Griffy, Lostwells, Wallson, and Worland soils. The percentage of included soils varies from one area to another.

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

Most areas of this unit are used for irrigated crops, mainly small grain, corn, and sugar beets. Among the other crops grown are beans, hay, and pasture. Some areas are used for livestock grazing and wildlife habitat. Less than 10 percent of the unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

This unit is well suited to cultivated crops. It has few limitations. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Wind erosion can be reduced by keeping the soil rough and cloddy when it is not protected by vegetation.

This unit is well suited to hay and pasture. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Rotation grazing helps to maintain the quality of forage. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to soil tests.

Furrow, border, and sprinkler irrigation systems are suited to the unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly needleandthread, rhizomatous wheatgrasses, Indian ricegrass, and big sagebrush. If the vegetation deteriorates, blue grama and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 375 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIs-5, irrigated, and capability subclass VIe, dryland. It is in Sandy range site, 5- to 9-inch precipitation zone.

3—Apron-Worland sandy loams, 0 to 10 percent slopes. This map unit is on fans and uplands. Slope ranges from 0 to 10 percent but is commonly about 5 percent. The vegetation in areas not cultivated is mainly grass and shrubs. Elevation is 3,950 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 45 percent Apron sandy loam and 35 percent Worland sandy loam. The gently sloping Apron soil is on small fans and along drainageways of uplands, and the sloping Worland soil is on ridges and knolls of uplands. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Greybull, Persayo, and Wallson soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Apron soil is deep and well drained. It formed in alluvium. Typically, the soil is brown sandy loam to a depth of 60 inches or more.

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

The Worland soil is moderately deep and well drained. It formed in material derived dominantly from sandstone interbedded with shale. Typically, the surface layer is light brownish gray sandy loam about 3 inches thick. The underlying material is pale brown sandy loam about 33 inches thick. Soft sandstone is at a depth of about 36 inches.

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

Most areas of this unit are used for irrigated crops, mainly small grain, corn, and hay and pasture. Some areas are used for livestock grazing and wildlife habitat. Less than 10 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

This unit is suited to cultivated crops. It is limited mainly by depth to bedrock of the Worland soil and by slope. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Wind erosion can be reduced by keeping the soil rough and cloddy when it is not protected by vegetation.

If this unit is used for hay and pasture, the main limitations are depth to bedrock of the Worland soil and slope. Seedbed preparation should be on the contour or across the slope where practical. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Rotation grazing helps to maintain the quality of forage. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to soil tests.

Furrow, border, corrugation, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. If furrow or corrugation irrigation systems are used, runs should be on the contour or across the slope. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of irrigation water, leveling is needed in sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly needleandthread, rhizomatous wheatgrasses, Indian ricegrass, and big sagebrush. If the vegetation deteriorates, blue grama and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 375 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IVe-5, irrigated, and capability subclass VIe, dryland. It is in Sandy range site, 5- to 9-inch precipitation zone.

4—Apron-Worland sandy loams, 1 to 12 percent slopes. This map unit is on fans and uplands. The vegetation in areas not cultivated is mainly grass and shrubs. Elevation is 3,950 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 45 percent Apron sandy loam that has slopes of 1 to 10 percent and 30 percent Worland sandy loam that has slopes of 1 to 12 percent. The Apron soil is on small fans, and the Worland soil is on ridges and hillsides of uplands. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Greybull, Persayo, and Wallson soils. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Apron soil is deep and well drained. It formed in alluvium. Typically, the soil is brown sandy loam to a depth of 60 inches or more.

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

The Worland soil is moderately deep and well drained. It formed in material derived dominantly from sandstone interbedded with shale. Typically, the surface layer is light brownish gray sandy loam about 3 inches thick. The underlying material is pale brown sandy loam about 33 inches thick. Sandstone is at a depth of about 36 inches.

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

This unit is used mainly for livestock grazing and wildlife habitat. It is also used as homesites. Most climatically adapted crops could be grown if a dependable supply of water for irrigation were made available.

The potential plant community on this unit is mainly needleandthread, Indian ricegrass, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, big sagebrush and blue grama increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 375 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

If this unit is used for homesite development, the main limitations are depth to bedrock in the Worland soil and slope. The hazard of erosion is increased if the soil is left exposed during site development. Cuts needed to provide essentially level building sites can expose bedrock. Effluent from septic tank absorption fields can surface in downslope areas and thus create a hazard to health. Slope is a concern in installing septic tank absorption fields. Absorption lines should be installed on the contour.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIe, dryland, and in Sandy range site, 5- to 9-inch precipitation zone.

5—Arvada-Olney association. This map unit is on fans on Blue Mesa. Slope is 1 to 10 percent. The native vegetation is mainly grass and shrubs. Elevation is 4,500 to 5,500 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 30 percent Arvada loam that has slopes of 1 to 8 percent and 30 percent Olney sandy loam that has slopes of 1 to 10 percent. Also in this unit is about 25 percent Rairdent fine sandy loam that has slopes of 1 to 10 percent. The Arvada soil is in depressional areas of alluvial fans, the Olney soil is in smooth areas of fans, and the Rairdent soil is in slightly higher lying, smooth areas of fans.

Included in this unit are small areas of Larim and Shingle soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Arvada soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray loam about 3 inches thick. The subsoil is pale brown, very strongly alkaline clay loam about 14 inches thick. The substratum to a depth of 60 inches or more is very pale brown clay loam.

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

The Olney soil is deep and well drained. It formed in alluvium. Typically, the surface layer is brown sandy loam about 5 inches thick. The subsoil is brown sandy clay loam about 13 inches thick. The substratum to a depth of 60 inches or more is very pale brown sandy clay loam.

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

The Rairdent soil is deep and well drained. It formed in alluvium. Typically, the surface layer is pale brown fine sandy loam about 2 inches thick. The subsoil is brown clay loam about 15 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown gravelly fine sandy loam.

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

This unit is used for livestock grazing and wildlife habitat.

The potential plant community on the Arvada soil is mainly gardner saltbush, bottlebrush squirreltail, bud sagebrush, and rhizomatous wheatgrasses. If the vegetation deteriorates, gardner saltbush and birdfoot sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 450 pounds of air-dry vegetation per acre in normal years. Production varies from 650 pounds in favorable years to 275 pounds in unfavorable years.

The potential plant community on the Olney soil is mainly needleandthread, bluebunch wheatgrass, prairie junegrass, and big sagebrush. If the vegetation deteriorates, big sagebrush and threadleaf sedge increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Rairdent soil is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama, threadleaf sedge, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Arvada soil is in capability subclass VIIs, dryland, and in Saline Upland range site, 10- to 14-inch precipitation zone; the Olney soil is in capability subclass VIe, dryland, and in Sandy range site, 10- to 14-inch precipitation zone; and the Rairdent soil is in capability subclass VIe, dryland, and in Loamy range site, 10- to 14-inch precipitation zone.

6—Barnum loam. This deep, well drained soil is on flood plains. It formed in alluvium derived dominantly from red sandstone and siltstone. Slope ranges from 1 to 3 percent but is commonly about 2 percent. The vegetation in areas not cultivated is mainly grass, shrubs, and trees. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

Typically, the surface layer is brown loam about 3 inches thick. The underlying material to a depth of 60 inches or more is loam stratified with lenses of very fine sandy loam, loamy very fine sand, and clay loam.

Included in this unit are small areas of Lostwells and Neville soils and a soil that is similar to this Barnum soil but is underlain by gravel. The percentage of included soils varies from one area to another.

Permeability of this Barnum soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate. This soil is subject to occasional, brief periods of flooding in May through July. The soil is slightly saline or moderately saline.

Most areas of this unit are used for irrigated crops, mainly small grain and hay and pasture. Some areas are used for livestock grazing and wildlife habitat. Less than 15 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, it is limited by occasional periods of flooding and slight to moderate salinity. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Flooding can be controlled by the use of dikes and diversions. Tile or open drains can be used to remove excess water and provide an outlet for leached salts.

This unit is well suited to hay and pasture. It has few limitations. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Rotation grazing helps to maintain the quality of forage. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas.

The potential plant community on this unit is mainly basin wildrye, slender wheatgrass, willows, and cottonwoods. If the vegetation deteriorates, cottonwoods, willows, and big sagebrush and other shrubs increase. If the vegetation further deteriorates, Kentucky bluegrass and annual grasses and weeds invade. The potential plant community produces about 1,200 pounds of air-dry vegetation per acre in normal years. Production varies from 1,500 pounds in favorable years to 900 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIe-2, irrigated, and capability subclass VIe, dryland. It is in Lowland range site, 10- to 14-inch precipitation zone.

7—Baroid sandy loam. This deep, moderately well drained soil is on flood plains. It formed in alluvium. Slope ranges from 0 to 3 percent but is commonly about 2 percent. The vegetation in areas not cultivated is mainly grass, shrubs, and trees. Elevation is 3,950 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is light brownish gray sandy loam about 7 inches thick. The underlying material to a depth of 60 inches or more is pale brown loamy fine sand.

Included in this unit are small areas of Glenton and Las Animas Variant soils and a soil that is similar to this Baroid soil but has lenses of gravel and cobbles below a depth of 24 inches. The percentage of included soils varies from one area to another.

Permeability of this Baroid soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is high. A seasonal high water table fluctuates between depths of 48 and 72 inches in June through November. This soil is subject to occasional, brief periods of flooding in May through July.

Most areas of this unit are used for irrigated crops, mainly sugar beets and small grain. Among the other crops grown are hay and pasture. Some areas are used as rangeland and for wildlife habitat. Less than 10 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are impractical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are low available water capacity, low soil fertility, and the hazard of wind erosion. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Wind erosion can be reduced by keeping the soil rough and cloddy when it is not protected by vegetation. Drainage can be provided by using tile systems to intercept water from higher lying areas. The fluctuating water table may delay planting and harvesting.

If this unit is used for hay and pasture, the main limitation is the low available water capacity. Rotation grazing helps to maintain the quality of forage. Proper stocking rates, pasture rotation, and restricted grazing during wet periods help to keep the pasture in good condition and to protect the soil from erosion. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to soil needs as indicated by tests.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Because the soil in this unit is droughty, applications of irrigation water should be light and frequent. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly basin wildrye, needleandthread, slender wheatgrass, and cottonwood. If the vegetation deteriorates, cottonwood, silver buffaloberry, and wild rose increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production varies from 2,400 pounds in favorable years to 1,400 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIIs-4, irrigated, and capability subclass VIe, dryland. It is in Lowland range site, 5- to 9-inch precipitation zone.

8—Baroid-Las Animas Variant sandy loams. This map unit is on flood plains and bottom lands. Slope ranges from 0 to 3 percent but is commonly about 1 percent. The vegetation in areas not cultivated is mainly grass, shrubs, and trees. Elevation is 3,950 to 5,000 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 40 percent Baroid sandy loam and 35 percent Las Animas Variant sandy loam. The Baroid soil is in the higher lying areas, and the Las Animas Variant soil is in depressional areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Dobent and Glenton soils. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Baroid soil is deep and moderately well drained. It formed in alluvium. Typically, the surface layer is light brownish gray sandy loam about 7 inches thick. The underlying material to a depth of 60 inches or more is pale brown loamy fine sand.

Permeability of the Baroid soil is rapid. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is high. A seasonal high water table fluctuates between depths of 48 and 72 inches in June through November. This soil is subject to occasional, brief periods of flooding in May through July. The soil is moderately saline.

The Las Animas Variant soil is deep and somewhat poorly drained. It formed in alluvium. Typically, the surface layer is brown sandy loam about 2 inches thick. The underlying material to a depth of 60 inches or more is pale brown, stratified sandy loam.

Permeability of the Las Animas Variant soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is high. A seasonal high water table fluctuates between depths of 20 and 40 inches throughout the year. This soil is subject to occasional, brief periods of flooding in May through August. The soil is moderately saline.

Most areas of this unit are used for irrigated crops, mainly sugar beets and small grain. Among the other crops grown are hay and pasture. Some areas are used as rangeland and for wildlife habitat. Less than 10 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are wetness and salinity. Deep-rooted crops are suited to areas where the natural drainage is adequate or where a drainage system has been installed. Drainage can be provided by using tile systems to intercept water from higher lying areas. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Wind erosion can be reduced by keeping the soil rough and cloddy when it is not protected by vegetation. The fluctuating high water table may delay planting and harvesting.

If this unit is used for hay and pasture, the main limitations are wetness and excess salts. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

The concentration of salts and alkali in the surface layer limits the production of plants suitable for hay and pasture. Leaching of the salts from the surface layer is limited by the high water table. Drainage and irrigation water management reduce the concentration of salts. Salt-tolerant species are most suitable for planting.

Rotation grazing helps to maintain the quality of forage. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Because the Baroid soil is droughty, applications of irrigation water should be light and frequent. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion. If this unit is irrigated, salinity influences the choice of crops. Intensive management is required to reduce the salinity and maintain soil productivity.

The potential plant community on the Baroid soil is mainly basin wildrye, needleandthread, slender wheatgrass, and cottonwood. If the vegetation deteriorates, cottonwood, silver buffaloberry, and wildrye increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production varies from 2,400 pounds in favorable years to 1,400 pounds in unfavorable years.

The potential plant community on the Las Animas Variant soil is mainly alkali sacaton, Nuttall saltbush, inland saltgrass, and greasewood. If the vegetation deteriorates, inland saltgrass increases. If the vegetation further deteriorates, greasewood and annual grasses and weeds invade. The potential plant community produces about 2,400 pounds of air-dry vegetation per acre in normal years. Production varies from 2,600 pounds in favorable years to 1,800 pounds in unfavorable years.

Range recovery is slow because of the salt content of the soils in this unit. Among the limitations for seeding are the salinity of the soils and low precipitation.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIIws-10, irrigated, and capability subclass IVws, dryland. The Baroid soil is in Lowland range site, 5- to 9-inch precipitation zone, and the Las Animas Variant soil is in Saline Subirrigated range site, 5- to 9-inch precipitation zone.

9—Billycreek-Wetterhorn complex, 6 to 60 percent slopes. This map unit is on north- and east-facing mountainsides and canyon walls. The native vegetation is mainly trees. Elevation is 6,500 to 8,000 feet. The average annual precipitation is about 22 inches, the

average annual air temperature is about 37 degrees F, and the average frost-free period is 30 to 70 days.

This unit is 40 percent Billycreek loamy fine sand that has slopes of 6 to 60 percent and 35 percent Wetterhorn very stony loam that has slopes of 6 to 50 percent. These soils commonly are in long, narrow areas paralleling the bedrock formations. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Mulgon soils, Rock outcrop, Billycreek soils that have slopes of more than 60 percent, and Wetterhorn soils that have slopes of more than 50 percent. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Billycreek soil is moderately deep and somewhat excessively drained. It formed in colluvium derived dominantly from sandstone. Typically, the surface is covered with a mat of forest duff about 2 inches thick. The surface layer is very pale brown loamy fine sand about 8 inches thick. The subsoil is very pale brown loamy fine sand about 16 inches thick. Hard sandstone is at a depth of about 24 inches.

Permeability of the Billycreek soil is moderately rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Wetterhorn soil is moderately deep and well drained. It formed in colluvium derived dominantly from sandstone. Typically, the surface is covered with a mat of partially decomposed needles and duff about 2 inches thick. The surface layer is light grayish brown very stony loam about 2 inches thick. The upper 14 inches of the subsoil is pinkish gray flaggy very fine sandy loam, and the lower 11 inches is light brown flaggy clay. Hard sandstone is at a depth of about 27 inches.

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

This unit is used mainly for forest products. It is also used for wildlife habitat.

This unit is well suited to lodgepole pine and ponderosa pine. The site index for the unit is about 70. The main concerns in producing and harvesting timber are limited rooting depth and available water capacity and the hazard of erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Roads and landings can be protected from erosion by constructing water bars and by seeding cuts and fills. Proper design of road drainage systems and care in the placement of culverts also help to control erosion.

Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees.

This unit produces food and cover for elk and deer; for small mammals; and for grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIIe, dryland.

10—Burnette-Lucky Star association. This map unit is on fans, mountain foot slopes, and foothills. Slope is 2 to 20 percent. The native vegetation is mainly grass and shrubs. Elevation is 5,800 to 8,500 feet. The average annual precipitation is about 19 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 65 to 90 days.

This unit is 35 percent Burnette loam that has slopes of 2 to 20 percent and 25 percent Lucky Star very stony loam that has slopes of 6 to 15 percent. Also in this unit is about 15 percent Wallrock sandy loam that has slopes of 3 to 15 percent. The Burnette soil is in the steeper areas on fans, the Lucky Star soil is on mountain foot slopes, and the Wallrock soil is on concave foot slopes of mountains and foothills.

Included in this unit are small areas of Bachus, Clayburn, Irigul, and Woosley soils. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Burnette soil is deep and well drained. It formed in alluvium derived dominantly from sandstone and granite. Typically, the surface layer is dark grayish brown loam about 2 inches thick. The subsoil is brown clay loam about 34 inches thick. The substratum to a depth of 60 inches or more is light olive brown silty clay loam.

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

The Lucky Star soil is deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, about 10 percent of the surface is covered with stones. The surface layer is dark brown very stony loam about 2 inches thick. The subsurface layer is brown very cobbly fine sandy loam about 14 inches thick. The upper 16 inches of the subsoil is reddish brown very cobbly sandy clay loam, and the lower 28 inches is brown very cobbly sandy clay loam.

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

The Wallrock soil is deep and somewhat poorly drained. It formed in alluvium derived dominantly from sandstone, limestone, and granite. Typically, the surface layer is very dark grayish brown sandy loam about 10 inches thick. The subsoil is yellowish brown sandy clay loam about 12 inches thick. The substratum to a depth of 60 inches or more is yellowish brown sandy clay loam.

Permeability of the Wallrock soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. An apparent water table is at a depth of 24 to 48 inches in June through August.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Burnette and Lucky Star soils is mainly Columbia needlegrass, spike fescue, Idaho fescue, and big sagebrush. If the vegetation deteriorates, big sagebrush and rabbitbrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The potential plant community on the Wallrock soil is mainly Nebraska sedge, tufted hairgrass, willows, and boxelder. If the vegetation deteriorates, willows and forbs increase. If the vegetation further deteriorates, Kentucky bluegrass and annual grasses and weeds invade. The potential plant community produces about 3,800 pounds of air-dry vegetation per acre in normal years. Production varies from 4,200 pounds in favorable years to 3,000 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Burnette and Lucky Star soils are in capability subclass VIe, dryland, and in Loamy range site, 15- to 19-inch precipitation zone. The Wallrock soil is in capability subclass VIw, dryland, and in Subirrigated range site, 15- to 19-inch precipitation zone.

11—Chittum-Rock outcrop association. This map unit is on hogbacks and mountainsides. Slope is 2 to 25 percent. The native vegetation is mainly grass and shrubs. Elevation is 7,500 to 9,000 feet. The average annual precipitation is about 19 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 60 to 90 days.

This unit is 45 percent Chittum gravelly loam that has slopes of 2 to 25 percent and 20 percent Rock outcrop. Also in this unit is about 10 percent Bachus loam that has slopes of 2 to 15 percent. The Chittum soil is in the higher lying areas on hogbacks, Rock outcrop is in the gently sloping to sloping areas and occurs as ledges along drainageways, and the Bachus soil is in concave areas of mountainsides.

Included in this unit are small areas of Clayburn, Splitro, and Irigul soils. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Chittum soil is shallow and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is dark brown gravelly loam about 5 inches thick. The subsoil is yellowish red gravelly clay loam about 12 inches thick. Hard sandstone is at a depth of about 17 inches.

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

Rock outcrop is exposures of sandstone.

The Bachus soil is moderately deep and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is dark grayish brown loam about 8 inches thick. The subsoil is reddish gray loam about 14 inches thick. Sandstone is at a depth of about 22 inches.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Chittum soil is mainly Columbia needlegrass, Idaho fescue, spike fescue, and mountainmahogany. If the vegetation deteriorates, big sagebrush and black sagebrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 850 pounds of air-dry vegetation per acre in normal years. Production varies from 1,000 pounds in favorable years to 500 pounds in unfavorable years. Slope limits access by livestock and results in overgrazing of the less sloping areas.

The potential plant community on the Bachus soil is mainly Columbia needlegrass, spike fescue, Idaho fescue, and big sagebrush. If the vegetation deteriorates, big sagebrush and rabbitbrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Chittum soil is in capability subclass VIIe, dryland, and in Shallow Loamy range site, 15- to 19-inch precipitation zone. The Bachus soil is in capability subclass VIe, dryland, and in Loamy range site, 15- to 19-inch precipitation zone.

12—Clayburn-Bachus-Inchau association. This map unit is on mountainsides. Slope is 2 to 25 percent. The native vegetation is mainly grass and shrubs. Elevation is 7,500 to 9,000 feet. The average annual precipitation is about 19 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 60 to 90 days.

This unit is 35 percent Clayburn loam that has slopes of 2 to 20 percent, 30 percent Bachus loam that has slopes of 2 to 25 percent, and 15 percent Inchau loam that has slopes of 5 to 25 percent. The Clayburn and Inchau soils are on the lower part of the mountainsides, and the Bachus soil is on the upper part of the mountainsides.

Included in this unit are small areas of Chittum, Lucky Star, and Splitro soils. Included areas make up about 20 percent of the total acreage.

The Clayburn soil is deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is dark grayish brown loam about 18 inches thick. The upper 18 inches of the subsoil is dark brown clay loam, and the lower 24 inches is yellowish brown gravelly clay loam.

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

The Bachus soil is moderately deep and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is dark grayish brown loam about 8 inches thick. The subsoil is reddish gray loam about 14 inches thick. Hard sandstone is at a depth of about 22 inches.

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

The Inchau soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is brown loam about 6 inches thick. The subsoil is yellowish brown gravelly loam about 30 inches thick. The substratum is very pale brown gravelly loam about 3 inches thick. Shale is at a depth of about 39 inches.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on this unit is mainly Columbia needlegrass, spike fescue, Idaho fescue, and big sagebrush. If the vegetation deteriorates, big sagebrush and rabbitbrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIe, dryland, and in Loamy range site, 15- to 19-inch precipitation zone.

13—Clayburn-Wallrock association. This map unit is on mountainsides. Slope is 2 to 25 percent. The native vegetation is mainly grass, shrubs, and trees. Elevation is 6,500 to 8,500 feet. The average annual precipitation is about 19 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 60 to 90 days.

This unit is 40 percent Clayburn loam that has slopes of 2 to 25 percent and 20 percent Wallrock sandy loam that has slopes of 2 to 20 percent. Also in this unit is about 15 percent Burnette loam that has slopes of 2 to 20 percent. The Clayburn soil is on the higher part of mountainsides, the Wallrock soil is in concave areas on mountainsides, and the Burnette soil is on mid and lower parts of mountainsides.

Included in this unit are small areas of Bachus and Irigul soils and a soil that is moderately deep. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Clayburn soil is deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is dark grayish brown loam about 18 inches thick. The upper 18 inches of the subsoil is dark brown clay loam, and the lower 24 inches is yellowish brown gravelly clay loam.

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

The Wallrock soil is deep and somewhat poorly drained. It formed in mixed alluvium derived dominantly from sandstone and granite. Typically, the surface layer is very dark grayish brown sandy loam about 10 inches thick. The subsoil is yellowish brown sandy clay loam about 12 inches thick. The substratum to a depth of 60 inches or more is dark yellowish brown sandy clay loam.

Permeability of the Wallrock soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. An apparent water table is at a depth of 24 to 48 inches in June through August.

The Burnette soil is deep and well drained. It formed in alluvium derived dominantly from sandstone and granite. Typically, the surface layer is dark grayish brown loam about 2 inches thick. The subsoil is brown clay loam about 34 inches thick. The substratum to a depth of 60 inches or more is light olive brown silty clay loam.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Clayburn and Burnette soils is mainly Columbia needlegrass, spike fescue, Idaho fescue, and big sagebrush. If the vegetation deteriorates, big sagebrush and rabbitbrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The potential plant community on the Wallrock soil is mainly Nebraska sedge, tufted hairgrass, willows, and boxelder. If the vegetation deteriorates, willows and forbs increase. If the vegetation further deteriorates, Kentucky

bluegrass and annual weeds and grasses invade. The potential plant community produces about 3,800 pounds of air-dry vegetation per acre in normal years. Production varies from 4,200 pounds in favorable years to 3,000 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Clayburn and Burnette soils are in capability subclass VIe, dryland, and in Loamy range site, 15- to 19-inch precipitation zone. The Wallrock soil is in capability subclass VIw, dryland, and in Subirrigated range site, 15- to 19-inch precipitation zone.

14—Clifterson-Persayo association. This map unit is on alluvial terraces, fans, and hillsides. Slope is 1 to 45 percent. The native vegetation is mainly grass and shrubs. Elevation is 4,200 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 45 percent Clifterson gravelly sandy clay loam that has slopes of 2 to 30 percent and 25 percent Persayo clay loam that has slopes of 2 to 45 percent. Also in this unit is about 10 percent Lostwells sandy clay loam that has slopes of 1 to 10 percent. The Clifterson soil is on dissected terraces, the Persayo soil is on hillsides, and the Lostwells soil is on fans.

Included in this unit are small areas of Apron and Griffy soils and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Clifterson soil is deep and excessively drained. It formed in alluvium. Typically, the surface layer is pale brown gravelly sandy clay loam about 5 inches thick. The underlying material to a depth of 60 inches or more is very pale brown very gravelly loam.

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

The Persayo soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is light yellowish brown clay loam about 1 inch thick. The underlying material is pale brown clay loam about 12 inches thick. Variegated olive green, brown, and gray shale is at a depth of about 13 inches. In some areas the surface layer is gravelly clay loam. This soil is moderately saline throughout.

Permeability of the Persayo soil is moderately slow. Available water capacity is low. Effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

The Lostwells soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray sandy clay loam about 3 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray sandy clay loam stratified with lenses of sandy loam and clay loam.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Clifterson soil is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 200 pounds of air-dry vegetation per acre in normal years. Production varies from 300 pounds in favorable years to 100 pounds in unfavorable years.

The potential plant community on the Persayo soil is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, birdfoot sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years.

The potential plant community on the Lostwells soil is mainly bluebunch wheatgrass, rhizomatous wheatgrasses, needleandthread, and big sagebrush. If the vegetation deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

The Clifterson soil is in capability subclass VIe, dryland, and in Gravelly range site, 5- to 9-inch precipitation zone; the Persayo soil is in capability subclass VIIe, dryland, and in Saline Upland range site, 5- to 9-inch precipitation zone; and the Lostwells soil is in capability subclass VIe, dryland, and in Loamy range site, 5- to 9-inch precipitation zone.

15—Coutis-Greenman association. This map unit is on mountain foot slopes and hogbacks and along narrow canyon walls. Slope is 2 to 45 percent. The native vegetation is mainly grass, shrubs, and trees. Elevation is 6,000 to 8,500 feet. The average annual precipitation is about 19 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 60 to 90 days.

This unit is 40 percent Coutis fine sandy loam that has slopes of 2 to 45 percent and 35 percent Greenman fine sandy loam that has slopes of 2 to 25 percent. Also in

this unit is about 10 percent Chittum gravelly loam that has slopes of 2 to 25 percent. The Coutis soil is on mountain foot slopes and along narrow canyon walls, the Greenman soil is on hogbacks, and the Chittum soil is on ridges of hogbacks near areas of Rock outcrop.

Included in this unit are small areas of Bachus, Splitro, and Whaley soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Coutis soil is deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is dark grayish brown fine sandy loam about 25 inches thick. The underlying material to a depth of 60 inches or more is pale brown fine sandy loam.

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

The Greenman soil is moderately deep and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is dark grayish brown fine sandy loam about 8 inches thick. The subsoil is brown fine sandy loam about 16 inches thick. The substratum is pale brown fine sandy loam about 10 inches thick. Hard sandstone is at a depth of about 34 inches.

Permeability of the Greenman soil is moderately rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Chittum soil is shallow and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is dark brown gravelly loam about 5 inches thick. The upper 6 inches of the subsoil is reddish brown gravelly loam, and the lower 6 inches is yellowish red gravelly clay loam. Hard sandstone is at a depth of about 17 inches.

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

This unit is used mainly for livestock grazing (fig. 3). It is also used for wildlife habitat.

The potential plant community on the Coutis and Greenman soils is mainly Columbia needlegrass, mountain brome, forbs, and big sagebrush. If the vegetation deteriorates, big sagebrush increases. If the vegetation further deteriorates, annual grasses and shrubs invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The potential plant community on the Chittum soil is mainly Columbia needlegrass, Idaho fescue, spike fescue, and mountainmahogany. If the vegetation deteriorates, big sagebrush and black sagebrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 850 pounds of air-dry vegetation per acre in normal years. Production varies from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Coutis and Greenman soils are in capability subclass VIe, dryland, and in Sandy range site, 15- to 19-inch precipitation zone. The Chittum soil is in capability subclass VIIe, dryland, and in Shallow Loamy range site, 15- to 19-inch precipitation zone.

16—Dobent loam. This deep, somewhat poorly drained soil is on flood plains. It formed in alluvium. Slope ranges from 0 to 3 percent but is commonly about 1 percent. The vegetation in areas not cultivated is mainly grass, shrubs, and trees. Elevation is 3,950 to 5,200 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is light brownish gray loam about 7 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray loam stratified with lenses of sandy loam, very fine sandy loam, and silty clay loam.

Included in this unit are small areas of Baroid, Glenton, and Las Animas Variant soils. Also included are small areas of Youngston clay loam, moderately wet, 0 to 3 percent slopes. The percentage of included soils varies from one area to another.

Permeability of this Dobent soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. A seasonal high water table fluctuates between depths of 18 and 40 inches in June through November. This soil is subject to occasional, brief periods of flooding in February through August. The soil is moderately saline.

Most areas of this unit are used for irrigated crops, mainly small grain. Among the other crops grown are hay and pasture. Some areas are used as rangeland and for wildlife habitat. Less than 5 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are wetness and salinity. Deep-rooted crops are suited to areas where the natural drainage is adequate or where a drainage system has been installed. Drainage can be provided by using tile systems to intercept water from higher lying areas. Intensive management is required to reduce the salinity and maintain soil productivity. Returning all crop residue to

Figure 3.—An area of Coutis-Greenman association is in the foreground. Billycreek-Wetterhorn complex, 6 to 60 percent slopes, is in the background.

the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

If this unit is used for hay and pasture, the main limitations are wetness and salinity. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

The concentration of salts and alkali in the surface layer limits the production of plants suitable for hay and pasture. Leaching of the salts from the surface layer is limited by the high water table. Drainage and irrigation water management reduce the concentration of salts. Salt-tolerant species are most suitable for planting.

Rotation grazing helps to maintain the quality of forage. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the

crop needs. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas.

The potential plant community on this unit is mainly alkali sacaton, Nuttall alkaligrass, inland saltgrass, and greasewood. If the vegetation deteriorates, inland saltgrass increases. If the vegetation further deteriorates, greasewood and annual grasses and weeds invade. The potential plant community produces about 2,400 pounds of air-dry vegetation per acre in normal years. Production varies from 2,600 pounds in favorable years to 1,800 pounds in unfavorable years. Range recovery is slow because of the salinity of the soil. Among the limitations for seeding are the salinity of the soil and low precipitation.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIIws-11, irrigated, and capability subclass IVws, dryland. It is in Saline Subirrigated range site, 5- to 9-inch precipitation zone.

17—Finnerty silty clay. This deep, well drained soil is on fans and flood plains. It formed in alluvium. Slope ranges from 0 to 3 percent but is commonly about 1 percent. The vegetation in areas not cultivated is mainly grass and shrubs. Elevation is 3,950 to 5,200 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is grayish brown silty clay about 9 inches thick. The underlying material to a depth of 60 inches or more is brown clay.

Included in this unit are small areas of Stutzman and Youngston soils. The percentage of included soils varies from one area to another.

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

Most areas of this unit are used for irrigated crops, mainly sugar beets, corn, and small grain. Among the other crops grown are hay and pasture. The unit is also used as rangeland and for wildlife habitat. Less than 15 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are very slow permeability and slow water intake rate. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Tillage should be kept to a minimum.

If this unit is used for hay and pasture, the main limitations are very slow permeability, slow water intake rate, and wetness because of ponding. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow and border irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Because of the very slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Intensive management is required to reduce the salinity of the soil and maintain soil productivity.

The potential plant community on this unit is mainly alkali sacaton, basin wildrye, western wheatgrass, and greasewood. If the vegetation deteriorates, greasewood and inland saltgrass increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 525 pounds of air-dry vegetation per acre in normal years. Production varies from 800 pounds in favorable years to 350 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IVs-8, irrigated, and capability subclass VIs, dryland. It is in Saline Lowland range site, 5- to 9-inch precipitation zone.

18—Finnerty silty clay, wet. This deep, somewhat poorly drained soil is on fans and flood plains. It formed in alluvium. Slope ranges from 0 to 3 percent but is commonly about 1 percent. The vegetation in areas not cultivated is mainly grass, shrubs, and trees. Elevation is 3,950 to 5,200 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is grayish brown silty clay about 9 inches thick. The underlying material to a depth of 60 inches or more is brown clay.

Included in this unit are small areas of Dobent, Lostwells, Stutzman, and Youngston soils. The percentage of included soils varies from one area to another.

Permeability of this Finnerty soil is very slow. Available water capacity is high. Effective rooting depth is 60

inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate. A seasonal high water table fluctuates between depths of 18 and 40 inches in June through November. This soil is highly saline.

Most areas of this unit are used for irrigated crops, mainly sugar beets and small grain. Among the other crops grown are hay and pasture. Some areas are used as rangeland and for wildlife habitat. Less than 15 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are wetness, very slow permeability, and salinity. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Drainage can be provided by using tile systems to intercept water from higher lying areas. The content of toxic salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil.

If this unit is used for hay and pasture, the main limitations are wetness, very slow permeability, and salinity. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

The concentration of salts and alkali in the surface layer limits the production of plants suitable for hay and pasture. Leaching of the salts from the surface layer is limited by the high water table. Drainage and irrigation water management reduce the concentration of salts. Salt-tolerant species are most suitable for planting.

Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow and border irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Because of the very slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Intensive management is required to reduce the salinity of the soil and maintain soil productivity.

The potential plant community on this unit is mainly alkali sacaton, Nuttall alkaligrass, inland saltgrass, and greasewood. If the vegetation deteriorates, greasewood and inland saltgrass increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 2,400 pounds of air-dry vegetation per acre in normal years. Production varies from 2,600 pounds in favorable years to 1,800 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IVws-10, irrigated, and capability subclass Vlws, dryland. It is in Saline Subirrigated range site, 5- to 9-inch precipitation zone.

19—Fluvaquents. These deep, poorly drained soils are in filled channels in depressional areas and in oxbows on flood plains. They formed in alluvium. Slope ranges from 0 to 2 percent but is commonly about 1 percent. The native vegetation is mainly sedges and willows. Elevation is 3,950 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

The soils in this unit are fine textured to medium textured and are slightly saline to moderately saline. Texture and other properties vary within short distances. Some areas of the soils are underlain by gravel. A seasonal high water table is at or near the surface in May through October. The properties of these soils are too variable to interpret.

Included in this unit are small areas of Dobent and Lostwells soils. The percentage of included soils varies from one area to another.

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

The potential plant community on this unit is mainly Nebraska sedge, water sedge, beaked sedge, and willows. If the vegetation deteriorates, golden sedge and willows increase. If the vegetation further deteriorates, foxtail barley, dock, common milkweed, and stickseed invade. The potential plant community produces about 4,500 pounds of air-dry vegetation per acre in normal years. Production varies from 6,000 pounds in favorable years to 3,000 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, waterfowl, and other birds.

This map unit is in capability subclass Vlw, dryland. It is in Wetland range site, 5- to 9-inch precipitation zone.

20—Fluvents. These deep, well drained and poorly drained soils are on flood plains. They formed in alluvium. Slope ranges from 0 to 3 percent but is commonly about 1 percent. The native vegetation is mainly grass, shrubs, and trees. Elevation is 3,950 to 5,500 feet. The average annual precipitation is about 8

inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

The texture and other properties of these soils vary over short distances. Depth to gravel also varies. A seasonal high water table fluctuates between the surface and a depth of 60 inches throughout the year. These soils are subject to brief periods of flooding in February through July. The properties of these soils are too variable to interpret.

Included in this unit are small areas of Baroid, Dobent, Glenton, and Las Animas Variant soils.

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

The potential plant community on this unit is mainly basin wildrye, needleandthread, slender wheatgrass, and cottonwood. If the vegetation deteriorates, cottonwood, silver buffaloberry, and wild rose increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production varies from 2,400 pounds in favorable years to 1,400 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIc, dryland. It is in Lowland range site, 5- to 9-inch precipitation zone.

21—Forkwood-Haverdad association. This map unit is on fans, in valleys, and on flood plains. Slope is 1 to 10 percent. The native vegetation is mainly grass, shrubs, and trees. Elevation is 4,250 to 5,500 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 40 percent Forkwood very fine sandy loam that has slopes of 3 to 10 percent and 20 percent Haverdad loam that has slopes of 1 to 3 percent. Also in this unit is about 15 percent Arvada loam that has slopes of 3 to 8 percent. The Forkwood soil is on fans and valley floors, the Haverdad soil is on flood plains, and the Arvada soil is on fans.

Included in this unit are small areas of Kishona soils and a soil that is similar to the Haverdad soil but has a surface layer of sandy loam. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Forkwood soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray very fine sandy loam about 2 inches thick. The subsoil is brown clay loam about 17 inches thick. The substratum to a depth of 60 inches or more is light gray loam.

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

The Haverdad soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light yellowish brown loam about 6 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown loam stratified with lenses of sandy loam, fine sandy loam, and silty clay loam.

Permeability of the Haverdad soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. This soil is subject to rare periods of flooding. It is moderately saline.

The Arvada soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray loam about 3 inches thick. The subsoil is pale brown, very strongly alkaline clay loam about 14 inches thick. The substratum to a depth of 60 inches or more is very pale brown clay loam.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Forkwood soil is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama, threadleaf sedge, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Haverdad soil is mainly alkali sacaton, basin wildrye, Canada wildrye, and greasewood. If the vegetation deteriorates, greasewood and inland saltgrass increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 600 pounds in unfavorable years. The main limitation for seeding is the moderate content of salt in the soil.

The potential plant community on the Arvada soil is mainly gardner saltbush, bottlebrush squirreltail, bud sagebrush, and rhizomatous wheatgrasses. If the vegetation deteriorates, gardner saltbush and sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 450 pounds of air-dry vegetation per acre in normal years. Production varies from 650 pounds in favorable years to 275 pounds in unfavorable years.

Range recovery on this unit is slow because of the content of salt in the Haverdad soil. The unit is better suited to grazing by sheep than by cattle because of the high percentage of gardner saltbush present. Among the

limitations for seeding are the salinity of the Haverdad soil and low precipitation.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Forkwood soil is in capability subclass VIe, dryland, and in Loamy range site, 10- to 14-inch precipitation zone. The Haverdad soil is in capability subclass VIe, dryland, and in Saline Lowland range site, 10- to 14-inch precipitation zone. The Arvada soil is in capability subclass VIIs, dryland, and in Saline Upland range site, 10- to 14-inch precipitation zone.

22—Forkwood-Kishona association. This map unit is on fans, in valleys, and on flood plains. Slope is 1 to 15 percent. The native vegetation is mainly grass and shrubs. Elevation is 4,500 to 5,500 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 45 percent Forkwood very fine sandy loam that has slopes of 3 to 10 percent and 25 percent Kishona loam that has slopes of 1 to 15 percent. Also in this unit is about 15 percent Haverdad loam that has slopes of 1 to 3 percent. The Forkwood soil is on fans and valley floors, the Kishona soil is on fans, and the Haverdad soil is on flood plains of small drainageways.

Included in this unit are small areas of Shingle soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Forkwood soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray very fine sandy loam about 2 inches thick. The subsoil is brown clay loam about 17 inches thick. The substratum to a depth of 60 inches or more is light gray loam.

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

The Kishona soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray loam about 4 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown loam.

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

The Haverdad soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light yellowish brown loam about 6 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown loam stratified with lenses of sandy loam, fine sandy loam, and silty clay loam.

Permeability of the Haverdad soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. This soil is subject to rare periods of flooding. It is moderately saline.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Forkwood and Kishona soils is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama, threadleaf sedge, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Haverdad soil is mainly alkali sacaton, basin wildrye, Canada wildrye, and greasewood. If the vegetation deteriorates, greasewood and inland saltgrass increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 900 pounds of air-dry vegetation per acre in normal years. Production varies from 1,200 pounds in favorable years to 600 pounds in unfavorable years. Range recovery is slow because of the salt content of this soil.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Forkwood and Kishona soils are in capability subclass VIe, dryland, and in Loamy range site, 10- to 14-inch precipitation zone. The Haverdad soil is in capability subclass VIe, dryland, and in Lowland range site, 10- to 14-inch precipitation zone.

23—Fruita-Neiber association. This map unit is on fans and uplands. Slope is 1 to 30 percent. The native vegetation is mainly grass and shrubs. Elevation is 4,200 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 30 percent Fruita fine sandy loam that has slopes of 1 to 10 percent and 30 percent Neiber fine sandy loam that has slopes of 3 to 30 percent. Also in this unit is about 15 percent Muff fine sandy loam that has slopes of 3 to 30 percent. The Fruita soil is on fans, the Neiber soil is on back slopes and foot slopes of uplands, and the Muff soil is on ridges and hillsides of uplands.

Included in this unit are small areas of Absted, Persayo, and Wallson soils and Rock outcrop. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Fruita soil is deep and well drained. It formed in alluvium. Typically, the surface layer is pale brown fine sandy loam about 4 inches thick. The subsoil is pale brown clay loam about 20 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown sandy clay loam.

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

The Neiber soil is moderately deep and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is pale brown fine sandy loam about 8 inches thick. The subsoil is yellowish brown sandy clay loam about 7 inches thick. The substratum is light gray sandy clay loam about 6 inches thick. Soft sandstone is at a depth of about 21 inches.

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

The Muff soil is moderately deep and well drained. It formed in material derived dominantly from sandy shale. Typically, the surface layer is pale brown fine sandy loam about 5 inches thick. The subsoil is light yellowish brown, very strongly alkaline sandy clay loam about 14 inches thick. The substratum is light brownish gray sandy clay loam about 11 inches thick. Sandy shale is at a depth of about 30 inches.

Permeability of the Muff soil is slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high. The soil is moderately saline.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Fruita and Neiber soils is mainly bluebunch wheatgrass, rhizomatous wheatgrasses, needleandthread, and big sagebrush. If the vegetation deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 365 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

The potential plant community on the Muff soil is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years.

Range recovery is slow because of the salt content of the Muff soil in this unit. The unit is better suited to grazing by sheep than by cattle because of the high percentage of gardner saltbush present. Among the limitations for seeding are the salinity of the Muff soil and low precipitation.

The Fruita and Neiber soils are in capability subclass VIe, dryland, and in Loamy range site, 5- to 9-inch precipitation zone. The Muff soil is in capability subclass VIe, dryland, and in Saline Upland range site, 5- to 9-inch precipitation zone.

24—Garland clay loam. This deep, well drained soil is on fans and terraces. It formed in alluvium. Slope ranges from 0 to 3 percent but is commonly about 2 percent. The vegetation in areas not cultivated is mainly grass and shrubs. Elevation is 3,950 to 5,200 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is brown clay loam about 8 inches thick. The subsoil is brown sandy clay loam about 14 inches thick. The upper 6 inches of the substratum is very pale brown very gravelly clay loam, and the lower part to a depth of 60 inches or more is light brownish gray very gravelly sand.

Included in this unit are small areas of Clifterson, Griffy, Lostwells, and Wallson soils.

Permeability of this Garland soil is moderate to a depth of 22 inches and rapid below this depth. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

Most areas of this unit are used for irrigated crops, mainly sugar beets, corn, and small grain. Among the other crops grown are hay and pasture. Some areas are used for livestock grazing and wildlife habitat. Less than 10 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

This unit is well suited to cultivated crops. It has few limitations. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Tillage should be kept to a minimum.

This unit is well suited to hay and pasture. It has few limitations. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water

should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas.

The potential plant community on this unit is mainly bluebunch wheatgrass, rhizomatous wheatgrasses, needleandthread, and big sagebrush. If the vegetation deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 365 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit is well suited to homesite development. It has few limitations. Removal of pebbles and cobbles in disturbed areas is needed for best results when landscaping, particularly in areas used for lawns.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIe-2, irrigated, and capability subclass VIe, dryland. It is in Loamy range site, 5- to 9-inch precipitation zone.

25—Glenton sandy loam, moderately wet. This deep, moderately well drained soil is on flood plains. It formed in alluvium. Slope ranges from 0 to 3 percent but is commonly about 1 percent. The vegetation in areas not cultivated is mainly grass, shrubs, and trees. Elevation is 3,950 to 5,200 feet. The average annual precipitation is about 8 inches, the average annual air temperature about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is grayish brown sandy loam about 7 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray fine sandy loam stratified with lenses of loam, fine sand, and sandy loam.

Included in this unit are small areas of Baroid, Dobent, Las Animas Variant, and Lostwells soils. The percentage of included soils varies from one area to another.

Permeability of this Glenton soil is moderately rapid. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is high. A seasonal high water table fluctuates between depths of 48 and 72 inches in May through November. This soil is subject to occasional, brief periods of flooding in February through June.

Most areas of this unit are used for irrigated crops, mainly sugar beets, small grain, and corn. Among the other crops grown are hay and pasture. Some areas are used as rangeland and for wildlife habitat. Less than 10 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitation is a fluctuating high water table. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth.

This unit is well suited to hay and pasture. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth of plants. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly basin wildrye, needleandthread, slender wheatgrass, and cottonwood. If the vegetation deteriorates, cottonwood, silver buffaloberry, and wild rose increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production varies from 2,400 pounds in favorable years to 1,400 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIe-5, irrigated, and capability subclass VIe, dryland. It is in Lowland range site, 5- to 9-inch precipitation zone.

26—Glenton-Baroid sandy loams, wet. This map unit is on flood plains. Slope ranges from 0 to 3 percent but is commonly about 1 percent. The vegetation in areas not cultivated is mainly grass, shrubs, and trees. Elevation is 3,950 to 5,200 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 35 percent Glenton sandy loam and 35 percent Baroid sandy loam. The Glenton soil is in the lower lying areas, and the Baroid soil is in the higher

lying areas. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Dobent, Las Animas Variant, Lostwells, and Youngston soils. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

The Glenton soil is deep and somewhat poorly drained. It formed in alluvium. Typically, the surface layer is grayish brown sandy loam about 7 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray fine sandy loam stratified with lenses of loam, fine sand, and sandy loam.

Permeability of the Glenton soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is high. A seasonal high water table fluctuates between depths of 20 and 40 inches in June through November. This soil becomes wet because the water table has been raised as a result of irrigation. The soil is subject to occasional, brief periods of flooding in February through June. It is slightly saline to moderately saline in the upper part of the root zone.

The Baroid soil is deep and somewhat poorly drained. It formed in alluvium. Typically, the surface layer is light brownish gray sandy loam about 7 inches thick. The underlying material to a depth of 60 inches or more is pale brown loamy fine sand.

Permeability of the Baroid soil is rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is high. A seasonal high water table fluctuates between depths of 20 and 40 inches in June through November. This soil becomes wet because the water table has been raised as a result of irrigation. The soil is subject to occasional, brief periods of flooding in February through June. It is slightly saline to moderately saline in the upper part of the root zone.

Most areas of this unit are used for irrigated crops, mainly sugar beets and small grain. Among the other crops grown are corn, hay, and pasture. Some areas are used for livestock grazing and wildlife habitat. Less than 20 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are the fluctuating high water table and salinity. Most climatically adapted crops can be grown if the unit is protected from flooding late in spring and early in summer and if artificial drainage is provided. Maintaining crop residue on or near the surface reduces runoff, reduces soil blowing, and helps to maintain soil tilth and organic matter content. Wind erosion can be reduced by keeping the soil rough and cloddy when it is not protected by vegetation. The fluctuating high water table may delay planting and harvesting.

If this unit is used for hay and pasture, the main limitations are wetness and salinity. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

The concentration of salts and alkali in the surface layer limits the production of plants suitable for hay and pasture. Leaching of the salts from the surface layer is limited by the high water table. Drainage and irrigation water management reduce the concentration of salts. Salt-tolerant species are most suitable for planting.

Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table. Drainage may also be needed. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion. Intensive management is required to reduce the salinity of the soils and maintain soil productivity.

Tile drainage can be used to lower the water table if a suitable outlet is available. Tile or open drains can be used to remove excess water and provide an outlet for leached salts. The content of toxic salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil. Fertilizer should be applied according to needs as indicated by soil tests.

The potential plant community on this unit is mainly alkali sacaton, Nuttall alkaligrass, inland saltgrass, and greasewood. If the vegetation deteriorates, inland saltgrass and greasewood increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 2,400 pounds of air-dry vegetation per acre in normal years. Production varies from 2,600 pounds in favorable years to 1,800 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIIws-2, irrigated, and capability subclass IVws, dryland. It is in Saline Lowland range site, 5- to 9-inch precipitation zone.

27—Granile-Tine association. This map unit is on fans. Slope is 2 to 35 percent. The native vegetation on the Granile soil is trees, and the native vegetation on the Tine soil is grass and shrubs. Elevation is 6,500 to 9,000 feet. The average annual precipitation is about 20 inches, the average annual air temperature is about 36 degrees F, and the average frost-free period is 40 to 70 days.

This unit is 50 percent Granile very stony sandy loam that has slopes of 2 to 35 percent and 20 percent Tine extremely stony sandy loam that has slopes of 2 to 30 percent. The Granile soil is on old stabilized fans and the Tine soil is on more recent fans.

Included in this unit are small areas of Nathrop soils, deep soils, and gravel bars. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

The Granile soil is deep and well drained. It formed in alluvium derived dominantly from quartzitic rock. Typically, the surface is covered with a mat of forest duff about 1 inch thick. The surface layer is brown very stony fine sandy loam about 3 inches thick. The subsurface layer is very pale brown very cobbly fine sandy loam about 17 inches thick. The subsoil is brown very cobbly clay loam about 20 inches thick. The substratum to a depth of 60 inches or more is light brownish gray very cobbly sandy loam. From 1 to 3 percent of the surface is covered with stones.

Permeability of the Granile soil is moderate to a depth of 40 inches and rapid below this depth. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight.

The Tine soil is deep and somewhat excessively drained. It formed in alluvium. Typically, the surface is covered with a mat of grass litter about 1 inch thick. The surface layer is dark grayish brown extremely stony sandy loam about 12 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray extremely cobbly sand. From 3 to 15 percent of the surface is covered with stones.

Permeability of the Tine soil is very rapid. Available water capacity is very low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is slight.

The Granile soil is used mainly for forest products. It is also used for wildlife habitat. The Tine soil is used mainly for livestock grazing. It is also used for wildlife habitat.

The Granile soil is suited to the production of lodgepole pine. The site index for lodgepole pine is about 50. Conventional methods of harvesting timber can be used. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion.

The low available water capacity generally influences seedling survival in areas where understory plants are numerous. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees.

The potential plant community on the Tine soil is mainly bluebunch wheatgrass, Idaho fescue, spike fescue, bitterbrush, and big sagebrush. If the vegetation deteriorates, big sagebrush, rabbitbrush, and forbs increase. If the vegetation further deteriorates, low rabbitbrush and annual grasses and weeds invade. The potential plant community produces about 2,000 pounds of air-dry vegetation per acre in normal years. Production varies from 2,400 pounds in favorable years to 1,200 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Granile soil is in capability subclass VIe. The Tine soil is in capability subclass VIe, dryland, and in Coarse Upland range site, 20+ inch precipitation zone.

28—Greenman-Splitro association. This map unit is on hogbacks and ridges and along narrow canyon walls. Slope is 2 to 25 percent. The native vegetation is mainly grass and shrubs. Elevation is 6,500 to 8,500 feet. The average annual precipitation is about 19 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 60 to 90 days.

This unit is 40 percent Greenman fine sandy loam that has slopes of 2 to 25 percent and 25 percent Splitro fine sandy loam that has slopes of 6 to 25 percent. Also in this unit is about 10 percent Coutis fine sandy loam that has slopes of 2 to 15 percent. The Greenman soil is on dip slopes of hogbacks; the Splitro soil is on ridges and the upper part of dip slopes of hogbacks, adjacent to exposures of bedrock; and the Coutis soil is along drainageways along narrow canyon walls.

Included in this unit are small areas of Whaley and Woosley soils and Rock outcrop. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Greenman soil is moderately deep and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is dark grayish brown fine sandy loam about 8 inches thick. The subsoil is brown fine sandy loam about 16 inches thick. The substratum is pale brown fine sandy loam about 10 inches thick. Hard sandstone is at a depth of about 34 inches.

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

The Splitro soil is shallow and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The subsoil is brown fine sandy loam about 11 inches thick. Hard sandstone is at a depth of about 18 inches.

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

The Coutis soil is very deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the surface layer is dark grayish brown fine sandy loam about 25 inches thick. The underlying material to a depth of 60 inches or more is pale brown fine sandy loam.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Greenman and Coutis soils is mainly Columbia needlegrass and mountain brome. If the vegetation deteriorates, big sagebrush increases. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The potential plant community on the Splitro soil is mainly Columbia needlegrass, Idaho fescue, mountain brome, and big sagebrush. If the vegetation deteriorates, big sagebrush and Sandberg bluegrass increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 850 pounds of air-dry vegetation per acre in normal years. Production varies from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Greenman and Coutis soils are in capability subclass VIe, dryland, and in Sandy range site, 15- to 19-inch precipitation zone. The Splitro soil is in capability subclass VIIe, dryland, and in Shallow Sandy range site, 15- to 19-inch precipitation zone.

29—Greybull-Persayo clay loams, 3 to 10 percent slopes. This map unit is on uplands. The native vegetation is mainly grass and shrubs. Elevation is about 3,950 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 40 percent Greybull clay loam and 40 percent Persayo clay loam. The Greybull soil is on the lower part of slopes, and the Persayo soil is on the upper part of slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Lostwells soils and small areas of Greybull and Persayo clay loams that have slopes of 1 to 3 percent. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Greybull soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is olive clay loam about 7 inches thick. The underlying material is pale olive clay loam about 16 inches thick. Shale is at a depth of about 23 inches.

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

The Persayo soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is pale brown clay loam about 7 inches thick. The underlying material is pale olive clay loam about 6 inches thick. Variegated olive green, brown, and gray shale is at a depth of about 13 inches.

Permeability of the Persayo soil is moderately slow. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The hazard of wind erosion is moderate. The soil is moderately saline.

Most areas of this unit are used for irrigated crops, mainly small grain and hay and pasture. Some areas are used as rangeland and for wildlife habitat. Less than 25 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are depth to bedrock and slope. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Crusting of the surface and compaction of the soil can also be reduced by returning crop residue to the soil and by using minimum tillage.

If this unit is used for hay and pasture, the main limitation is depth to bedrock. All adapted pasture plants can be grown, but bunch-type species planted alone generally are not suitable because of the hazard of erosion. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, contour ditch, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. If furrow irrigation systems are used, runs should be on the contour or across the slope. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, birdfoot sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years.

Range recovery is slow on this unit because of the salt content of the Persayo soil. This unit is better suited to grazing by sheep than by cattle because of the high percentage of gardner saltbush present. Among the limitations for seeding are the salinity of the Persayo soil and low precipitation.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit VIe-1, irrigated, and capability subclass VIe, dryland. It is in Saline Upland range site, 5- to 9-inch precipitation zone.

30—Greybull-Persayo association. This map unit is on uplands. Slope is 1 to 40 percent. The native vegetation is mainly grass and shrubs. Elevation is 4,000 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 40 percent Greybull clay loam that has slopes of 1 to 30 percent and 30 percent Persayo clay loam that has slopes of 1 to 40 percent. The Greybull soil is on the hillsides, and the Persayo soil is on the tops of hills and ridges.

Included in this unit are small areas of Lostwells and Muff soils and Rock outcrop. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

The Greybull soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is olive clay loam about 4 inches thick. The underlying material is pale olive clay loam about 19 inches thick. Shale is at a depth of about 23 inches.

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

The Persayo soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is light yellowish brown clay loam about 1 inch thick. The underlying material is pale brown clay loam about 12 inches thick. Variegated olive green, brown, and gray shale is at a depth of about 13 inches.

Permeability of the Persayo soil is moderately slow. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is high. The soil is moderately saline.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on this unit is mainly gardner saltbush, Indian ricegrass, and bottlebrush squirreltail. If the vegetation deteriorates, gardner saltbush, sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years.

Range recovery is slow on this unit because of the salt content of the Persayo soil. This unit is better suited to grazing by sheep than by cattle because of the high percentage of gardner saltbush present. Among the limitations for seeding are the salinity of the Persayo soil and low precipitation. Uniform distribution of grazing is difficult to achieve on this unit because of the steepness of slope or the lack of permanent water developments, or both.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

The Greybull soil is in capability subclass VIe, dryland, and in Saline Upland range site, 5- to 9-inch precipitation zone. The Persayo soil is in capability subclass VIIe, dryland, and in Saline Upland range site, 5- to 9-inch precipitation zone.

31—Griffy sandy loam, 1 to 10 percent slopes. This deep, well drained soil is on fans and terraces. It formed in alluvium. The native vegetation is mainly grass and shrubs. Elevation is 4,000 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is light brownish gray sandy loam about 3 inches thick. The subsoil is brown sandy clay loam about 11 inches thick. The substratum to a depth of 60 inches or more is very pale brown sandy loam.

Included in this unit are small areas of Neiber, Persayo, and Wallson soils. The percentage of included soils varies from one area to another.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat. Most climatically adapted crops could be grown if a dependable supply of water for irrigation were made available.

The potential plant community on this unit is mainly needleandthread, rhizomatous wheatgrasses, Indian ricegrass, and big sagebrush. If the vegetation deteriorates, blue grama and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 375 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIe, dryland. It is in Sandy range site, 5- to 9-inch precipitation zone.

32—Griffy clay loam, 0 to 3 percent slopes. This deep, well drained soil is on fans and terraces. It formed in alluvium. Slope ranges from 0 to 3 percent but is commonly about 2 percent. The vegetation in areas not cultivated is mainly grass and shrubs. Elevation is 4,000 to 5,000 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is light brownish gray clay loam about 8 inches thick. The subsoil is pale brown sandy clay loam about 6 inches thick. The substratum to a depth of 60 inches or more is very pale brown sandy loam. In some areas the surface layer is sandy loam.

Included in this unit are small areas of Apron and Wallson soils.

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

Most areas of this unit are used for irrigated crops, mainly sugar beets, corn, and small grain. Among the other crops grown are hay and pasture. Some areas are used as rangeland and for wildlife habitat. Less than 10 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

This unit is well suited to cultivated crops. It has few limitations. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry.

This unit is well suited to hay and pasture. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas.

The potential plant community on this unit is mainly bluebunch wheatgrass, rhizomatous wheatgrasses, needleandthread, and big sagebrush. If the vegetation deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 365 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIe-2, irrigated, and capability subclass VIe, dryland. It is in Loamy range site, 5- to 9-inch precipitation zone.

33—Hoot-Rock outcrop complex, 3 to 45 percent slopes. This map unit is on hills, hogbacks, ridges, and escarpments. The native vegetation is mainly grass and shrubs. Elevation is 4,300 to 5,000 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 50 percent Hoot fine sandy loam that has slopes of 3 to 30 percent and 30 percent Rock outcrop. Also in this unit is about 10 percent Persayo clay loam that has slopes of 3 to 40 percent. The Hoot and Persayo soils are on hogback dip slopes and on hillsides, and Rock outcrop is on the tops of hills and ridges and on escarpments. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Lostwells soils and a soil that is similar to the Persayo soil but is sandy

loam. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Hoot soil is shallow and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is pale brown fine sandy loam about 5 inches thick. The subsoil is light brown very channery sandy clay loam about 7 inches thick. The substratum is light yellowish brown very channery sandy loam about 4 inches thick. Hard sandstone is at a depth of about 16 inches.

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

Rock outcrop is exposures of sandstone and shale.

The Persayo soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is light yellowish brown clay loam about 1 inch thick. The underlying material is pale brown clay loam about 12 inches thick. Variegated olive green, brown, and gray shale is at a depth of about 13 inches.

Permeability of the Persayo soil is moderately slow. Available water capacity is low. Effective rooting depth is 4 to 8 inches. Runoff is rapid, and the hazard of water erosion is high. The soil is moderately saline.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Hoot soil is mainly rhizomatous wheatgrasses, bluebunch wheatgrass, Indian ricegrass, and big sagebrush. If the vegetation deteriorates, blue grama, big sagebrush, and forbs increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 375 pounds of air-dry vegetation per acre in normal years. Production varies from 500 pounds in favorable years to 225 pounds in unfavorable years.

The potential plant community on the Persayo soil is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years.

Range recovery is slow on this unit because of the salt content of the Persayo soil. The unit is better suited to grazing by sheep than by cattle because of the high percentage of gardner saltbush present on the Persayo soil. Among the limitations for seeding are the salinity of the Persayo soil and low precipitation. Uniform distribution of grazing is difficult to achieve on this unit because of the steepness of slope or the lack of permanent water developments, or both.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIIe, dryland. The Hoot soil is in Shallow Loamy range site, 5- to 9-inch precipitation zone, and the Persayo soil is in Saline Upland range site, 5- to 9-inch precipitation zone.

34—Kishona-Shingle-Rock outcrop association. This map unit is on fans and uplands. Slope is 3 to 40 percent. The native vegetation is mainly grass and shrubs. Elevation is 4,500 to 5,700 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 30 percent Kishona loam that has slopes of 3 to 15 percent, 30 percent Shingle clay loam that has slopes of 10 to 40 percent, and 15 percent Rock outcrop. The Kishona soil is on fans, the Shingle soil is on the tops of ridges and hills, and Rock outcrop occurs as buttes and escarpments.

Included in this unit are small areas of Forkwood soils and a soil that is similar to the Kishona soil but is very strongly alkaline. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

The Kishona soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray loam about 4 inches thick. The underlying material to a depth of 60 inches or more is yellowish brown loam.

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

The Shingle soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is grayish brown clay loam about 4 inches thick. The underlying material is grayish brown clay loam about 13 inches thick. Olive green, brown, and gray shale is at a depth of 17 inches.

Permeability of the Shingle soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop is exposures of shale and sandstone.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Kishona soil is mainly bluebunch wheatgrass, rhizomatous wheatgrasses, needleandthread, and big sagebrush. If the vegetation deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 365 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

The potential plant community on the Shingle soil is mainly bluebunch wheatgrass, Indian ricegrass,

rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, rhizomatous wheatgrasses and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 700 pounds in favorable years to 350 pounds in unfavorable years.

Uniform distribution of grazing is difficult to achieve on this unit because of the steepness of slope or the lack of permanent water developments, or both.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Kishona soil is in capability subclass VIe, dryland, and in Loamy range site, 10- to 14-inch precipitation zone. The Shingle soil is in capability subclass VIIe, dryland, and in Shallow Clayey range site, 10- to 14-inch precipitation zone.

35—Kishona-Shingle association. This map unit is on fans and uplands. Slope is 6 to 30 percent. The native vegetation is mainly grass and shrubs. Elevation is 4,500 to 5,700 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 45 percent Kishona clay loam and 30 percent Shingle clay loam. The Kishona soil is on fans, and the Shingle soil is on ridges and hillsides.

Included in this unit are small areas of Absted, Arvada, and Forkwood soils and moderately saline Haverdad soils. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Kishona soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray clay loam about 3 inches thick. The underlying material to a depth of 60 inches or more is very strongly alkaline, grayish brown silty clay loam.

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

The Shingle soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is grayish brown clay loam about 4 inches thick. The underlying material is grayish brown clay loam about 13 inches thick. Shale is at a depth of 17 inches.

Permeability of the Shingle soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Kishona soil is mainly gardner saltbush, bottlebrush squirreltail, bud sagebrush, and rhizomatous wheatgrasses. If the vegetation deteriorates, gardner saltbush and sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 450 pounds of air-dry vegetation per acre in normal years. Production varies from 650 pounds in favorable years to 275 pounds in unfavorable years.

The potential plant community on the Shingle soil is mainly bluebunch wheatgrass, Indian ricegrass, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, rhizomatous wheatgrasses and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 700 pounds in favorable years to 350 pounds in unfavorable years.

Uniform distribution of grazing is difficult to achieve on this unit because of the steepness of slope or the lack of permanent water developments, or both.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Kishona soil is in capability subclass Ve, dryland, and in Saline Upland range site, 10- to 14-inch precipitation zone. The Shingle soil is in capability subclass VIIe, dryland, and in Shallow Clayey range site, 10- to 14-inch precipitation zone.

36—Kyle-Shingle-Bidman association. This unit is on uplands and fans. Slope is 2 to 40 percent. The native vegetation is mainly grass and shrubs. Elevation is 4,500 to 5,700 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 35 percent Kyle clay that has slopes of 2 to 8 percent, 25 percent Shingle clay loam that has slopes 6 to 40 percent, and 10 percent Bidman fine sandy loam that has slopes 2 to 10 percent. The Kyle soil is on back slopes of uplands, the Shingle soil is on the tops of ridges and hills, and the Bidman soil is on fans.

Included in this unit are small areas of Bondman and Forkwood soils and a shallow, very gravelly soil that is underlain by sandstone. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

The Kyle soil is deep and well drained. It formed in alluvium derived dominantly from shale. Typically, the surface layer is grayish brown clay about 2 inches thick. The subsoil is grayish brown clay about 22 inches thick. The substratum to a depth of 60 inches or more is grayish brown clay.

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

The Shingle soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is grayish brown clay loam about 4 inches thick. The underlying material is grayish brown clay loam about 13 inches thick. Shale is at a depth of about 17 inches.

Permeability of the Shingle soil is moderate. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

The Bidman soil is deep and well drained. It formed in alluvium derived dominantly from shale. Typically, the surface layer is grayish brown fine sandy loam about 5 inches thick. The subsurface layer is pale brown fine sandy loam about 6 inches thick. The subsoil is grayish brown clay about 16 inches thick. The substratum to a depth of 60 inches or more is grayish brown sandy clay loam.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Kyle soil is mainly Indian ricegrass, bluebunch wheatgrass, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, big sagebrush and forbs increase. If the vegetation further deteriorates, pricklypear and annual grasses invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Shingle soil is mainly bluebunch wheatgrass, Indian ricegrass, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, rhizomatous wheatgrasses and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 700 pounds in favorable years to 350 pounds in unfavorable years.

The potential plant community on the Bidman soil is mainly needleandthread, bluebunch wheatgrass, prairie junegrass, and big sagebrush. If the vegetation deteriorates, big sagebrush and threadleaf sedge increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

Uniform distribution of grazing is difficult to achieve on this unit because of the steepness of slope or the lack of permanent water developments, or both.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Kyle soil is in capability subclass VIe, dryland, and in Clayey range site, 10- to 14-inch precipitation zone. The Shingle soil is in capability subclass VIIe, dryland, and in Shallow Clayey range site, 10- to 14-inch precipitation zone. The Bidman soil is in capability subclass VIe, dryland, and in Sandy range site, 10- to 14-inch precipitation zone.

37—Lakehelen-Irigul-Rock outcrop association. This map unit is on the sides and ridges of mountains and on escarpments. Slope is 5 to 35 percent. The native vegetation on the Lakehelen soil is trees. The native vegetation on the Irigul soil is grass and shrubs. Elevation is 8,000 to 9,500 feet. The average annual precipitation is about 22 inches, the average annual air temperature is about 37 degrees F, and the average frost-free period is 30 to 80 days.

This unit is 45 percent Lakehelen stony sandy loam that has slopes of 5 to 35 percent, 25 percent Irigul very channery loam that has slopes of 6 to 30 percent, and 10 percent Rock outcrop. The Lakhelelen soil is on back slopes and foot slopes of mountains, the Irigul soil is on ridges, and Rock outcrop is on escarpments and ridgetops.

Included in this unit are small areas of Castino Variant, Meadowlake, Wallrock, and Nathrop soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Lakehelen soil is moderately deep and well drained. It formed in material derived dominantly from granite. Typically, the surface is covered with a mat of forest duff about 1 inch thick. The surface layer is pale brown stony sandy loam about 19 inches thick. The subsoil is strong brown very cobbly sandy clay loam about 18 inches thick. Granite is at a depth of about 37 inches. From 3 to 10 percent of the surface commonly is covered with stones.

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

The Irigul soil is shallow and well drained. It formed in material derived dominantly from schist. Typically, the surface layer is dark grayish brown very channery loam about 3 inches thick. The subsurface layer is brown very channery loam about 7 inches thick. The underlying material is yellowish brown very channery loam about 4 inches thick. Schist is at a depth of 14 inches.

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

Rock outcrop is exposures of schist, gneiss, and granite.

The Lakehelen soil is used mainly for forest products. The Irigul soil is used mainly for livestock grazing. Both of these soils are also used for wildlife habitat.

The Lakehelen soil is well suited to the production of lodgepole pine. The site index for lodgepole pine is 60. The steepness of slope limits the kinds of equipment that can be used in forest management. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. The low available water capacity generally influences seedling survival in areas where understory plants are numerous. Trees are subject to windthrow because of limited rooting depth.

The potential plant community on the Irigul soil is mainly bluebunch wheatgrass, big sagebrush, black sagebrush, and threetip sagebrush. If the vegetation deteriorates, big sagebrush, snowberry, and forbs increase. If the vegetation further deteriorates, annual grasses and forbs invade. The potential plant community produces about 650 pounds of air-dry vegetation per acre in normal years. Production varies from 800 pounds in favorable years to 500 pounds in unfavorable years. Uniform distribution of grazing is difficult to achieve on this soil because of the steepness of slope or the lack of permanent water developments, or both.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Lakehelen soil is in capability subclass VIe, dryland. The Irigul soil is in capability subclass VIIe, dryland, and in Shallow Loamy range site, 20+ inch precipitation zone.

38—Larim-Olney association. This map unit is on terraces, fans, hillsides, and escarpments. Slope is 1 to 40 percent. The native vegetation is mainly grass and shrubs. Elevation is 4,500 to 5,500 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 45 percent Larim very gravelly sandy loam that has slopes of 1 to 35 percent and 30 percent Olney sandy loam that has slopes of 1 to 10 percent. Also in this unit is about 10 percent Shingle clay loam that has slopes of 6 to 40 percent. The Larim soil is on terrace margins, the Olney soil is on fans, and the Shingle soil is on hillsides and the upper part of escarpments.

Included in this unit are small areas of Rairdent soils and Rock outcrop. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Larim soil is deep and well drained. It formed in alluvium. Typically, 20 to 40 percent of the surface is covered with gravel. The surface layer is brown very gravelly sandy loam about 3 inches thick. The subsoil is brown very gravelly sandy clay loam about 12 inches thick. The upper 19 inches of the substratum is very pale brown very gravelly loamy sand, and the lower part to a depth of 60 inches or more is brownish yellow very gravelly loamy sand.

Permeability of the Larim soil is moderate to a depth of 15 inches and rapid below this depth. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

The Olney soil is deep and well drained. It formed in alluvium. Typically, the surface layer is brown sandy loam about 5 inches thick. The subsoil is brown sandy clay loam about 13 inches thick. The substratum to a depth of 60 inches or more is very pale brown sandy clay loam.

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

The Shingle soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is grayish brown clay loam about 4 inches thick. The underlying material is grayish brown clay loam about 13 inches thick. Shale is at a depth of about 17 inches.

Permeability of the Shingle soil is moderate. Available water capacity is low. Effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Larim soil is mainly bluebunch wheatgrass, needleandthread, Indian ricegrass, and black sagebrush. If the vegetation deteriorates, big sagebrush and threadleaf sedge increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 300 pounds of air-dry vegetation per acre in normal years. Production varies from 450 pounds in favorable years to 100 pounds in unfavorable years.

The potential plant community on the Olney soil is mainly needleandthread, bluebunch wheatgrass, prairie junegrass, and big sagebrush. If the vegetation deteriorates, big sagebrush and threadleaf sedge increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Shingle soil is mainly bluebunch wheatgrass, Indian ricegrass, rhizomatous wheatgrasses and big sagebrush. If the vegetation deteriorates, rhizomatous wheatgrasses and

big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 700 pounds in favorable years to 350 pounds in unfavorable years.

Uniform distribution of grazing is difficult to achieve on this unit because of the steepness of slope or the lack of permanent water developments, or both.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Larim soil is in capability subclass VIe, dryland, and in Gravelly range site, 10- to 14-inch precipitation zone; the Olney soil is in capability subclass VIe, dryland, and in Sandy range site, 10- to 14-inch precipitation zone; and the Shingle soil is in capability subclass VIIe, dryland, and in Shallow Clayey range site, 10- to 14-inch precipitation zone.

39—Limber-Hyattville-Rock outcrop association. This map unit is mainly on mountain back slopes and foot slopes. Slope is 3 to 40 percent. The native vegetation is mainly fir, lodgepole pine, and an understory of grasses. Elevation is 7,000 to 9,000 feet. The average annual precipitation is about 22 inches, the average annual air temperature is about 37 degrees F, and the average frost-free period is 50 to 90 days.

This unit is 40 percent Limber gravelly loam that has slopes of 3 to 30 percent, 25 percent Hyattville stony loam that has slopes of 6 to 40 percent, and about 10 percent Rock outcrop. The Limber soil is on mountain back slopes, the Hyattville soil is on mountain foot slopes, and Rock outcrop is on the tops of hills and ridges and also occurs as escarpments.

Included in this unit are small areas of Lucky Star soils, Mulgon soils, and deep soils. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Limber soil is moderately deep and well drained. It formed in material derived dominantly from limestone. Typically, the surface is covered with a mat of partially decomposed needles and bark about 2 inches thick. The surface layer is dark grayish brown gravelly loam about 1 inch thick. The subsurface layer is light brownish gray gravelly loam about 4 inches thick. The subsoil is brown gravelly clay loam about 15 inches thick. The substratum is very pale brown gravelly clay loam about 19 inches thick. Hard limestone is at a depth of about 39 inches. From 3 to 10 percent of the surface is covered with gravel.

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

The Hyattville soil is moderately deep and well drained. It formed in material derived dominantly from limestone. Typically, the surface is covered with a mat of partially decomposed needles, leaves, and bark about 2 inches thick. The surface layer is pinkish gray stony loam about 7 inches thick. The subsoil is brown very channery clay loam about 22 inches thick. The substratum is pale brown very channery clay loam about 7 inches thick. Hard limestone is at a depth of about 36 inches.

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

Rock outcrop is exposures of limestone.

This unit is used mainly for timber production. It is also used for wildlife habitat.

This unit is well suited to Douglas-fir. The steepness of slope limits the kinds of equipment that can be used in forest management. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion. The low available water capacity generally influences seedling survival in areas where understory plants are numerous. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Trees are subject to windthrow because of the limited rooting depth.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Limber and Hyattville soils are in capability subclass VIe, dryland.

40—Lostwells clay loam, 0 to 3 percent slopes. This deep, well drained soil is on alluvial fans and in valleys. It formed in alluvium. Slope ranges from 0 to 3 percent but is commonly about 2 percent. The vegetation in areas not cultivated is mainly grass and shrubs. Elevation is 3,950 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is light brownish gray clay loam about 8 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray sandy clay loam stratified with lenses of sandy loam and clay loam. In some areas the surface layer is sandy clay loam.

Included in this unit are small areas of Stutzman and Youngston soils. The percentage of included soils varies from one area to another.

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

Most areas of this unit are used for irrigated crops, mainly sugar beets, corn, and small grain. Among the

other crops grown are dry beans and hay and pasture. Some areas are used as rangeland and for wildlife habitat. Less than 5 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

This unit is well suited to cultivated crops. It has few limitations. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry.

This unit is well suited to hay and pasture. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly bluebunch wheatgrass, rhizomatous wheatgrasses, needleandthread, and big sagebrush. If the vegetation deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase. If the vegetation further deteriorates, pricklypear, annual grasses, and weeds invade. The potential plant community produces about 365 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIs-16, irrigated, and capability subclass VIe, dryland. It is in Loamy range site, 5- to 9-inch precipitation zone.

41—Lostwells clay loam, 3 to 6 percent slopes. This deep, well drained soil is on alluvial fans and in valleys. It formed in alluvium. Slope ranges from 3 to 6 percent but is commonly about 4 percent. The vegetation in areas not cultivated is mainly grass and shrubs. Elevation is 3,950 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is light brownish gray clay loam about 8 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray sandy clay loam stratified with lenses of sandy loam and clay loam. In some areas the surface layer is sandy clay loam.

Included in this unit are small areas of Apron and Youngston soils and 160 acres of a Lostwells sandy clay loam, primarily along Gooseberry Creek, that has slopes of 6 to 10 percent.

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

Most areas of this unit are used for irrigated crops, mainly small grain and corn. Among the other crops grown are dry beans and hay and pasture. Some areas are used as rangeland and for wildlife habitat. Less than 5 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitation is slope. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry.

If this unit is used for hay and pasture, the main limitation is slope. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, border, contour ditch, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. If furrow irrigation systems are used, runs should be on the contour or across the slope. Irrigation water needs to be applied at a rate that insures optimum production without increasing deep percolation, runoff, and erosion. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly bluebunch wheatgrass, Sandberg bluegrass, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama, Sandberg bluegrass, and big

sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 365 pounds of air-dry vegetaton per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIIe-2, irrigated, and capability subclass VIe, dryland. It is in Loamy range site, 5- to 9-inch precipitation zone.

42—Lostwells-Youngston complex, 1 to 10 percent slopes. This map unit is on alluvial fans and terraces and in valleys. The native vegetation is mainly grass and shrubs. Elevation is 3,950 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about to 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 40 percent Lostwells sandy clay loam that has slopes of 1 to 10 percent and 25 percent Youngston silty clay loam that has slopes of 1 to 8 percent. Also in this unit is about 10 percent Uffens loam that has slopes of 1 to 8 percent. The Lostwells soil is in valleys and on fans, the Youngston soil is on terraces and fans and in valleys, and the Uffens soil is on terraces. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Apron, Stutzman, Glenton, and Worland soils. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Lostwells soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray sandy clay loam about 3 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray sandy clay loam stratified with lenses of sandy loam and clay loam.

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

The Youngston soil is deep and well drained. It formed in alluvium. Typically, the surface layer is pale brown silty clay loam about 3 inches thick. The underlying material to a depth of 60 inches or more is pale brown clay loam stratified with lenses of silt loam, silty clay loam, and very fine sandy loam.

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

The Uffens soil is very deep and well drained. It formed in alluvium. Typically, the surface layer is pale brown loam about 1 inch thick. The subsoil is pinkish gray sandy clay loam about 21 inches thick. The substratum to a depth of 60 inches or more is pale brown clay loam.

Permeability of the Uffens soil is moderately slow. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The subsoil is very strongly alkaline.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Lostwells soil is mainly bluebunch wheatgrass, rhizomatous wheatgrasses, needleandthread, and big sagebrush. If the vegetation deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 365 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

The potential plant community on the Youngston and Uffens soils is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years.

Range recovery is slow on this unit because of the salt content of the Youngston and Uffens soils. This unit is better suited to grazing by sheep than by cattle because of the high percentage of gardner saltbush present. Among the limitations for seeding are the salinity of the Youngston soil, the alkalinity of the Uffens soil, and low precipitation.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIe, dryland. The Lostwells soil is in Loamy range site, 5- to 9-inch precipitation zone, and the Youngston and Uffens soils are in Saline Upland range site, 5- to 9-inch precipitation zone.

43—Lostwells-Youngston complex, wet, 0 to 6 percent slopes. This map unit is on fans and terraces and in valleys. It formed in alluvium. The vegetation in areas not cultivated is mainly grass and shrubs. Elevation is 3,950 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 30 percent Lostwells clay loam, wet, and 30 percent Youngston silty clay loam, wet. Also in this unit is about 25 percent Lostwells sandy clay loam. The Lostwells, wet, and Youngston, wet, soils are on the lower lying slopes and in depressional areas, and the

Lostwells sandy clay loam is on the higher lying slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Dobent, Glenton, Stutzman, and Youngston soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Lostwells, wet, soil is deep and somewhat poorly drained. It formed in alluvium. Typically, the surface layer is light brownish gray clay loam about 8 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray sandy clay loam stratified with lenses of sandy loam or clay loam.

Permeability of the Lostwells, wet, soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate. A seasonal high water table fluctuates between depths of 20 and 40 inches in June through November. This soil is wet because the water table has been raised as a result of irrigation. It is slightly saline to moderately saline in the upper part of the root zone.

The Youngston soil is deep and somewhat poorly drained. It formed in alluvium. Typically, the surface layer is pale brown silty clay loam about 8 inches thick. The underlying material to a depth of 60 inches or more is pale brown clay loam stratified with lenses of silt loam, silty clay loam, and very fine sandy loam.

Permeability of the Youngston, wet, soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium and the hazard of water erosion is high. The hazard of wind erosion is moderate. A seasonal high water table fluctuates between depths of 20 and 40 inches in June through November. The soil is wet because the water table has been raised as a result of irrigation. It is slightly saline to moderately saline in the upper part of the root zone.

The Lostwells sandy clay loam is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray sandy clay loam about 3 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray sandy clay loam stratified with lenses of sandy loam and clay loam. In some areas the surface layer is clay loam.

Permeability of the Lostwells sandy clay loam is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

Most areas of this unit are used for irrigated crops, mainly small grain and hay and pasture. Among the other crops grown are sugar beets and corn. Some areas are used for livestock grazing and wildlife habitat. Less than 5 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are wetness and the high content of salts. Intensive management is required to reduce the salinity and maintain soil productivity. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Maintaining crop residue on or near the surface reduces runoff, reduces soil blowing, and helps to maintain soil tilth and organic matter content.

If this unit is used for hay and pasture, the main limitations are wetness and the high content of salts. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Water needs to be applied carefully to prevent the buildup of a high water table. Drainage may also be needed.

The concentration of salts and alkali in the surface layer limits the production of hay and pasture. Leaching of the salts from the surface layer is limited by the high water table. Drainage and irrigation water management reduce the concentration of salts. The content of toxic salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil. Tile or open drains can be used to remove excess water and provide an outlet for leached salts. Most climatically adapted crops can be grown if artificial drainage is provided. Salt-tolerant species are most suitable for planting. The fluctuating high water table may delay planting and harvesting.

The potential plant community on the Lostwells, wet, and Youngston, wet, soils is mainly alkali sacaton, Nuttall alkaligrass, inland saltgrass, and greasewood. If the vegetation deteriorates, inland saltgrass and greasewood increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 2,400 pounds of air-dry vegetation per acre in normal years. Production varies from 2,600 pounds in favorable years to 1,800 pounds in unfavorable years. Range recovery is slow because of

the salt content of these soils. Among the limitations for seeding are the salinity of the soils and low precipitation.

The potential plant community on the Lostwells sandy clay loam is mainly bluebunch wheatgrass, rhizomatous wheatgrasses, needleandthread, and big sagebrush. If the vegetation deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 365 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIIws-10, irrigated, and capability subclass IVws, dryland. The Lostwells, wet, and Youngston, wet soils are in Saline Subirrigated range site, 5- to 9-inch precipitation zone; and the Lostwells sandy clay loam is in Loamy range site, 5- to 9-inch precipitation zone.

44—Lymanson-Turk-Jenkinson association. This map unit is on mountains and ridges. Slope is 1 to 30 percent. The native vegetation is mainly grass and shrubs. Elevation is 7,500 to 9,000 feet. The average annual precipitation is about 18 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 60 to 90 days.

This unit is 30 percent Lymanson gravelly loam that has slopes of 10 to 30 percent, 30 percent Turk silty clay loam that has slopes of 1 to 15 percent, and 20 percent Jenkinson channery loam that has slopes of 2 to 30 percent. The Lymanson and Turk soils are on mountainsides and ridges, and the Jenkinson soil is on mountains.

Included in this unit are small areas of Inchau, Stubbs, and Starman soils and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Lymanson soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, 5 to 15 percent of the surface is covered with gravel. The surface layer is dark grayish brown gravelly loam about 2 inches thick. The subsoil is grayish brown gravelly clay loam about 5 inches thick. The substratum is pale olive gravelly clay loam about 14 inches thick. Shale is at a depth of about 21 inches.

Permeability of the Lymanson soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Turk soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is grayish brown silty clay loam about 3 inches thick. The subsoil is dark brown clay about 11 inches thick. The substratum is light brownish gray clay about 20 inches thick. Shale is at a depth of about 34 inches.

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

The Jenkinson soil is shallow and well drained. It formed in material derived dominantly from limestone. Typically, 10 to 20 percent of the surface is covered with channery fragments. The surface layer is dark grayish brown channery loam about 7 inches thick. The underlying material is grayish brown channery loam about 7 inches thick. Limestone is at a depth of about 14 inches.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Lymanson soil is mainly Columbia needlegrass, spike fescue, Idaho fescue, and big sagebrush. If the vegetation deteriorates, big sagebrush and rabbitbrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The potential plant community on the Turk soil is mainly Columbia needlegrass, spike fescue, Idaho fescue, and big sagebrush. If the vegetation deteriorates, big sagebrush and forbs increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The potential plant community on the Jenkinson soil is mainly Columbia needlegrass, Idaho fescue, spike fescue, and mountainmahogany. If the vegetation deteriorates, big sagebrush and black sagebrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 850 pounds of air-dry vegetation per acre in normal years. Production varies from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Lymanson soil is in capability subclass VIe, dryland, and in Loamy range site, 15- to 19-inch precipitation zone; the Turk soil is in capability subclass VIe, dryland, and in Clayey range site, 15- to 19-inch precipitation zone; and the Jenkinson soil is in capability subclass VIIe, dryland, and in Shallow Loamy range site, 15- to 19-inch precipitation zone.

45—Meadowlake-Castino Variant-Rock outcrop association. This map unit is on mountainsides,

escarpments, and ledges. Slope is 5 to 30 percent. The native vegetation on the Meadowlake soil is trees, and the native vegetation on the Castino Variant soil is grass and shrubs. Elevation is 8,000 to 9,500 feet. The average annual precipitation is about 22 inches, the average annual air temperature is about 37 degrees F, and the average frost-free period is 30 to 90 days.

This unit is 50 percent Meadowlake very flaggy sandy loam that has slopes of 10 to 30 percent, 20 percent Castino Variant very stony loam that has slopes of 5 to 25 percent, and 15 percent Rock outcrop. The Meadowlake soil is on mountainsides, the Castino Variant soil is in depressional areas and along drainageways on mountainsides, and Rock outcrop is on escarpments and rocky ledges.

Included in this unit are small areas of Lakehelen and Irigul soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Meadowlake soil is moderately deep and well drained. It formed in material derived dominantly from sandstone. Typically, the surface is covered with a mat of grass litter about 1 inch thick. The surface layer is dark brown very flaggy sandy loam about 1 inch thick. The subsurface layer is pinkish gray very flaggy sandy loam about 15 inches thick. The subsoil is weak red very flaggy loamy sand about 6 inches thick. Hard sandstone is at a depth of about 22 inches. From 20 to 45 percent of the surface is covered with flagstones.

Permeability of the Meadowlake soil is moderately rapid. Available water capacity is very low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is slight.

The Castino Variant soil is moderately deep and well drained. It formed in material derived dominantly from sandstone. Typically, 15 to 40 percent of the surface is covered with flagstones. The surface layer is dusky red very stony loam about 4 inches thick. The subsoil is dusky red very stony clay loam about 18 inches thick. The substratum is reddish brown very stony sandy clay loam about 8 inches thick. Hard sandstone is at a depth of about 30 inches.

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

Rock outcrop is exposures of sandstone.

The Meadowlake soil is used mainly for forest products and wildlife habitat. The Castino Variant soil is used mainly for livestock grazing. Both soils are also used for wildlife habitat.

The Meadowlake soil is suited to the production of lodgepole pine. The site index for lodgepole pine is about 55. The steepness of slope in places limits the kinds of equipment that can be used in forest management. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion.

The low available water capacity generally influences seedling survival in areas where understory plants are numerous. Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Trees are subject to windthrow because of limited rooting depth.

The potential plant community on the Castino Variant soil is mainly Idaho fescue, Columbia needlegrass, thickspike wheatgrass, and bluebunch wheatgrass. If the vegetation deteriorates, big sagebrush and forbs increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 2,500 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,800 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds. In summer and winter the Castino Variant soil is often used as range by big game animals.

The Meadowlake soil is in capability subclass VIe, dryland. The Castino Variant soil is in capability subclass VIe, dryland, and in Loamy range site, 20-inch precipitation zone.

46—Muff-Neiber fine sandy loams, 3 to 30 percent slopes. This map unit is on ridges and hillsides. The native vegetation is mainly grass and shrubs. Elevation is 4,200 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 40 percent Muff fine sandy loam that has slopes of 3 to 30 percent and 40 percent Neiber fine sandy loam that has slopes 3 to 30 percent. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Lostwells and Persayo soils, Rock outcrop, and slick spots. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Muff soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is pale brown fine sandy loam about 5 inches thick. The subsoil is light yellowish brown sandy clay loam about 14 inches thick. The substratum is light brownish gray sandy clay loam about 11 inches thick. Shale is at a depth of about 30 inches. The subsoil is very strongly alkaline.

Permeability of the Muff soil is slow. Available water capacity is moderate. Effective rooting depth is 20 to 40

inches. Runoff is rapid, and the hazard of water erosion is moderate.

The Neiber soil is moderately deep and well drained. It formed in alluvial material derived dominantly from sandstone. Typically, the surface layer is pale brown fine sandy loam about 8 inches thick. The subsoil is yellowish brown sandy clay loam about 7 inches thick. The substratum is light gray sandy clay loam about 6 inches thick. Soft sandstone is at a depth of 21 inches.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Muff soil is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years.

The potential plant community on the Neiber soil is mainly needleandthread, rhizomatous wheatgrasses, Indian ricegrass, and big sagebrush. If the vegetation deteriorates, blue grama and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 375 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIe, dryland. The Muff soil is in Saline Upland range site, 5- to 9-inch precipitation zone, and the Neiber soil is in Sandy range site, 5- to 9-inch precipitation zone.

47—Mughut-Bondman association. This map unit is on dip slopes and ridges of hogbacks and on fans. Slope is 2 to 25 percent. The native vegetation is mainly grass and shrubs. Elevation is 4,500 to 5,700 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 40 percent Mughut fine sandy loam that has slopes of 2 to 12 percent and 25 percent Bondman sandy loam that has slopes of 2 to 25 percent. Also in this unit is about 15 percent Bidman fine sandy loam that has slopes of 2 to 10 percent. The Mughut soil is on the lower parts of dip slopes, the Bondman soil is on ridges and the upper parts of dip slopes, and the Bidman soil is on fans.

Included in this unit are small areas of Forkwood and Shingle soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Mughut soil is moderately deep and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam about 3 inches thick. The upper 10 inches of the subsoil is brown clay loam, and the lower 11 inches is yellowish brown clay loam. Hard sandstone is at a depth of 24 inches.

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

The Bondman soil is shallow and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is brown sandy loam about 3 inches thick. The subsoil is yellowish brown sandy clay loam about 9 inches thick. The substratum is light yellowish brown sandy loam about 6 inches thick. Hard sandstone is at a depth of about 18 inches.

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

The Bidman soil is deep and well drained. It formed in alluvium derived dominantly from shale. Typically, the surface layer is grayish brown fine sandy loam about 5 inches thick. The subsurface layer is pale brown fine sandy loam about 6 inches thick. The subsoil is grayish brown clay about 16 inches thick. The substratum to a depth of 60 inches or more is grayish brown sandy clay loam.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Mughut and Bidman soils is mainly needleandthread, bluebunch wheatgrass, prairie junegrass, and big sagebrush. If the vegetation deteriorates, big sagebrush and threadleaf sedge increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Bondman soils is mainly Indian ricegrass, bluebunch wheatgrass, needleandthread, and rhizomatous wheatgrasses. If the vegetation deteriorates, rhizomatous wheatgrasses, bluegrasses, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry

vegetation per acre in normal years. Production varies from 700 pounds in favorable years to 350 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Mughut and Bidman soils are in capability subclass VIe, dryland, and in Sandy range site, 10- to 14-inch precipitation zone. The Bondman soil is in capability subclass VIIe, dryland, and in Shallow Sandy range site, 10- to 14-inch precipitation zone.

48—Mulgon-Lucky Star association. This map unit is on mountainsides, foot slopes, and fans (fig. 4). Slope is 6 to 30 percent. The native vegetation on the Mulgon soil is coniferous forest, and the native vegetation on the Lucky Star soils is grass and shrubs. Elevation is 6,500 to 8,500 feet. The average annual precipitation is about 22 inches, the average annual air temperature is about 37 degrees F, and the average frost-free period is 60 to 90 days.

This unit is 40 percent Mulgon very stony loam that has slopes of 6 to 30 percent and 30 percent Lucky Star very stony loam that has slopes of 6 to 25 percent. The Mulgon soil is in north-facing areas on mountainsides and fans, and the Lucky Star soil is on foot slopes.

Included in this unit are small areas of Billycreek and Clayburn soils, Rock outcrop, and stony soils. Included areas make up about 30 percent of the total acreage. The percentage varies from one area to another.

The Mulgon soil is deep and well drained. It formed in alluvium. Typically, the surface is covered with a mat of needles, bark, twigs, and grass about 2 inches thick. The surface layer is dark grayish brown very stony loam about 3 inches thick. The subsurface layer is brown very stony fine sandy loam about 12 inches thick. The subsoil is reddish brown very stony sandy clay loam about 16 inches thick. The substratum to a depth of 60 inches or more is reddish yellow very stony sandy loam.

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

The Lucky Star soil is deep and well drained. It formed in alluvium. Typically, the surface layer is dark brown very stony loam about 16 inches thick. The subsoil to a depth of 60 inches or more is brown very cobbly sandy clay loam.

Permeability of the Lucky Star soil is moderate. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate.

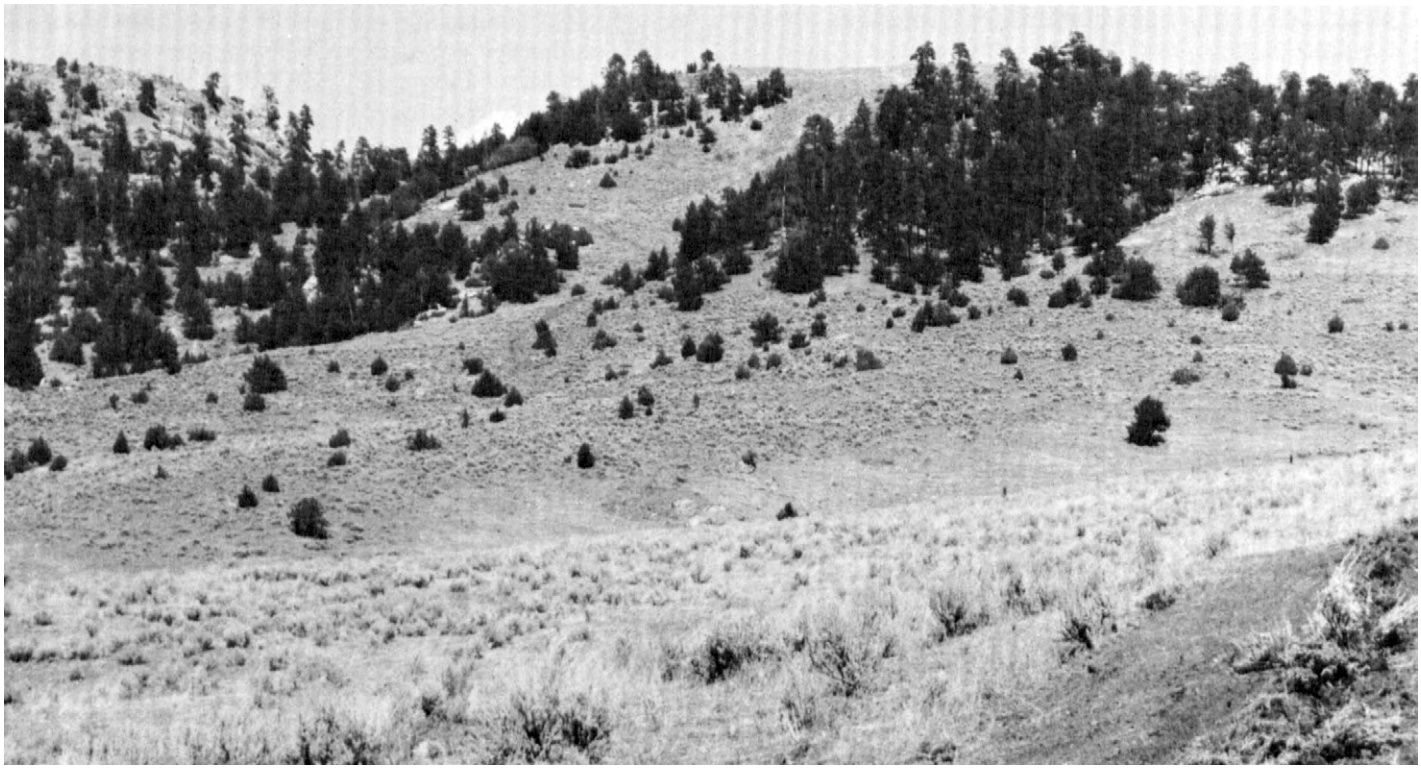


Figure 4.—Area of Mulgon-Lucky Star association, north of Cherry Creek Hill.

The Mulgon soil is used mainly for forest products, and the Lucky Star soil is used mainly for livestock grazing. Both soils are also used for wildlife habitat.

The Mulgon soil is well suited to the production of lodgepole pine. The site index for lodgepole pine is about 70. The steepness of slope limits the kinds of equipment that can be used in forest management. Stones on the surface can interfere with felling, yarding, and other operations involving the use of equipment. Spoil from excavations is subject to rill and gully erosion and to sloughing. Proper design of road drainage systems and care in the placement of culverts help to control erosion.

Competing vegetation can be controlled by properly preparing the site and by spraying, cutting, or girdling to eliminate unwanted weeds, brush, or trees. Trees are subject to windthrow because of limited rooting depth.

The potential plant community on the Lucky Star soils is mainly Idaho fescue, Columbia needlegrass, thickspike wheatgrass, and bluebunch wheatgrass. If the vegetation deteriorates, big sagebrush and forbs increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 2,500 pounds of air-dry vegetation per acre in normal years. Production varies from 3,000 pounds in favorable years to 1,800 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds. In summer and winter the unit is often used as range by big game animals.

The Mulgon soil is in capability subclass VIe, dryland. The Lucky Star soil is in capability subclass VIe, dryland, and in Loamy range site, 20+ inch precipitation zone.

49—Nathrop-Starley-Rock outcrop association. This map unit is on mountainsides, hilltops, ridges, buttes, escarpments, and ledges (fig. 5). Slope is 2 to 40 percent. The native vegetation is mainly grass and shrubs. Elevation is 6,500 to 8,500 feet. The average annual precipitation is about 19 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 50 to 75 days.

This unit is 35 percent Nathrop very cobbly loam that has slopes of 6 to 25 percent, 30 percent Starley very channery loam that has slopes 2 to 40 percent, and 10 percent Rock outcrop. The Nathrop soil is on mountainsides; the Starley soil is on hilltops, ridges, and mountainsides; and Rock outcrop is on buttes, escarpments, and ledges.

Included in this unit are small areas of Morset, Woosley, and Starman soils. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Nathrop soil is moderately deep and well drained. It formed in material derived dominantly from limestone. Typically, 10 to 30 percent of the surface is covered with cobbles and gravel. The surface layer is dark grayish brown very cobbly loam about 8 inches thick. The subsoil is brown very cobbly clay loam about 14 inches thick. The substratum is pale brown very cobbly loam about 14 inches thick. Hard limestone is at a depth of about 36 inches.

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

The Starley soil is shallow and well drained. It formed in material derived dominantly from limestone. Typically, 10 to 35 percent of the surface layer is covered with channery fragments and flagstones. The surface layer is dark grayish brown very channery loam about 6 inches thick. The underlying material is pinkish gray very channery loam about 8 inches thick. Hard limestone is at a depth of about 14 inches.

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

Rock outcrop is exposures of limestone and sandstone.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Nathrop soil is mainly Columbia needlegrass, Idaho fescue, bluebunch wheatgrass, and big sagebrush. If the vegetation deteriorates, bluegrasses and big sagebrush increase. If the vegetation further deteriorates, forbs and annual grasses and weeds invade. The potential plant community produces 950 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 600 pounds in unfavorable years.

The potential plant community on the Starley soil is mainly Columbia needlegrass, Idaho fescue, spike fescue, and mountainmahogany. If the vegetation deteriorates, big sagebrush and black sagebrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 850 pounds of air-dry vegetation per acre in normal years. Production varies from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

Uniform distibution of grazing is difficult to achieve on this unit because of the steepness of slope or the lack of permanent water developments, or both.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Nathrop soil is in capability subclass VIe, dryland, and in Coarse Upland range site, 15- to 19-inch precipitation zone. The Starley soil is in capability subclass VIIe, dryland, and in Shallow Loamy range site, 15- to 19-inch precipitation zone.

50—Neville loam, 0 to 3 percent slopes. This deep, well drained soil is on fans. It formed in alluvium derived

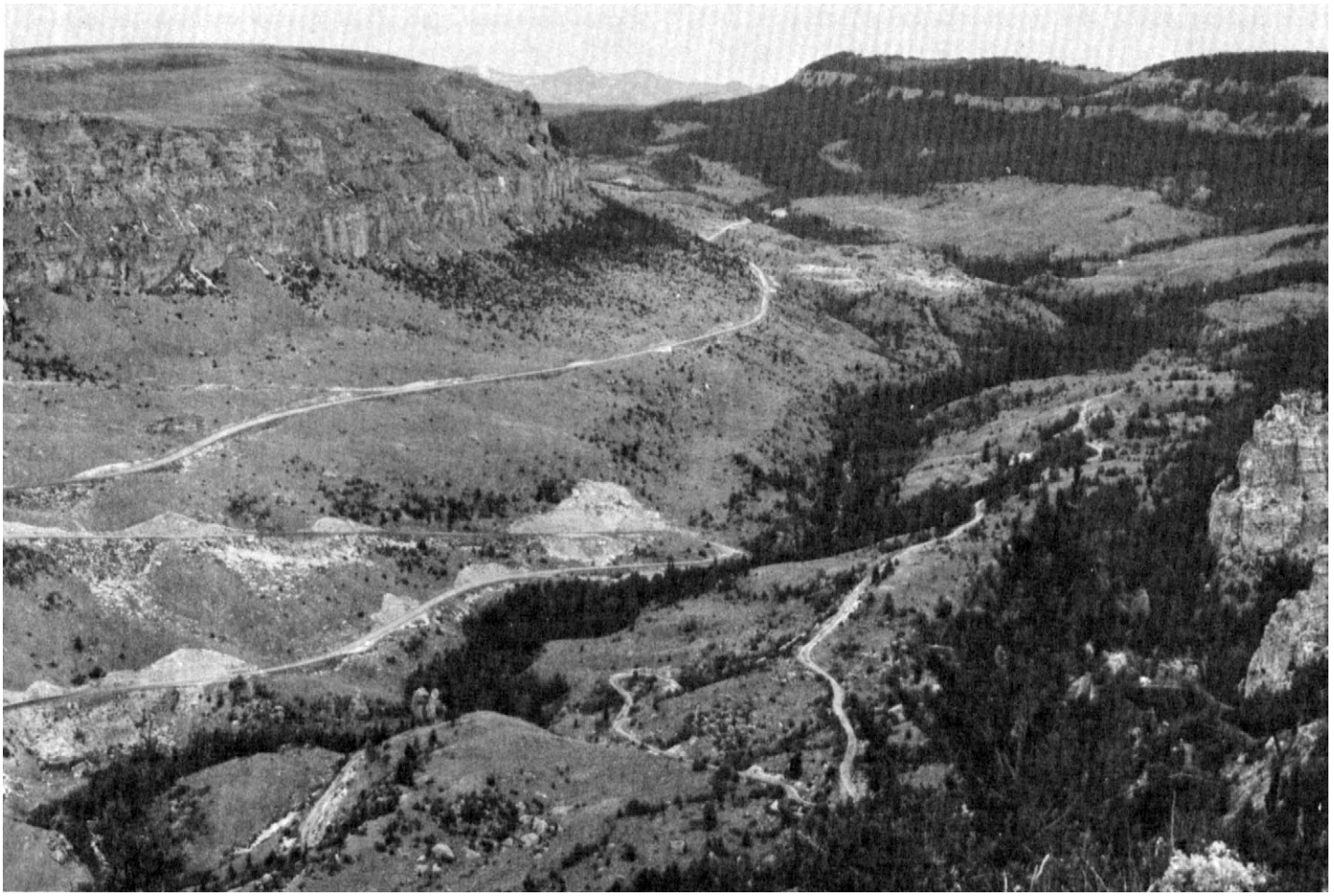


Figure 5.—Area of Nathrop-Starley-Rock outcrop association, in Ten Sleep Canyon.

dominantly from red sandstone and siltstone. Slope ranges from 0 to 3 percent but is commonly about 2 percent. The vegetation in areas not cultivated is mainly grasses and shrubs. Elevation is 4,500 to 6,000 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

Typically, the surface layer is reddish brown loam about 8 inches thick. The underlying material to a depth of 60 inches or more is light red loam.

Included in this unit are small areas of Tensleep and Lostwells soils. The percentage of included soils varies from one area to another.

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

Most areas of this unit are used for irrigated crops, mainly small grain. Among the other crops grown are hay and pasture. Some areas are used as rangeland, for wildlife habitat, and as homesites. Less than 10 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

This unit is well suited to cultivated crops. It has few limitations. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Tillage should be kept to a minimum.

This unit is well suited to hay and pasture. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper

grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, border, contour ditch, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama, threadleaf sedge, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

If this unit is used for homesite development, the main limitation is low soil strength. Erosion is a hazard in the steeper areas. Only the part of the site that is used for construction should be disturbed. Preserving the existing plant cover during construction also helps to control erosion. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

Lawn grasses, shrubs, and trees that are not sensitive to lime-induced chlorosis are well suited to use in landscaping. An annual application of iron chelates reduces the chlorosis. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other seeded plants.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIe-3, irrigated, and capability subclass VIe, dryland. It is in Loamy range site, 10- to 14-inch precipitation zone.

51—Neville loam, 3 to 6 percent slopes. This deep, well drained soil is on fans. It formed in alluvium derived dominantly from red sandstone and siltstone. Slope ranges from 3 to 6 percent but is commonly about 4 percent. The vegetation in areas not cultivated is mainly grasses and shrubs. Elevation is 4,500 to 6,000 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

Typically, the surface layer is reddish brown loam about 8 inches thick. The underlying material to a depth of 60 inches or more is light red loam.

Included in this unit are small areas of Tensleep and Lostwells soils. The percentage of included soils varies from one area to another.

Permeablity of this Neville soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate.

Most areas of this unit are used for irrigated crops, mainly small grain. Among the other crops grown are hay and pasture. Some areas are used for wildlife habitat and as homesites. Less than 15 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are slope and the hazard of water erosion. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Limiting tillage for seedbed preparation and weed control reduces runoff and erosion. All tillage should be on the contour or across the slope.

If this unit is used for hay and pasture, the main limitations are slope and the hazard of water erosion. Seedbed preparation should be on the contour or across the slope where practical. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, contour, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. If furrow irrigation is used, runs should be on the contour or across the slope. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Irrigation water needs to be applied at a rate that insures optimum production without increasing deep percolation, runoff, and erosion. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama, threadleaf sedge, and big sagebrush increase. If the vegetation further

deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

If this unit is used for homesite development, the main limitation is low soil strength. Erosion is also a limitation in the steeper areas. Preserving the existing plant cover during construction helps to control erosion. Only the part of the site that is used for construction should be disturbed. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

Lawn grasses, shrubs, and trees that are not sensitive to lime-induced chlorosis are well suited to use in landscaping. An annual application of iron chelates reduces the chlorosis. Mulch, fertilizer, and irrigation are needed to establish lawn grasses and other seeded plants.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIIe-3, irrigated, and capablity subclass VIe, dryland. It is in Loamy range site, 10- to 14-inch precipitation zone.

52—Neville loam, 6 to 10 percent slopes. This deep, well drained soil is on fans. It formed in alluvium derived dominantly from red sandstone and siltstone. Slope ranges from 6 to 10 percent but is commonly about 7 percent. The vegetation in areas not cultivated is mainly grasses and shrubs. Elevation is 4,500 to 6,000 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

Typically, the surface layer is reddish brown loam about 8 inches thick. The underlying material to a depth of 60 inches or more is light red loam.

Included in this unit are small areas of Tensleep and Spearfish soils. The percentage of included soils varies from one area to another.

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

Most areas of this unit are used for irrigated crops, mainly hay and pasture. Among the other crops grown is small grain. Some areas are used for livestock grazing and wildlife habitat. Less than 15 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are slope and the hazard of water erosion. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Limiting tillage for seedbed preparation and weed control reduces runoff and erosion. All tillage should be on the contour or across the slope.

If this unit is used for hay and pasture, the main limitations are slope and the hazard of water erosion. Seedbed preparation should be on the contour or across the slope where practical. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, contour ditch, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. If sprinkler irrigation is used, water needs to be applied slowly to minimize runoff. If furrow irrigation is used, runs should be on the contour or across the slope. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Irrigation water needs to be applied at a rate that insures optimum production without increasing deep percolation, runoff, and erosion. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion. Limiting tillage for seedbed preparation and weed control reduces runoff and erosion.

The potential plant community on this unit is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama, threadleaf sedge, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

If this unit is used for homesite development, the main limitations are slope and low soil strength. Erosion is also a limitation in the steeper areas. Preserving the existing plant cover during construction helps to control erosion. Only the part of the site that is used for construction should be disturbed. Buildings and roads should be designed to offset the limited ability of the soil in this unit to support a load.

Lawn grasses, shrubs, and trees that are not sensitive to lime-induced chlorosis are well suited to use in landscaping. An annual application of iron chelates reduces the chlorosis. Mulch, fertilizer, and irrigation are

needed to establish lawn grasses and other seeded plants.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IVe-3, irrigated, and capability unit VIe-2, dryland. It is in Loamy range site, 10- to 14-inch precipitation zone.

53—Neville loam, wet, 0 to 3 percent slopes. This deep, somewhat poorly drained soil is on fans. It formed in alluvium derived dominantly from red sandstone and siltstone. Slope ranges from 0 to 3 percent but is commonly about 1 percent. The vegetation in areas not cultivated is mainly grasses and shrubs. Elevation is 4,500 to 6,000 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

Typically, the surface layer is reddish brown loam about 8 inches thick. The underlying material to a depth of 60 inches or more is light red loam.

Included in this unit are small areas of Neville, Tensleep, and Barnum soils. The percentage of included soils varies from one area to another.

Permeability of this Neville soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate. A seasonal high water table fluctuates between depths of 20 and 40 inches in April through October. The soil is wet because the water table has been raised as a result of irrigation. It is slightly saline to moderately saline in the upper part of the root zone.

Most areas of this unit are used for irrigated crops, mainly hay and pasture. Among the other crops grown is small grain. Some areas are used for livestock grazing and wildlife habitat. Less than 5 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not pratical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are wetness and salinity. Most climatically adapted crops can be grown if artificial drainage is provided. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. The fluctuating high water table may delay planting and harvesting.

If this unit is used for hay and pasture, the main limitations are wetness and salinity. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Deep-rooted crops are suited to areas where the natural drainage is adequate or where a drainage system has been installed. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

The concentration of salts and alkali in the surface layer limits the production of plants suitable for hay and pasture. Leaching of the salts from the surface layer is limited by the high water table. Drainage and irrigation water management reduce the concentration of salts. Salt-tolerant species are most suitable for planting.

Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Tile drainage can be used to lower the water table if a suitable outlet is available. Tile or open drains can be used to remove excess water and provide an outlet for leached salts. The content of toxic salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table. Drainage may also be needed. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion. Intensive management is required to reduce the salinity of the soil and maintain soil productivity.

The potential plant community on this unit is mainly alkali sacaton, Nuttall alkaligrass, inland saltgrass, and greasewood. If the vegetation deteriorates, inland saltgrass and greasewood increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 2,400 pounds of air-dry vegetation per acre in normal years. Production varies from 2,600 pounds in favorable years to 1,800 pounds in unfavorable years. Range recovery is slow because of the salt content of the soil. Among the limitations for seeding are the salinity of the soil and low precipitation.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIIws-10, irrigated, and capability subclass IVws, dryland. It is in Saline Subirrigated range site, 10- to 14-inch precipitation zone.

54—Neville-Tensleep complex, 1 to 10 percent slopes. This map unit is on alluvial fans and uplands. Slope is 1 to 10 percent. The native vegetation is mainly grass and shrubs. Elevation is 4,500 to 6,000 feet. The average annual precipitation is about 11 inches, the

average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 65 percent Neville loam and 20 percent Tensleep very fine sandy loam. The Neville soil is on fans, and the Tensleep soil is on fans and on knolls of uplands. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Spearfish soils and a soil that is similar to the Neville soil but is moderately deep. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Neville soil is deep and well drained. It formed in alluvium derived dominantly from red sandstone and siltstone. Typically, the surface layer is reddish brown loam about 7 inches thick. The substratum to a depth of 60 inches or more is light red loam.

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

The Tensleep soil is deep and well drained. It formed in alluvium derived dominantly from red siltstone and sandstone. Typically, the surface layer is red very fine sandy loam about 5 inches thick. The subsoil is yellowish red silt loam about 15 inches thick. The substratum to a depth of 60 inches or more is yellowish red very fine sandy loam.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on this unit is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama, threadleaf sedge, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIe, dryland, and in Loamy range site, 10- to 14-inch precipitation zone.

55—Neville-Spearfish-Rock outcrop association. This map unit is on fans, ridges, hills, escarpments, and ledges. Slope is 1 to 45 percent. The native vegetation is mainly grasses and shrubs. Elevation is 4,200 to 6,000 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 50 percent Neville loam that has slopes of 1 to 10 percent, 25 percent Spearfish loam that has slopes of 5 to 40 percent, and 10 percent Rock outcrop. The Neville soil is on fans, the Spearfish soil is on ridges and hillsides, and Rock outcrop is on escarpments, ledges, hills, and ridgetops.

Included in this unit are small areas of Tensleep soils and a soil that is similar to the Neville soil but is moderately deep. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Neville soil is deep and well drained. It formed in alluvium derived dominantly from red sandstone and siltstone. Typically, the surface layer is reddish brown loam about 7 inches thick. The underlying material to a depth of 60 inches or more is light red loam.

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

The Spearfish soil is shallow and well drained. It formed in material derived dominantly from red siltstone. Typically, the surface layer is light reddish brown loam about 4 inches thick. The underlying material is reddish yellow loam about 9 inches thick. Red siltstone is at a depth of about 13 inches.

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

Rock outcrop is exposures of siltstone and sandstone.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Neville soil is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama, threadleaf sedge, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and shrubs invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Spearfish soil is mainly bluebunch wheatgrass, needleandthread, Indian ricegrass, and rhizomatous wheatgrasses. If the vegetation deteriorates, big sagebrush, rhizomatous wheatgrasses, bluegrasses, and forbs increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 700 pounds in favorable years to 350 pounds in unfavorable years.

Uniform distribution of grazing is difficult to achieve on this unit because of the steepness of slope or the lack of permanent water developments, or both.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Neville soil is in capability subclass VIe, dryland, and in Loamy range site, 10- to 14-inch precipitation zone. The Spearfish soil is in capability subclass VIIe, dryland, and in Shallow Loamy range site, 10- to 14-inch precipitation zone.

56—Persayo-Muff-Rock outcrop association. This map unit is in shallow basins on uplands that have numerous drainageways. Slope is 1 to 6 percent. The native vegetation is mainly grasses and shrubs. Elevation is 4,200 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 50 percent Persayo clay loam that has slopes of 2 to 6 percent, 15 percent Muff fine sandy loam that has slopes of 1 to 6 percent, and 10 percent Rock outcrop. The Persayo soil is on ridges and knolls, the Muff soil is on hillsides and ridges, and Rock outcrop is on remnant buttes, ridges, and knolls.

Included in this unit are small areas of Greybull, Lostwells, and Youngston soils. Included areas make up 25 percent of the total acreage. The percentage varies from one area to another.

The Persayo soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is light yellowish brown clay loam about 1 inch thick. The underlying material is pale brown clay loam about 12 inches thick. Variegated olive green, brown, and gray shale is at a depth of about 13 inches.

Permeability of the Persayo soil is moderately slow. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is high. This soil is moderately saline.

The Muff soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is pale brown fine sandy loam about 5 inches thick. The subsoil is light yellowish brown sandy clay loam about 14 inches thick. The substratum is light brownish gray sandy clay loam about 11 inches thick. Shale is at a depth of about 30 inches. The subsoil is very strongly alkaline.

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

Rock outcrop is exposures of shale and sandstone.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on this unit is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years.

Range recovery is slow because of salt content of the soils. This unit is better suited to grazing by sheep because of the high percentage of gardner saltbush present. Among the limitations for seeding are the salinity of the soils and low precipitation.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Persayo soil is in capability subclass VIIe, dryland, and in Saline Upland range site, 5- to 9-inch precipitation zone. The Muff soil is in capability subclass VIs, dryland, and in Saline Upland range site, 5- to 9-inch precipitation zone.

57—Persayo-Rock outcrop association. This map unit is on ridges, hills that are dissected by numerous dendritic drainageways, and escarpments (fig. 6). Slope is 15 to 40 percent. The native vegetation is mainly grass and shrubs. Elevation is 4,000 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 40 percent Persayo clay loam and 40 percent Rock outcrop. The Persayo soil is on the lower part of ridges and hillsides, and Rock outcrop is on ridges, hilltops, and escarpments.

Included in this unit are small areas of Greybull, Lostwells, Uffens, Youngston, and Persayo soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Persayo soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is light yellowish brown clay loam about 1 inch thick. The underlying material is pale brown clay loam about 12 inches thick. Variegated olive green, brown, and gray shale is at a depth of about 13 inches.

Permeability of the Persayo soil is moderately slow. Available water capacity is very low. Effective rooting depth is 4 to 10 inches. Runoff is rapid, and the hazard of water erosion is high.

Rock outcrop is exposures of shale and sandstone.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on this unit is mainly gardner saltbush, bottlebrush squirreltail, rhizomatous wheatgrasses, and Indian ricegrass. If the vegetation deteriorates, birdfoot sagebrush and woody aster increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 175 pounds of air-dry vegetation per acre in normal years. Production varies from 300 pounds in favorable years to 85 pounds in unfavorable years.

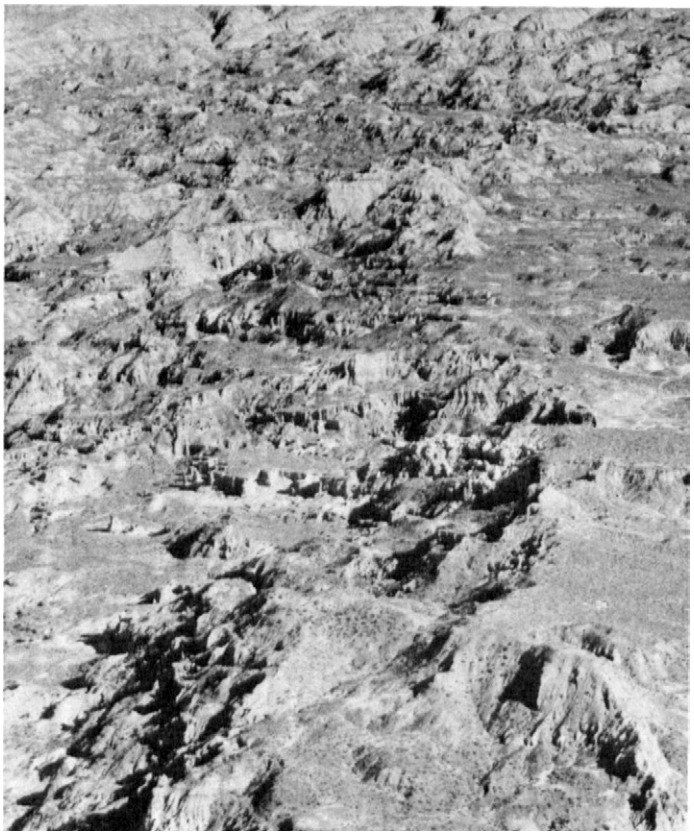


Figure 6.—Area of Persayo-Rock outcrop association, near North Butte.

Range recovery is slow because of the salt content of the soil. This unit is better suited to grazing by sheep than by cattle because of the high percentage of gardner saltbush present. Among the limitations for seeding are the salinity of the soil and low precipitation. Uniform distribution of grazing is difficult to achieve on this unit because of the steepness of slope or the lack of permanent water developments, or both.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Persayo soil is in capability subclass VIIe, dryland, and in Shale range site, 5- to 9- inch precipitation zone.

58—Rekop-Gystrum association. This map unit is on ridges and hillsides. Slope is 3 to 60 percent. The native vegetation is mainly grasses and shrubs. Elevation is 4,500 to 6,000 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 40 percent Rekop loam that has slopes of 10 to 60 percent and 30 percent Gystrum silt loam that has slopes of 3 to 45 percent. Also in this unit is about 10 percent Spearfish loam that has slopes of 5 to 40 percent. The Rekop soil is on gyprock ridgetops and the upper parts of hillsides, the Gystrum soil is on the sides of ridges and the lower parts of hillsides, and the Spearfish soil is on siltstone ridges and the upper parts of hillsides.

Included in this unit are small areas of Neville soils and moderately deep soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Rekop soil is shallow and well drained. It formed in material derived dominantly from gyprock. Typically, the surface layer is reddish brown loam about 9 inches thick. The underlying material is pink loam about 5 inches thick. Gyprock is at a depth of about 14 inches.

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

The Gystrum soil is moderately deep and well drained. It formed in material derived dominantly from gyprock. Typically, the surface layer is reddish brown silt loam about 4 inches thick. The subsoil is light reddish brown silt loam about 8 inches thick. The substratum is mixed pink and white silt loam about 24 inches thick. Gyprock is at a depth of about 36 inches.

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

The Spearfish soil is shallow and well drained. It formed in material derived dominantly from red siltstone. Typically, the surface layer is light reddish brown loam about 4 inches thick. The underlying material is reddish brown loam about 10 inches thick. Siltstone is at a depth of about 14 inches.

Permeablity of the Spearfish soil is moderate. Available water capacity is low. Effective rooting depth is 8 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Rekop and Spearfish soils is mainly bluebunch wheatgrass, needleandthread, Indian ricegrass, and rhizomatous wheatgrasses. If the vegetation deteriorates, big sagebrush, rhizomatous wheatgrasses, bluegrasses, and forbs increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 700 pounds in favorable years to 350 pounds in unfavorable years.

The potential plant community on the Gystrum soil is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrass, and big sagebrush. If the vegetation deteriorates, blue grama, threadleaf sedge,

and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Rekop and Spearfish soils are in capability subclass VIIe, dryland, and in Shallow Loamy range site, 10- to 14-inch precipitation zone. The Gystrum soil is in capability subclass VIe, dryland, and in Loamy range site, 10- to 14-inch precipitation zone.

59—Renohill-Heldt-Worf association. This map unit is on ridges, hillsides, and fans. Slope is 1 to 25 percent. The native vegetation is mainly grasses and shrubs. Elevation is 5,000 to 5,500 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 35 percent Renohill silty clay loam that has slopes of 2 to 25 percent, 30 percent Heldt silty clay loam that has slopes of 1 to 10 percent, and 15 percent Worf loam that has slopes of 1 to 25 percent. The Renohill soil is on the lower part of ridges and hillsides, the Heldt soil is on fans, and the Worf soil is on the upper part of ridges and hillsides.

Included in this unit are small areas of fine textured soils, Shingle soils, and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Renohill soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is pale brown silty clay loam about 2 inches thick. The subsoil is yellowish brown clay about 12 inches thick. The substratum is light yellowish brown silty clay about 7 inches thick. Shale is at a depth of about 21 inches.

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

The Heldt soil is very deep and well drained. It formed in alluvium derived dominantly from shale. Typically, the surface layer is pale brown silty clay loam about 5 inches thick. The subsoil is yellowish brown clay about 22 inches thick. The substratum to a depth of 60 inches or more is yellowish brown clay.

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

The Worf soil is shallow and well drained. It formed in material derived dominantly from sandstone interbedded with shale. Typically, the surface layer is pale brown loam about 4 inches thick. The subsoil is yellowish brown clay loam about 6 inches thick. The substratum is pale brown loam about 6 inches thick. Sandstone is at a depth of about 16 inches.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Renohill and Heldt soils is mainly Indian ricegrass, bluebunch wheatgrass, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, big sagebrush and forbs increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Worf soil is mainly bluebunch wheatgrass, needleandthread, Indian ricegrass, and rhizomatous wheatgrasses. If the vegetation deteriorates, big sagebrush, rhizomatous wheatgrasses, bluegrasses, and forbs increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 700 pounds in favorable years to 350 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

The Renohill and Heldt soils are in capability subclass VIe, dryland, and in Clayey range site, 10- to 14-inch precipitation zone. The Worf soil is in capability subclass VIIe, dryland, and in Shallow Loamy range site, 10- to 14-inch precipitation zone.

60—Riverwash. This unit consists of unstabilized fine-textured, medium-textured, or gravelly sediment that is slightly saline or moderately saline. The texture and other properties vary within short distances.

A seasonal high water table fluctuates according to the level of nearby streams. This unit is subject to brief periods of flooding throughout the year.

This unit is not assigned to a capability classification.

61—Rock outcrop-Persayo complex, 15 to 70 percent slopes. This map unit is on dissected, hilly to very steep uplands. The native vegetation is mainly grasses and shrubs. Elevation is 4,000 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 65 percent Rock outcrop and 20 percent Persayo clay loam that has slopes of 15 to 45 percent. Rock outcrop is on knobs, ridges, hilltops, and

escarpments, and the Persayo soil is on ridges and hillsides. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Lostwells, Muff, and Youngston soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

Rock outcrop is exposures of shale and sandstone.

The Persayo soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is pale brown clay loam about 1 inch thick. Variegated olive green, brown, and gray shale is at a depth of about 13 inches.

Permeability of the Persayo soil is moderately slow. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. This soil is saline.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Persayo soil is mainly gardner saltbush, bottlebrush squirreltail, rhizomatous wheatgrasses, and Indian ricegrass. If the vegetation deteriorates, sagebrush and woody aster increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 175 pounds of air-dry vegetation per acre in normal years. Production varies from 300 pounds in favorable years to 85 pounds in unfavorable years.

Range recovery is slow because of the salt content of the soil in this unit. This unit is better suited to grazing by sheep than by cattle because of the high percentage of gardner saltbush present. Uniform distribution of grazing is difficult to achieve on this unit because of the steepness of slope or the lack of permanent water developments, or both.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Persayo soil is in capability subclass VIIIe, dryland, and in Shale range site, 5- to 9-inch precipitation zone.

62—Rock outcrop-Spearfish complex, 1 to 60 percent slopes. This map unit is on ridges, hills, escarpments, and fans. The native vegetation is mainly grasses, shrubs, and scattered juniper. Elevation is 4,200 to 6,000 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 55 percent Rock outcrop and 15 percent Spearfish loam that has slopes of 5 to 40 percent. Also in this unit is about 10 percent Neville loam that has slopes of 1 to 10 percent. Rock outcrop is on ridges, hilltops, and escarpments; the Spearfish soil is on ridges and back slopes of hills; and the Neville soil is on fans. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Rairdent, Rekop, and Tensleep soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Rock outcrop is exposures of red siltstone or sandstone.

The Spearfish soil is shallow and well drained. It formed in material derived dominantly from red siltstone. Typically, the surface layer is light reddish brown loam about 4 inches thick. The underlying material is reddish yellow loam about 9 inches thick. Siltstone is at a depth of about 13 inches.

Permeability of the Spearfish soil is moderate. Available water capacity is low. Effective rooting depth is 8 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

The Neville soil is deep and well drained. It formed in alluvium derived dominantly from red sandstone and siltstone. Typically, the surface layer is reddish brown loam about 7 inches thick. The underlying material to a depth of 60 inches or more is light red loam.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Spearfish soil is mainly bluebunch wheatgrass, needleandthread, Indian ricegrass, and rhizomatous wheatgrasses. If the vegetation deteriorates, big sagebrush, rhizomatous wheatgrasses, bluegrasses, and forbs increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 700 pounds in favorable years to 350 pounds in unfavorable years.

The potential plant community on the Neville soil is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama, threadleaf sedge, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

Uniform distribution of grazing is difficult to achieve on this unit because of the steepness of slope or the lack of permanent water developments, or both.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

The Spearfish and Neville soils are in capability subclass VIIIs, dryland. The Spearfish soil is in Shallow

Loamy range site, 10- to 14-inch precipitation zone, and the Neville soil is in Loamy range site, 10- to 14-inch precipitation zone.

63—Rock outcrop-Starman complex, 6 to 45 percent slopes. This map unit is on escarpments, ledges, and dissected mountainsides. The native vegetation is mainly grasses, shrubs, and scattered limber pine. Elevation is 6,500 to 9,000 feet. The average annual precipitation is about 19 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 50 to 75 days.

This unit is 60 percent Rock outcrop and 20 percent Starman gravelly loam that has slopes of 6 to 45 percent. Rock outcrop is on escarpments and ledges, and the Starman soil is on mountainsides adjacent to or between areas of Rock outcrop. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Limber, Morset, Nathrop, Splitro, and Starley soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

Rock outcrop is exposures of limestone and calcareous sandstone.

The Starman soil is very shallow and well drained. It formed in material derived dominantly from limestone. Typically, the surface layer is grayish brown gravelly loam about 3 inches thick. The underlying material is pale brown very gravelly loam about 7 inches thick. Hard limestone is at a depth of about 10 inches.

Permeability of the Starman soil is moderate. Available water capacity is very low. Effective rooting depth is 3 to 10 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Starman soil is mainly Columbia needlegrass, bluebunch wheatgrass, mountainmahogany, and Idaho fescue. If the vegetation deteriorates, black sagebrush and big sagebrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 600 pounds of air-dry vegetation per acre in normal years. Production varies from 800 pounds in favorable years to 400 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Starman soil is in capability subclass VIIIs, dryland, and in Very Shallow range site, 15- to 19-inch precipitation zone.

64—Spearfish-Travessilla-Rock outcrop complex, 10 to 60 percent slopes. This map unit is on ridges, hills, and escarpments. Slope is 10 to 60 percent. The native vegetation is mainly grasses, shrubs, and scattered juniper. Elevation is 4,200 to 7,200 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 35 percent Spearfish loam that has slopes of 10 to 40 percent, 30 percent Travessilla loam that has slopes of 10 to 60 percent, and 15 percent Rock outcrop. The Spearfish and Travessilla soils are on hillsides, and Rock outcrop is on ridges, hilltops, and escarpments. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Neville, Rekop, and Travessilla soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Spearfish soil is shallow and well drained. It formed in material derived dominantly from red siltstone. Typically, the surface layer is light reddish brown loam about 4 inches thick. The underlying material is reddish yellow loam about 9 inches thick. Siltstone is at a depth of about 13 inches.

Permeability of the Spearfish soil is moderate. Available water capacity is low. Effective rooting depth is 8 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

The Travessilla soil is very shallow and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is brown loam about 1 inch thick. The underlying material is brown channery loam about 9 inches thick. Hard sandstone is at a depth of about 10 inches.

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

Rock outcrop is exposures of sandstone, siltstone, and limestone.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Spearfish soil is mainly bluebunch wheatgrass, needleandthread, Indian ricegrass, and rhizomatous wheatgrasses. If the vegetation deteriorates, big sagebrush, rhizomatous wheatgrasses, bluegrasses, and forbs increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 500 pounds in favorable years to 250 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Spearfish and Travessilla soils are in capability subclass VIIe, dryland. The Spearfish soil is in Shallow Loamy range site, 10- to 14-inch precipitation zone, and the Travessilla soil is in Very Shallow range site, 10- to 14-inch precipitation zone.

65—Stubbs-Turk association. This map unit is on mountainsides and ridges. Slope is 1 to 30 percent. The native vegetation is mainly grasses and shrubs. Elevation is 8,000 to 9,000 feet. The average annual precipitation is about 19 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 60 to 90 days.

This unit is 40 percent Stubbs loam that has slopes of 2 to 15 percent and 30 percent Turk silty clay loam that has slopes of 1 to 15 percent. Also in this unit is about 15 percent Lymanson gravelly loam that has slopes of 10 to 30 percent slopes. The Stubbs soil is on mountainsides, and the Turk and Lymanson soils are on ridges and mountainsides.

Included in this unit are small areas of Clayburn, Decross, and Jenkinson soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Stubbs soil is moderately deep and well drained. It formed in material derived dominantly from interbedded shale and siltstone. Typically, the surface layer is dark grayish brown loam about 10 inches thick. The subsoil is brown loam about 8 inches thick. The substratum is light yellowish brown loam about 16 inches thick. Soft bedrock is at a depth of about 34 inches.

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

The Turk soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is grayish brown silty clay loam about 3 inches thick. The subsoil is dark brown clay about 11 inches thick. The substratum is light brownish gray clay about 20 inches thick. Shale is at a depth of about 34 inches.

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

The Lymanson soil is moderately deep and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is dark grayish brown gravelly loam about 2 inches thick. The subsoil is grayish brown gravelly clay loam about 5 inches thick. The substratum is pale olive gravelly clay loam about 14 inches thick. Shale is at a depth of about 21 inches.

Permeability of the Lymanson soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Stubbs and Lymanson soils is mainly Columbia needlegrass, spike fescue, Idaho fescue, and big sagebrush. If the vegetation deteriorates, big sagebrush and rabbitbrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The potential plant community on the Turk soil is mainly Columbia needlegrass, spike fescue, Idaho fescue, and big sagebrush. If the vegetation deteriorates, big sagebrush and forbs increase. If the vegetation futher deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 1,300 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Stubbs and Lymanson soils are in capability subclass VIe, dryland, and in Loamy range site, 15- to 19-inch precipitation zone. The Turk soil is in capability subclass VIe, dryland, and in Clayey range site, 15- to 19-precipitation zone.

66—Stutzman silty clay loam, 0 to 3 percent slopes. This deep, well drained soil is on fans and in valleys. It formed in alluvium. Slope ranges from 0 to 3 percent but is commonly about 1 percent. The vegetation in areas not cultivated is mainly grasses and shrubs. Elevation is 3,950 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

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

Included in this unit are small areas of Lostwells, Youngston, and Dobent soils. The percentage of included soils varies from one area to another.

Permeability of this Stutzman soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate. This soil is slightly saline.

Most areas of this unit are used for irrigated crops, mainly sugar beets and small grain. Among the other crops grown are hay and pasture. Some areas are used for livestock grazing and wildlife habitat. Less than 10 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitation is slow permeability. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Excessive cultivation can result in the formation of

a tillage pan. This pan can be broken by subsoiling when the soil is dry.

If this unit is used for hay or pasture, the main limitation is slow permeability. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table. Drainage may also be needed. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Because of the slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas.

The potential plant community on this unit is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years.

Range recovery is slow because of the salt content of the soil in this unit. Among the limitations for seeding are the salinity of the soil and low precipitation. This unit is better suited to grazing by sheep than by cattle because of the high percentage of gardner saltbush present.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIIs-7, irrigated, and capability subclass VIs, dryland. It is in Saline Upland range site, 5- to 9-inch precipitation zone.

67—Stutzman silty clay loam, wet, 0 to 3 percent slopes. This deep, somewhat poorly drained soil is on fans and in valleys. It formed in alluvium. Slope ranges from 0 to 3 percent but is commonly about 1 percent. The vegetation in areas not cultivated is mainly grasses and shrubs. Elevation is 3,900 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

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

Included in this unit are small areas of Dobent and Lostwells soils and small areas of Youngston clay loam, moderately wet, 0 to 3 percent slopes. The percentage of included soils varies from one area to another.

Permeability of this Stutzman soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is moderate. The hazard of wind erosion is moderate. A seasonal high water table fluctuates between depths of 20 and 40 inches in June through November. This soil is wet because the water table has been raised by irrigation. It is highly saline in the upper part of the root zone.

Most areas of this unit are used for irrigated crops, mainly small grain and hay and pasture. Among the other crops grown is sugar beets. Some areas are used for livestock grazing and wildlife habitat. Less than 5 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are slow permeability and wetness. Most climatically adapted crops can be grown if artificial drainage is provided. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. The fluctuating high water table may delay planting and harvesting.

If this unit is used for hay and pasture, the main limitations are slow permeability, wetness, and salinity. Wetness limits the choice of plants and the period of cutting or grazing and increases the risk of winterkill. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff.

The concentration of salts and alkali in the surface layer limits the production of plants suitable for hay and pasture. Leaching the salts from the surface layer is limited by the high water table. Drainage and irrigation water management reduce the concentration of salts. Tile or open drains can be used to remove excess water and provide an outlet for leached salts. The content of toxic salts can be reduced by leaching, applying proper amounts of soil amendments, and returning crop residue to the soil. Salt-tolerant species are most suitable for planting.

Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage. Most climatically adapted plants can be grown if artificial drainage is provided.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Furrow, border,

and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. Irrigation water needs to be applied carefully to prevent the buildup of a high water table. Drainage may also be needed. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Because of the slow permeability of the soil in this unit, the length of runs should be adjusted to permit adequate infiltration of water. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly alkali sacaton, Nuttall alkaligrass, inland saltgrass, and greasewood. If the vegetation deteriorates, inland saltgrass and greasewood increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 2,400 pounds of air-dry vegetation per acre in normal years. Production varies from 2,600 pounds in favorable years to 1,800 pounds in unfavorable years. Range recovery is slow because of the salt content of the soil in this unit. Among the limitations for seeding are the salinity of the soil and low precipitation.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IVws-10, irrigated, and capability subclass VIIws, dryland. It is in Saline Subirrigated range site, 5- to 9-inch precipitation zone.

68—Stutzman-Persayo association. This map unit is on fans, in valleys, and on ridges and hillsides. Slope is 1 to 20 percent. The native vegetation is mainly grasses and shrubs. Elevation is 4,200 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 30 percent Stutzman silty clay loam that has slopes of 1 to 10 percent and 25 percent Persayo clay loam that has slopes of 6 to 20 percent. Also in this unit is about 20 percent Youngston silty clay loam that has slopes of 1 to 10 percent. The Stutzman and Youngston soils are on fans and in valleys, and the Persayo soil is in undulating areas on ridges and hillsides.

Included in this unit are small areas of Greybull and Uffens soils and a soil that is similar to the Stutzman soil but is moderately deep and nonacid. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Stutzman soil is deep and well drained. It formed in alluvium. Typically, the surface layer is brown silty clay loam about 6 inches thick. The underlying material to a depth of 60 inches or more is pale brown silty clay.

Permeability of the Stutzman soil is slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is rapid, and the hazard of water erosion is high. This soil is slightly saline.

The Persayo soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is light grayish brown clay loam about 1 inch thick. The underlying material is pale brown clay loam about 12 inches thick. Variegated olive green, brown, and gray shale is at a depth of about 13 inches.

Permeability of the Persayo soil is moderately slow. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. This soil is moderately saline.

The Youngston soil is deep and well drained. It formed in alluvium. Typically, the surface layer is pale brown silty clay loam about 4 inches thick. The underlying material to a depth of 60 inches or more is pale brown clay loam stratified with lenses of silt loam, silty clay loam, and very fine sandy loam.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on this unit is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years. Range recovery is slow because of the salt content of the soils in this unit. This unit is better suited to grazing by sheep than by cattle because of the high percentage of gardner saltbush present. Among the limitations for seeding are the salinity of the soil and low precipitation.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Stutzman amd Youngston soils are in capability subclass VIe, dryland, and in Saline Upland range site, 5- to 9-inch precipitation zone. The Persayo soil is in capability subclass VIIe, dryland, and in Saline Upland range site, 5- to 9-inch precipitation zone.

69—Tensleep loam, 3 to 6 percent slopes. This deep, well drained soil is on fans and uplands. It formed in alluvium derived dominantly from red siltstone and sandstone. Slope ranges from 3 to 6 percent but is commonly about 4 percent. The vegetation in areas not cultivated is mainly grasses and shrubs. Elevation is 4,200 to 6,000 feet. The average annual precipitation is

about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

Typically, the surface layer is red loam about 7 inches thick. The subsoil is yellowish red silt loam about 4 inches thick. The substratum to a depth of 60 inches or more is yellowish red very fine sandy loam. In some areas the surface layer is very fine sandy loam.

Included in this unit are small areas of Neville, Vale, and Spearfish soils. The percentage of included soils varies from one area to another.

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

Most areas of this unit are used for irrigated crops, mainly small grain, and hay and pasture. Among the other crops grown is corn for silage. Some areas are used for livestock grazing and for wildlife habitat. Less than 5 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for irrigated crops, the main limitation is slope. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. Limiting tillage for seedbed preparation and weed control reduces runoff and erosion. All tillage should be on the contour or across the slope.

If this unit is used for hay and pasture, the main limitation is slope. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Periodic mowing and clipping help to maintain uniform growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, contour ditch, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. If furrow irrigation is used, runs should be on the contour or across the slope. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama, threadleaf sedge, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIIe-2, irrigated, and capability subclass VIe, dryland. It is in Loamy range site, 10- to 14-inch precipitation zone.

70—Uffens-Persayo complex, 1 to 30 percent slopes. This map unit is on terraces and hillsides. The native vegetation is mainly grasses and shrubs. Elevation is 4,000 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 40 percent Uffens loam that has slopes of 1 to 8 percent and 30 percent Persayo clay loam that has slopes of 2 to 30 percent. Also in this unit is about 15 percent Greybull clay loam that has slopes of 2 to 20 percent. The Uffens soil is on terraces, the Persayo soil is on the upper part of hillsides, and the Greybull soil is on the lower part of hillsides. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Muff, Stutzman, and Youngston soils. Included areas make up about 15 percent of the total acreage. The percentage varies from one area to another.

The Uffens soil is deep and well drained. It formed in alluvium. Typically, the surface layer is pale brown loam about 1 inch thick. The upper 4 inches of the subsoil is pinkish gray clay loam, and the lower 7 inches is pinkish gray sandy clay loam. The upper 28 inches of the substratum is pale brown sandy clay loam, and the lower part to a depth of 60 inches or more is pale brown clay loam. The subsoil is very strongly alkaline.

Permeability of the Uffens soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is highly saline.

The Persayo soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is light yellowish brown clay loam about 1 inch thick. The underlying material is pale brown clay loam about 12 inches thick. Variegated olive green, brown, and gray shale is at a depth of about 13 inches.

Permeability of the Persayo soil is moderately slow. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is high. This soil is moderately saline.

The Greybull soil is moderately deep and well drained. It formed in material derived dominantly from shale.

Typically, the surface layer is olive clay loam about 4 inches thick. The underlying material is pale olive clay loam about 19 inches thick. Shale is at a depth of about 23 inches.

Permeability of the Greybull soil is moderately slow. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. This soil is slightly saline.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on this unit is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years. Range recovery is slow because of the salt content of these soils. This unit is better suited to grazing by sheep than by cattle because of the high percentage of gardner saltbush present. Among the limitations for seeding are the salinity of the soil and low precipitation.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIe, dryland, and in Saline Upland range site, 5- to 9-inch precipitation zone.

71—Uffens-Rairdent complex, 1 to 10 percent slopes. This map unit is on fans and terraces. The native vegetation is mainly grasses and shrubs. Elevation is 4,000 to 5,700 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 40 percent Uffens loam that has slopes of 1 to 8 percent and 30 percent Rairdent fine sandy loam that has slopes of 1 to 10 percent. Also in this unit is about 10 percent Griffy sandy loam that has slopes of 1 to 10 percent. The Uffens soil is in the lower lying areas and in depressional areas of terraces, and the Rairdent and Griffy soils are in the higher lying areas of fans and terraces. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Clifterson, Muff, and Neiber soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Uffens soil is deep and well drained. It formed in alluvium. Typically, the surface layer is pale brown loam about 1 inch thick. The upper 4 inches of the subsoil is pinkish gray clay loam, and the lower 7 inches is pinkish gray sandy clay loam. The upper 28 inches of the substratum is pale brown sandy clay loam, and the lower part to a depth of 60 inches or more is pale brown clay loam. The subsoil is very strongly alkaline.

Permeability of the Uffens soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is highly saline.

The Rairdent soil is deep and well drained. It formed in alluvium. Typically, the surface layer is pale brown fine sandy loam about 2 inches thick. The subsoil is brown clay loam about 15 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown gravelly fine sandy loam.

Permeability of the Rairdent soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is moderately saline.

The Griffy soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray sandy loam about 3 inches thick. The subsoil is brown sandy clay loam about 11 inches thick. The substratum to a depth of 60 inches or more is very pale brown sandy loam.

Permeability of the Griffy soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is slightly saline.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Uffens soil is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years.

The potential plant community on the Rairdent soil is mainly bluebunch wheatgrass, rhizomatous wheatgrass, needleandthread, and big sagebrush. If the vegetation deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 365 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

The potential plant community on the Griffy soil is mainly needleandthread, rhizomatous wheatgrass, Indian ricegrass, and big sagebrush. If the vegetation deteriorates, blue grama and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 375 pounds of air-dry vegetation per acre in normal years. Production varies

from 600 pounds in favorable years to 225 pounds in unfavorable years.

Range recovery is slow because of the salt content of the soils in this unit. The unit is better suited to grazing by sheep than by cattle because of the high percentage of gardner saltbush present. Among the limitations for seeding are the salinity of the soils and low precipitation.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIe, dryland. The Uffens soil is in Saline Upland range site, 5- to 9-inch precipitation zone; the Rairdent soil is in Loamy range site, 5- to 9-inch precipitation zone; and the Griffy soil is in Sandy range site, 5- to 9-inch precipitation zone.

72—Vale-Tensleep association. This map unit is on fans, ridges, and hillsides. Slope is 1 to 40 percent. The native vegetation is mainly grasses and shrubs. Elevation is 4,200 to 6,000 feet. The average annual precipitation is about 11 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 35 percent Vale very fine sandy loam that has slopes of 1 to 15 percent and 30 percent Tensleep very fine sandy loam that has slopes of 1 to 10 percent. Also in this unit is about 15 percent Spearfish loam that has slopes of 5 to 40 percent. The Vale soil is on the higher, broader, more stable fans; the Tensleep soil is on the lower, narrower fans and foot slopes; and the Spearfish soil is adjacent to Rock outcrop on ridges and hillsides.

Included in this unit are small areas of Gystrum and Neville soils and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Vale soil is deep and well drained. It formed in alluvium derived dominantly from red siltstone. Typically, the surface layer is brown very fine sandy loam about 5 inches thick. The upper 11 inches of the subsoil is reddish brown silty clay loam, and the lower 5 inches is light reddish brown loam. The substratum to a depth of 60 inches or more is light brown loam.

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

The Tensleep soil is deep and well drained. It formed in alluvium derived dominantly from red siltstone and sandstone. Typically, the surface layer is red very fine sandy loam about 5 inches thick. The subsoil is yellowish red silt loam about 6 inches thick. The substratum to a depth of 60 inches or more is yellowish red very fine sandy loam.

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

The Spearfish soil is shallow and well drained. It formed in material derived dominantly from red siltstone. Typically, the surface layer is light reddish brown loam about 4 inches thick. The underlying material is reddish yellow loam 9 inches thick. Red siltstone is at a depth of about 13 inches.

Permeability of the Spearfish soil is moderate. Available water capacity is low. Effective rooting depth is 8 to 20 inches. Runoff is rapid, and the hazard of water erosion is high.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Vale and Tensleep soils is mainly bluebunch wheatgrass, needleandthread, rhizomatous wheatgrasses, and big sagebrush. If the vegetation deteriorates, blue grama, threadleaf sedge, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces 800 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 500 pounds in unfavorable years.

The potential plant community on the Spearfish soil is mainly bluebunch wheatgrass, needleandthread, Indian ricegrass, and rhizomatous wheatgrasses. If the vegetation deteriorates, big sagebrush, rhizomatous wheatgrasses, bluegrasses, and forbs increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 500 pounds of air-dry vegetation per acre in normal years. Production varies from 700 pounds in favorable years to 350 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Vale and Tensleep soils are in capability subclass VIe, dryland, and in Loamy range site, 10- to 14-inch precipitation zone. The Spearfish soil is in capability subclass VIIe, dryland, and in Shallow Loamy range site, 10- to 14-inch precipitation zone.

73—Wallson loamy fine sand, 1 to 10 percent slopes. This deep, well drained soil is on fans. It formed in alluvium. The native vegetation is mainly grasses and shrubs. Elevation is 4,000 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is pale brown loamy fine sand about 4 inches thick. The subsoil is brown sandy loam about 11 inches thick. The substratum to a depth of 60 inches or more is light yellowish brown sandy loam.

Included in this unit are small areas of Apron, Griffy, Persayo, and Worland soils. The percentage of included soils varies from one area to another.

Permeability of this Wallson soil is moderately rapid. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on this unit is mainly needleandthread, rhizomatous wheatgrasses, Indian ricegrass, and big sagebrush. If the vegetation deteriorates, blue grama and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 375 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years. Seeding disturbed areas to native or tame pasture plants reduces soil blowing.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIe and in Sandy range site, 5- to 9-inch precipitation zone.

74—Wallson sandy loam, 3 to 6 percent slopes. This deep, well drained soil is on fans. It formed in alluvium. Slope ranges from 3 to 6 percent but is commonly about 3 percent. The vegetation in areas not cultivated is mainly grasses and shrubs. Elevation is 4,000 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is light brownish gray sandy loam about 8 inches thick. The subsoil is brown sandy loam about 4 inches thick. The underlying material to a depth of 60 inches or more is light yellowish brown sandy loam.

Included in this unit are small areas of Apron, Clifterson, Griffy, and Worland soils. The percentage of included soils varies from one area to another.

Permeability of this Wallson soil is moderately rapid. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is high.

Most areas of this unit are used for irrigated crops, mainly small grain and hay and pasture. Among the other crops grown is corn. Some areas are used for livestock grazing and wildlife habitat. Less than 10 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are slope and a rapid water intake rate. Returning crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Wind erosion can be reduced by keeping the soil rough and cloddy when it is not protected by vegetation. Tillage should be kept to a minimum.

If this unit is used for hay and pasture, the main limitations are slope and a rapid water intake rate. Grazing when the soil is moist results in compaction of the surface layer, poor tilth, and excessive runoff. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. If furrow or corrugation irrigation systems are used, runs should be on the contour or across the slope. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly needleandthread, rhizomatous wheatgrasses, Indian ricegrass, and big sagebrush. If the vegetation deteriorates, blue grama and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 375 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIIe-5, irrigated, and capability subclass VIe, dryland. It is in Sandy range site, 5- to 9-inch precipitation zone.

75—Whaley-Rock outcrop complex, 3 to 60 percent slopes. This map unit is on ridges, hogbacks, ledges, and escarpments. The native vegetation is mainly grasses, shrubs, and scattered ponderosa pine. Elevation is 5,600 to 8,500 feet. The average annual precipitation is about 19 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 60 to 90 days.

This unit is 45 percent Whaley loamy very fine sand that has slopes of 3 to 60 percent and 15 percent Rock outcrop. Also in this unit is about 15 percent Splitro fine sandy loam that has slopes of 6 to 25 percent. The

Whaley soil is on ridgetops and hogbacks, Rock outcrop is on narrow ledges and escarpments, and the Splitro soil is on ridges and hogbacks. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Coutis and Greenman soils. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Whaley soil is shallow and excessively drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is light brownish gray loamy very fine sand about 5 inches thick. The subsoil is brown loamy very fine sand about 5 inches thick. Hard sandstone is at a depth of about 10 inches.

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

Rock outcrop is exposures of sandstone.

The Splitro soil is shallow and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is dark brown fine sandy loam about 7 inches thick. The subsoil is brown fine sandy loam about 11 inches thick. Hard sandstone is at a depth of about 18 inches.

Permeability of the Splitro soil is moderately rapid. Available water capacity is very low. Effective rooting depth is 10 to 20 inches. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on this unit is mainly Columbia needlegrass, Idaho fescue, mountain brome, and big sagebrush. If the vegetation deteriorates, big sagebrush and Sandberg bluegrass increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 850 pounds of air-dry vegetation per acre in normal years. Production varies from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Whaley and Splitro soils are in capability subclass VIIe, dryland, and in Shallow Sandy range site, 15- to 19-inch precipitation zone.

76—Woosley-Decross association. This map unit is on mountainsides, hills, and fans. Slope is 1 to 25 percent. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 9,000 feet. The average annual precipitation is about 19 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 60 to 90 days.

This unit is 45 percent Woosley loam that has slopes of 2 to 20 percent and 25 percent Decross loam that has slopes of 1 to 10 percent. Also in this unit is about 10 percent Nathrop very cobbly loam that has slopes of 6 to 25 percent. The Woosley soil is on mountainsides, the Decross soil is on fans, and the Nathrop soil is adjacent to exposures of bedrock on mountainsides and hilltops.

Included in this unit are small areas of Burnette, Morset, Starley, and Wallrock soils and Rock outcrop. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Woosley soil is moderately deep and well drained. It formed in material derived dominantly from sandy limestone. Typically, the surface layer is dark grayish brown loam about 13 inches thick. The subsoil is light brownish gray clay loam about 9 inches thick. Hard limestone is at a depth of about 22 inches.

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

The Decross soil is deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is dark grayish brown loam about 16 inches thick. The subsoil is grayish brown clay loam about 20 inches thick. The substratum to a depth of 60 inches or more is light gray clay loam.

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

The Nathrop soil is moderately deep and well drained. It formed in material derived dominantly from limestone. Typically, 10 to 30 percent of the surface is covered with cobbles and gravel. The surface layer is dark grayish brown very cobbly loam about 3 inches thick. The subsoil is brown very cobbly clay loam about 19 inches thick. The substratum is pale brown very cobbly loam about 14 inches thick. Hard limestone is at a depth of about 36 inches.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Woosley and Decross soils is mainly Columbia needlegrass, spike fescue, Idaho fescue, and big sagebrush. If the vegetation deteriorates, big sagebrush and rabbitbrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The potential plant community on the Nathrop soil is mainly Columbia needlegrass, Idaho fescue, bluebunch wheatgrass, and big sagebrush. If the vegetation

deteriorates, bluegrasses and big sagebrush increase. If the vegetation further deteriorates, forbs and annual grasses and weeds invade. The potential plant community produces about 950 pounds of air-dry vegetation per acre in normal years. Production varies from 1,100 pounds in favorable years to 600 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Woosley and Decross soils are in capability subclass VIe, dryland, and in Loamy range site, 15- to 19-inch precipitation zone. The Nathrop soil is in capability subclass VIe, dryland, and in Coarse Upland range site, 15- to 19-inch precipitation zone.

77—Woosley-Morset association. This map unit is on mountainsides and fans. Slope is 2 to 25 percent. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 9,000 feet. The average annual precipitation is about 19 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 60 to 90 days.

This unit is 40 percent Woosley loam that has slopes of 2 to 25 percent and 35 percent Morset loam that has slopes of 2 to 20 percent. The Woosley soil is on mountainsides, and the Morset soil is on fans.

Included in this unit are small areas of Nathrop soils, Starley soils, and a shallow Woosley soil. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Woosley soil is moderately deep and well drained. It formed in material derived dominantly from limestone. Typically, the surface layer is dark grayish brown loam about 13 inches thick. The subsoil is light brownish gray clay loam about 9 inches thick. Hard limestone is at a depth of about 22 inches.

Permeabilty of the Woosley soil is moderate. Available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Morset soil is deep and well drained. It formed in alluvium derived dominantly from limestone. Typically, the surface layer is grayish brown loam about 10 inches thick. The subsoil is brown clay loam about 17 inches thick. The substratum to a depth of 60 inches or more is very pale brown clay loam.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on this unit is mainly Columbia needlegrass, spike fescue, Idaho fescue, and big sagebrush. If the vegetation deteriorates, big sagebrush and rabbitbrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIe, dryland, and in Loamy range site, 15- to 19-inch precipitation zone.

78—Woosley-Starley-Rock outcrop association. This map unit is on mountainsides, ridges, hilltops, and escarpments. Slope is 2 to 35 percent. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 8,500 feet. The average annual precipitation is about 19 inches, the average annual air temperature is about 41 degrees F, and the average frost-free period is 50 to 90 days.

This unit is 40 percent Woosley loam that has slopes of 2 to 15 percent, 25 percent Starley very channery loam that has slopes of 3 to 35 percent, and 10 percent Rock outcrop. The Woosley soil is on mountainsides, the Starley soil is on ridges, hilltops, and mountainsides, and Rock outcrop is on ridges, hilltops, and escarpments.

Included in this unit are small areas of Morset and Nathrop soils and a soil that is similar to the Woosley soil but is shallow. Included areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Woosley soil is moderately deep and well drained. It formed in material derived dominantly from limestone. Typically, the surface layer is dark grayish brown loam about 13 inches thick. The subsoil is light brownish gray clay loam about 9 inches thick. Hard limestone is at a depth of about 22 inches.

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

The Starley soil is shallow and well drained. It formed in material derived dominantly from limestone. Typically, 20 to 35 percent of the surface is covered with channery fragments and flagstones. The surface layer is dark grayish brown very channery loam about 6 inches thick. The underlying material is pinkish gray very channery loam about 8 inches thick. Hard limestone is at a depth of about 14 inches.

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

Rock outcrop is exposures of limestone and sandstone.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Woosley soil is mainly Columbia needlegrass, spike fescue, Idaho

fescue, and big sagebrush. If the vegetation deteriorates, big sagebrush and rabbitbrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,350 pounds of air-dry vegetation per acre in normal years. Production varies from 1,600 pounds in favorable years to 1,100 pounds in unfavorable years.

The potential plant community on the Starley soil is mainly Columbia needlegrass, Idaho fescue, spike fescue, and mountainmahogany. If the vegetation deteriorates, big sagebrush and black sagebrush increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 850 pounds of air-dry vegetation per acre in normal years. Production varies from 1,000 pounds in favorable years to 500 pounds in unfavorable years.

This unit produces food and cover for elk, deer, and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

The Woosley soil is in capability subclass VIe, dryland, and in Loamy range site, 15- to 19-inch precipitation zone. The Starley soil is in capability subclass VIIe, dryland, and in Shallow Loamy range site, 15- to 19-inch precipitation zone.

79—Worland sandy loam, 0 to 10 percent slopes. This moderately deep, well drained soil is on uplands. It formed in material derived dominantly from sandstone. Slope ranges from 0 to 10 percent but is commonly about 5 percent. The vegetation in areas not cultivated is mainly grasses and shrubs. Elevation is 4,000 to 5,500 feet. The average annual precipitation is about 8 inches, the average air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is light brownish gray sandy loam about 8 inches thick. The underlying material is pale brown sandy loam about 28 inches thick. Soft sandstone is at a depth of about 36 inches.

Included in this unit are small areas of Apron, Wallson, and Persayo soils. The percentage of included soils varies from one area to another.

Permeability of this Worland soil is moderately rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of wind erosion is high.

Most areas of this unit are used for irrigated crops, mainly small grain. Among the other crops grown are hay and pasture. Some areas are used for livestock grazing and wildlife habitat. Less than 15 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

If this unit is used for cultivated crops, the main limitations are slope and depth to bedrock. Returning all crop residue to the soil and using a cropping system that includes grasses, legumes, or grass-legume mixtures help to maintain fertility and tilth. Wind erosion can be reduced by keeping the soil rough and cloddy when it is not protected by vegetation.

If this unit is used for hay and pasture, the main limitations are slope and depth to bedrock. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Furrow, contour ditch, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly needleandthread, rhizomatous wheatgrasses, Indian ricegrass, and big sagebrush. If the vegetation deteriorates, blue grama and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 375 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IVe-5, irrigated, and capability subclass VIe, dryland. It is in Sandy range site, 5- to 9-inch precipitation zone.

80—Worland-Persayo complex, 3 to 30 percent slopes. This map unit is on hillsides and alluvial fans. The soils are underlain by interbedded sandstone and shale. The native vegetation is mainly grasses and shrubs. Elevation is 4,000 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 45 percent Worland sandy loam that has slopes of 6 to 30 percent and 20 percent Persayo clay loam that has slopes of 6 to 30 percent. Also in this unit is about 15 percent Apron sandy loam that has slopes of 3 to 10 percent. The Worland and Persayo soils are on hillsides, and the Apron soil is on alluvial fans.

Included in this unit are small areas of Greybull, Lostwells, Muff, and Wallson soils. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Worland soil is moderately deep and well drained. It formed in material derived dominantly from sandstone. Typically, the surface layer is light brownish gray sandy loam about 3 inches thick. The underlying material is pale brown sandy loam about 33 inches thick. Soft sandstone is at a depth of about 36 inches.

Permeability of the Worland soil is moderately rapid. Available water capacity is low. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate.

The Persayo soil is shallow and well drained. It formed in material derived dominantly from shale. Typically, the surface layer is light yellowish brown clay loam about 1 inch thick. The underlying material is pale brown clay loam about 12 inches thick. Variegated olive green, brown, and gray shale is at a depth of about 13 inches.

Permeability of the Persayo soil is moderately slow. Available water capacity is very low. Effective rooting depth is 4 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. This soil is moderately saline.

The Apron soil is deep and well drained. It formed in alluvium derived dominantly from sandstone. Typically, the soil is brown sandy loam to a depth of 60 inches or more.

Permeability of the Apron soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Worland and Apron soils is mainly needleandthread, rhizomatous wheatgrasses, Indian ricegrass, and big sagebrush. If the vegetation deteriorates, blue grama and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 375 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

The potential plant community on the Persayo soil is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years.

Range recovery on this unit is slow because of the salt content of the Persayo soil. This unit is better suited to grazing by sheep than by cattle because of the high percentage of gardner saltbush present. Among the limitations for seeding are the salinity of the Persayo soil and low precipitation.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIe, dryland. The Worland and Apron soils are in Sandy range site, 5- to 9-inch precipitation zone, and the Persayo soil is in Saline Upland range site, 5- to 9-inch precipitation zone.

81—Youngston clay loam, moderately wet, 0 to 3 percent slopes. This deep, moderately well drained soil is on alluvial fans, in valleys, and on terraces. It formed in alluvium. Slope ranges from 0 to 3 percent but is commonly about 1 percent. The vegetation in areas not cultivated is mainly grasses, shrubs, and trees. Elevation is 3,950 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is pale brown clay loam about 9 inches thick. The underlying material to a depth of 60 inches or more is pale brown clay loam stratified with lenses of loam, silty clay loam, and very fine sandy loam. In some areas the surface layer is loam.

Included in this unit are small areas of Dobent, Glenton, Lostwells, and Stutzman soils. The percentage of included soils varies from one area to another.

Permeability of this Youngston soil is moderate. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. The hazard of wind erosion is moderate. A seasonal high water table fluctuates between depths of 48 and 72 inches in June through November. This soil is subject to occasional, brief periods of flooding in February through June. It is slightly saline.

Most areas of this unit are used for irrigated crops, mainly sugar beets, corn, and small grain. Among the other crops grown are hay and pasture. Some areas are used for livestock grazing, for wildlife habitat, and as homesites. Less than 5 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

This unit is well suited to cultivated crops. It has few limitations. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate. The fluctuating high water table may delay planting and harvesting.

This unit is well suited to hay and pasture. It has few limitations. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce

clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Irrigation is needed for the maximum production of cultivated crops and hay and pasture. Fertilizer should be applied according to needs as indicated by soil tests.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. Irrigation water needs to be applied carefully to prevent the buildup of a high water table. Drainage may also be needed. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion. Intensive management is required to reduce the salinity of the soil and maintain soil productivity.

The potential plant community on this unit is mainly basin wildrye, needleandthread, slender wheatgrass, and cottonwood. If the vegetation deteriorates, cottonwood, silver buffaloberry, and wild rose increase. If vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production varies from 2,400 pounds in favorable years to 1,400 pounds in unfavorable years.

If this unit is used for homesite development, the main limitations are the hazard of flooding, the fluctuating high water table, and shrink-swell potential. Flooding can be controlled only by use of major flood control structures. Roads and streets should be located above the expected flood level. Wetness can be reduced by installing drain tile around footings. Deep drainage also reduces wetness. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling excavations with material that has low shrink-swell potential.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIe-2, irrigated, and capability subclass VIe, dryland. It is in Lowland range site, 5- to 9-inch precipitation zone.

82—Youngston silty clay loam, 0 to 3 percent slopes. This deep, well drained soil is on alluvial fans and terraces and in valleys. It formed in alluvium. Slope ranges from 0 to 3 percent but is commonly about 1 percent. The vegetation in areas not cultivated is mainly grasses and shrubs. Elevation is 3,950 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

Typically, the surface layer is pale brown silty clay loam about 9 inches thick. The underlying material to a depth of 60 inches or more is pale brown clay loam stratified with lenses of loam, silty clay loam, and very fine sandy loam. In some areas the surface layer is clay loam.

Included in this unit are small areas of Lostwells and Stutzman soils. The percentage of included soils varies from one area to another.

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

Most areas of this unit are used for irrigated crops, mainly sugar beets, corn, and small grain. Among the other crops grown are hay and pasture. Some areas are used as rangeland, for wildlife habitat, and as homesites. Less than 5 percent of this unit supports native vegetation. The vegetation commonly is in small, odd areas of fields that are not practical to manage as rangeland. However, some areas are grazed during the dormant season, while livestock are grazing the aftermath on adjacent cropland and pastureland.

This unit is well suited to cultivated crops. It has few limitations. Excessive cultivation can result in the formation of a tillage pan. This pan can be broken by subsoiling when the soil is dry. Returning crop residue to the soil or regularly adding other organic matter improves fertility, reduces crusting, and increases the water intake rate.

This unit is well suited to hay and pasture. It has few limitations. Grazing when the soil is wet results in compaction of the surface layer, poor tilth, and excessive runoff. Periodic mowing and clipping help to maintain uniform growth, discourage selective grazing, and reduce clumpy growth. Proper grazing practices, weed control, and fertilizer are needed to insure maximum quality of forage.

Furrow, border, and sprinkler irrigation systems are suited to this unit. The method used generally is governed by the crop grown. To avoid overirrigating and leaching of plant nutrients and to reduce water erosion, applications of irrigation water should be adjusted to the available water capacity, the water intake rate, and the crop needs. For the efficient application and removal of irrigation water, leveling is needed in the more sloping areas. Use of pipe, ditch lining, or drop structures in irrigation ditches facilitates irrigation and reduces ditch erosion.

The potential plant community on this unit is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, birdfoot sagebrush, and greasewood increase. If the vegetation further deteriorates, pricklypear and annual weeds and grasses invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years.

If this unit is used for homesite development, the main limitation is shrink-swell potential. The effects of shrinking and swelling can be minimized by using proper engineering designs and by backfilling excavations with material that has low shrink-swell potential.

This unit produces food and cover for deer and antelope; for small mammals; and for pheasant, grouse, chukar partridge, and other birds.

This map unit is in capability unit IIs-1, irrigated, and capability subclass VIe, dryland. It is in Saline Upland range site, 5- to 9-inch precipitation zone.

83—Youngston-Glenton complex, 0 to 3 percent slopes. This map unit is on alluvial fans and flood plains of intermittent streams. The native vegetation is mainly grasses, shrubs, and trees. Elevation is 3,950 to 5,000 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 45 percent Youngston silty clay loam and 20 percent Glenton sandy loam. Also in this unit is about 10 percent Lostwells sandy clay loam. The Youngston and Glenton soils are on flood plains, and the Lostwells soil is on fans. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Baroid, Las Animas Variant, Stutzman, and Uffens soils. The areas make up about 25 percent of the total acreage. The percentage varies from one area to another.

The Youngston soil is deep and well drained. It formed in alluvium. Typically, the surface layer is pale brown silty clay loam about 3 inches thick. The underlying material to a depth of 60 inches or more is brown and pale brown clay loam stratified with lenses of very fine sandy loam, loam, silty clay loam, and sandy clay loam.

Permeability of the Youngston soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is subject to occasional, brief periods of flooding in May through August. It is moderately saline.

The Glenton soil is deep and moderately well drained. It formed in alluvium. Typically, the surface layer is grayish brown sandy loam about 3 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray fine sandy loam stratified with lenses of loam, fine sand, and sandy loam.

Permeability of the Glenton soil is moderately rapid. Available water capacity is moderate. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. A seasonal high water table fluctuates between depths of 40 and 72 inches in February through November. This soil is subject to occasional, brief periods of flooding in May through August.

The Lostwells soil is deep and well drained. It formed in alluvium. Typically, the surface layer is pale brown sandy clay loam about 4 inches thick. The underlying material to a depth of 60 inches or more is very pale brown sandy clay loam stratified with lenses of sandy loam, loam, and clay loam.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Youngston soil is mainly alkali sacaton, basin wildrye, western wheatgrass, and greasewood. If the vegetation deteriorates, greasewood and inland saltgrass increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 525 pounds of air-dry vegetation per acre in normal years. Production varies from 800 pounds in favorable years to 350 pounds in unfavorable years.

The potential plant community on the Glenton soil is mainly basin wildrye, needleandthread, slender wheatgrass, and cottonwood. If the vegetation deteriorates, cottonwood, silver buffaloberry, and wild rose increase. If the vegetation further deteriorates, annual grasses and weeds invade. The potential plant community produces about 1,800 pounds of air-dry vegetation per acre in normal years. Production varies from 2,400 pounds in favorable years to 1,400 pounds in unfavorable years.

The potential plant community on the Lostwells soil is mainly bluebunch wheatgrass, rhizomatous wheatgrasses, needleandthread, and big sagebrush. If the vegetation deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 365 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIws, dryland. The Youngston soil is in Saline Lowland range site, 5- to 9-inch precipitation zone; the Glenton soil is in Lowland range site, 5- to 9-inch precipitation zone; and the Lostwells soil is in Loamy range site, 5- to 9-inch precipitation zone.

84—Youngston-Uffens-Lostwells complex, 1 to 10 percent slopes. This map unit is on alluvial fans and terraces and in valleys (fig. 7). The native vegetation is mainly grass and shrubs. Elevation is 4,000 to 5,500 feet. The average annual precipitation is about 8 inches, the average annual air temperature is about 45 degrees F, and the average frost-free period is 120 to 130 days.

This unit is 40 percent Youngston silty clay loam that has slopes of 0 to 8 percent, 25 percent Uffens loam that has slopes of 1 to 8 percent, and 15 percent

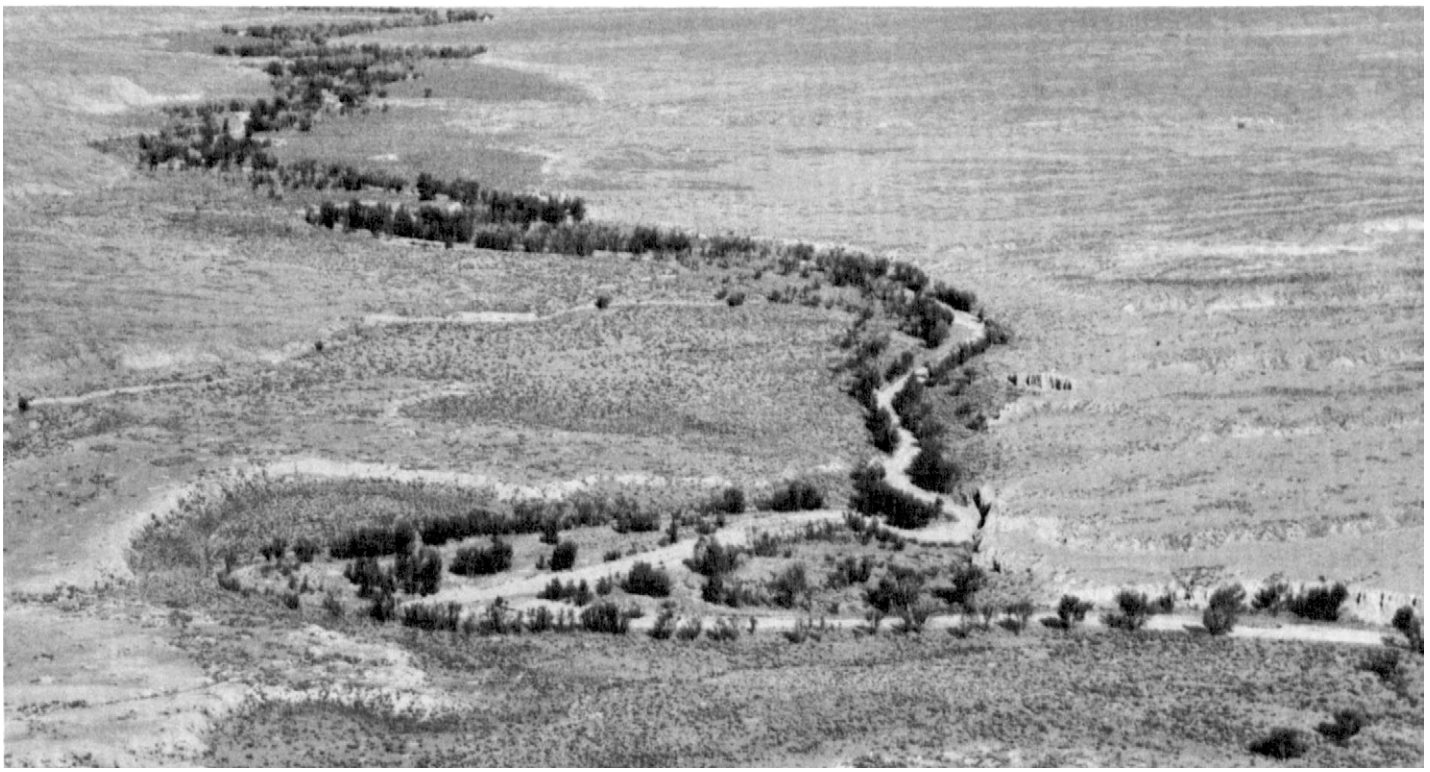


Figure 7.—An area of Youngston-Uffens-Lostwells complex, 1 to 10 percent slopes, is along East Fork Creek. Muff-Neiber fine sandy loams, 3 to 30 percent slopes, is to the right of the creek, and Wallson loamy fine sand, 1 to 10 percent slopes, is to the left.

Lostwells sandy clay loam that has slopes of 1 to 10 percent. The Youngston soil is on fans, on terraces, and in valleys, the Uffens soil is on terraces, and the Lostwells soil is on fans and in valleys. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used.

Included in this unit are small areas of Glenton, Greybull, and Stutzman soils and a strongly alkaline Lostwells soil. Included areas make up about 20 percent of the total acreage. The percentage varies from one area to another.

The Youngston soil is deep and well drained. It formed in alluvium. Typically, the surface layer is pale brown silty clay loam about 4 inches thick. The underlying material to a depth of 60 inches or more is clay loam stratified with lenses of silty clay loam, silt loam, and very fine sandy loam.

Permeability of the Youngston soil is moderately slow. Available water capacity is high. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight. This soil is moderately saline.

The Uffens soil is deep and well drained. It formed in alluvium. Typically, the surface layer is pale brown loam about 1 inch thick. The upper 4 inches of the subsoil is pinkish gray clay loam, and the lower 7 inches is pinkish gray sandy clay loam. The upper 28 inches of the underlying material is pale brown sandy clay loam, and the lower part to a depth of 60 inches or more is pale brown clay loam. The subsoil is very strongly alkaline and is saline.

Permeability of the Uffens soil is moderately slow. Available water capacity is low. Effective rooting depth is 60 inches or more. Runoff is slow, and the hazard of water erosion is slight.

The Lostwells soil is deep and well drained. It formed in alluvium. Typically, the surface layer is light brownish gray sandy clay loam about 3 inches thick. The underlying material to a depth of 60 inches or more is light brownish gray sandy clay loam stratified with lenses of sandy loam and clay loam.

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

This unit is used mainly for livestock grazing. It is also used for wildlife habitat.

The potential plant community on the Youngston and Uffens soils is mainly gardner saltbush, Indian ricegrass, bottlebrush squirreltail, and western wheatgrass. If the vegetation deteriorates, gardner saltbush, sagebrush,

and greasewood increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 350 pounds of air-dry vegetation per acre in normal years. Production varies from 550 pounds in favorable years to 200 pounds in unfavorable years.

The potential plant community on the Lostwells soil is mainly bluebunch wheatgrass, rhizomatous wheatgrasses, needleandthread, and big sagebrush. If the vegetation deteriorates, blue grama, Sandberg bluegrass, and big sagebrush increase. If the vegetation further deteriorates, pricklypear and annual grasses and weeds invade. The potential plant community produces about 365 pounds of air-dry vegetation per acre in normal years. Production varies from 600 pounds in favorable years to 225 pounds in unfavorable years.

This unit produces food and cover for deer and antelope; for small mammals; and for grouse, chukar partridge, and other birds.

This map unit is in capability subclass VIe, dryland. The Youngston and Uffens soils are in Saline Upland range site, 5- to 9-inch precipitation zone, and the Lostwells soil is in Loamy range site, 5- to 9-inch precipitation zone.

prime farmland

Prime farmland is one of several kinds of important farmlands 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. The supply of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, must encourage and facilitate the use of our nation's prime farmland with wisdom and foresight.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. When it is treated and managed using acceptable farming methods, it has the soil quality, length of growing season, and moisture supply needed to economically produce a sustained high yield of crops. Prime farmland produces the highest yields with minimal input of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland may now be in crops, pasture, range, or other land use, but it does not include urban and built-up land or water areas. It must either be used for producing food or fiber or be available for these uses.

Prime farmland has an adequate and dependable supply of moisture from irrigation. It also has a favorable temperature and length of growing season and an acceptable level of acidity or alkalinity. It has few if any rocks and is permeable to water and air. Prime farmland is not excessively erodible, is not saturated with water for long periods, and is not flooded during the growing season. The slope ranges mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland, consult the local office of the Soil Conservation Service.

About 42,000 acres, or 3 percent, of Washakie County is prime farmland or potential prime farmland if irrigated. The areas are mainly along the Big Horn River and Nowood Creek.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and difficult to cultivate and commonly are less productive.

The detailed map units that make up prime farmland in Washakie County are listed in this section. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 2. The location is shown on the detailed soil maps in the back of this publication. The soil qualities that affect use and management are described in the section "Detailed soil map units."

Exchangeable sodium or soluble salts, or both, occur within the profile of some of the soils. Onsite investigation is necessary to determine the presence of sodium or salt and whether its content can be reduced.

The symbols and names of the map units that meet the soil requirements for prime farmland if irrigated follow.

2—Apron sandy loam, 0 to 3 percent slopes
6—Barnum loam
24—Garland clay loam
25—Glenton sandy loam, moderately wet
40—Lostwells clay loam, 0 to 3 percent slopes
41—Lostwells clay loam, 3 to 6 percent slopes
69—Tensleep loam, 3 to 6 percent slopes
81—Youngston clay loam, moderately wet, 0 to 3 percent slopes
82—Youngston silty clay loam, 0 to 3 percent slopes

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 avoid 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 behavior 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 crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. 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.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

crops and pasture

General management needed for crops and pasture is suggested in this section. The crops and pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed soil map units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

The soils in the survey area best suited to irrigated crops are sandy loam to clay loam and have good structure and adequate depth. They also have moderate to high available water capacity and moderate water intake rate. They are free of excessive salts and alkali and do not have a water table that restricts plant growth. Because moisture in spring generally is inadequate for germinating seeds, these soils should be irrigated beginning late in March or early in April.

The major concerns for management of irrigated cropland are the maintenance of soil structure and fertility and erosion control. Maintaining soil structure is necessary for good soil tilth, a desirable water intake rate, and adequate soil aeration. The soils should not be tilled when the moisture content is high. Organic matter promotes good soil structure. Legumes, grass, or legume-grass mixtures or barnyard manure plowed into the soil help to maintain a desirable organic matter content. Burning crop residue destroys organic matter and results in loss of fertility, poor soil tilth, and erosion and lowers the available water capacity.

If the soils are properly managed, fertility is maintained at a high level. Nitrogen is needed for high grass production, and phosphorus is needed for alfalfa. The amount of potassium and minor elements in the soils in the survey area generally is adequate. Results of soil tests and fertilizer recommendations are available at the Riverton and Powell Soils Laboratories of the Wyoming Agricultural Experiment Station.

Successful irrigated farming depends on the correct use of water. The object of irrigation is to keep the soil moisture content adequate for normal plant growth. Soil is a reservoir that can hold only a certain amount of water. Plants remove some of this stored water, and then the reservoir needs refilling. Water that penetrates beyond the depth to which the roots of the plants extract water is lost to the plants, and soluble plant nutrients are leached from the soil.

Guidlines that are helpful in planning irrigation systems for soils in the survey area are available at the local office of the Soil Conservation Service. The latest information and suggestions for growing specialty crops can be obtained from the local offices of the Soil Conservation Service and the Cooperative Extension Service.

yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 3. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green-manure crops; and harvesting that insures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 3 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

land capability classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit (*8*). These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-2 or IIIe-5.

The capability classification of each map unit is given in the section "Detailed soil map units."

rangeland

Charles C. McAfee and Donald J. Viktorin, range conservationists, helped to write this section.

Rangeland is land on which the potential plant community is predominantly native grasses, grasslike plants, forbs, and shrubs suitable for grazing or

browsing. In addition to providing food for livestock and wildlife, it also provides cover for animals, provides recreation, and has esthetic value.

More than 90 percent of Washakie County is rangeland. More than two-thirds of the farm income is derived from livestock, principally cattle and sheep. Cow-calf and ewe-lamb operations are the primary types of livestock enterprises. Approximately 60 ranches are in the county. The average size of the ranches is 1,200 acres. Approximately 77 percent of the land in the county is administered by the federal government.

On many ranches the forage produced on rangeland is augmented by crop stubble and small grain. In winter the native forage is often supplemented by hay and protein concentrate. Creep feeding of calves and yearlings to increase their market weight is practiced on some ranches. Many of the livestock operators are dependent on grazing leases of federal land to supplement grazing from their private holdings.

The rangeland in Washakie County is in areas receiving from about 8 inches to more than 20 inches of precipitation annually. This alone is responsible for a considerable variation in the soils. The deep soils commonly are clay loams, sandy clay loams, and sandy loams. Some of the soils are strongly alkaline or very strongly alkaline and largely support varying amounts of salt-tolerant grasses, forbs, and shrubs. Several areas include varying amounts of Rock outcrop that supports little, if any, vegetation.

In this survey, each map unit in the section "Detail soil map units" lists the major grasses, grasslike plants, forbs, and shrubs that make up the potential natural plant community. The name of the range site is also given for each map unit.

Total production of each range site refers to the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It 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.

The basic soil and plant resources can best be maintained or improved through management. Among the important range management practices on all rangeland in the survey area are proper grazing use and planned grazing systems, which include deferred grazing and proper season of use in combination with good distribution of grazing. Distribution of grazing can be accomplished with proper placement of watering facilities combined with fencing where needed. The suitability of range improvement practices such as brush management, range seeding, and pipelines depends on the characteristics of a given site.

recreation

The soils of the survey area are rated in table 4 according to limitations that affect their suitability for recreation. The ratings 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 sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 4, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 4 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 7 and interpretations for dwellings without basements and for local roads and streets in table 6.

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 best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking, horseback riding, and bicycling should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

wildlife habitat

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 5, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, wheatgrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are needlegrass, fescue, sedges, wheatgrass, and grama.

Coniferous plants furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mountainmahogany, snowberry, and sagebrush.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include grouse, thrushes, woodpeckers, squirrels, elk, deer, and bear.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include antelope, deer, chukar partridge, sage grouse, meadowlark, and lark bunting.

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. The ratings are given in the following tables: Building site development,

Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil properties" section.

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 within a depth of 5 or 6 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 need to 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 grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, 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 kind 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 (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology, (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) 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

Table 6 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

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 stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic supporting capacity.

sanitary facilities

Table 7 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed tc overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 7 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

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 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

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. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 7 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive 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.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 7 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the

surface layer should be stockpiled for use as the final cover.

construction materials

Table 8 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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 soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high 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 engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 8, only the probability 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 engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

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.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

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 9 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 and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site

features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage and irrigation.

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. 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.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

soil properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined 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. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, 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 characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

Table 10 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil series and their morphology."

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 a soil contains particles coarser than sand, 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 (*2, 5*) and the system adopted by the American Association of State Highway and Transportation Officials (*1*).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter 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, SP-SM.

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 grain-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 3 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 oven-dry 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 the survey area and 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 grain-size distribution, liquid limit, and plasticity index are 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 omitted in the table.

physical and chemical properties

Table 11 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water 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, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

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 major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. 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.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major 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.

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.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

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) 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 (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion by water.

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 resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion and the amount of soil lost. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly

erodible. Crops can be grown if intensive measures to control wind erosion are used.

4L. Calcareous loamy soils that are less than 35 percent clay and more than 5 percent finely divided calcium carbonate. These soils are erodible. Crops can be grown if intensive measures to control wind erosion are used.

4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

5. Loamy soils that are less than 18 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.

6. Loamy soils that are 18 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.

7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.

8. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 11, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

soil and water features

Table 12 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils 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 permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes is not considered flooding.

Table 12 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

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 absence of distinctive horizons that form in soils that are not subject to flooding.

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.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 12 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table

that is seasonally high for less than 1 month is not indicated in table 12.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A perched water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavations.

Potential 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 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 mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves 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 creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel 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 is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*9*). 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. In table 13, the soils of the survey area are classified according to the system. The categories are defined in the following paragraphs.

ORDER. Ten 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 Entisol.

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 Orthent (*Orth*, meaning true, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Torriorthents (*Torri*, meaning hot and dry, plus *orthent*, the suborder of the Entisols that have a hot and dry climate).

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

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

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

soil series and their morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (*7*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*9*). Unless otherwise stated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed soil map units."

Absted series

The Absted series consists of deep, well drained soils on alluvial fans. These soils formed in alluvium derived from sedimentary rock. Slope is 1 to 10 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 46 degrees F.

Typical pedon of an Absted very fine sandy loam in an area of Absted-Forkwood association, in the SW1/4 of sec. 14, T. 45 N., R. 91 W.

A1—0 to 2 inches; light grayish brown (10YR 5/2) very fine sandy loam, grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, very friable,

nonsticky and nonplastic; common very fine and fine roots; mildly alkaline; abrupt smooth boundary.
A2—2 to 4 inches; light brownish gray (10YR 6/2) very fine sandy loam, grayish brown (10YR 5/2) moist; weak thick and medium platy structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; mildly alkaline; abrupt smooth boundary.
B21t—4 to 11 inches; brown (7.5YR 5/4) heavy clay loam, dark brown (7.5YR 4/4) moist; strong medium columnar structure parting to strong medium and fine angular blocky; very hard, very firm, very sticky and plastic; common fine, medium, and coarse roots; thin continuous and moderately thick patchy clay films on faces of peds; moderately alkaline; clear wavy boundary.
B22t—11 to 14 inches; brown (7.5YR 5/4) heavy clay loam, dark brown (7.5YR 4/4) moist; moderate medium prismatic structure parting to moderate medium angular blocky; very hard, very firm, very sticky and plastic; common very fine and fine roots and few medium roots; common thin patchy clay films on some faces of peds; few fine soft accumulations, threads, and seams of calcium carbonate; strongly effervescent; moderately alkaline; clear wavy boundary.
B3tca—14 to 21 inches; light brownish gray (7.5YR 6/2) clay loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few fine and medium roots; few thin patches of clay films on some faces of peds; many medium and fine streaks and threads of calcium carbonate; strongly effervescent; strongly alkaline; gradual wavy boundary.
C1casa—21 to 35 inches; light gray (10YR 7/2) sandy clay loam, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common medium and fine soft accumulations, streaks, and seams of calcium carbonate; strongly effervescent; very strongly alkaline; gradual wavy boundary.
C2ca—35 to 60 inches; light yellowish brown (2.5Y 6/4) sandy clay loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few medium and fine threads and seams of calcium carbonate; strongly effervescent; moderately alkaline.

The A horizon has hue of 5Y to 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 or 3. The B horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is heavy clay loam or clay. The C horizon has hue of 10YR to 5Y.

Apron series

The Apron series consists of deep, well drained soils on alluvial fans. These soils formed in alluvium. Slope is 0 to 10 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of an Apron sandy loam in an area of Apron-Worland sandy loams, 1 to 12 percent slopes, in the SE1/4SE1/4 of sec. 1, T. 48 N., R. 93 W.

A1—0 to 3 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; slightly effervescent; mildly alkaline; abrupt smooth boundary.
C1—3 to 9 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; strongly effervescent; moderately alkaline; clear wavy boundary.
C2—9 to 60 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few masses of calcium carbonate; strongly effervescent; moderately alkaline.

The profile is 0 to 15 percent gravel. The A horizon has hue of 10YR to 5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. The C horizon has hue of 5Y to 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3.

Arvada series

The Arvada series consists of deep, well drained soils on alluvial fans. These soils formed in alluvium. Slope is 1 to 10 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of an Arvada loam in an area of Forkwood-Haverdad association, in the NW1/4NE1/4 of sec. 22, T. 43 N., R. 90 W.

A1—0 to 3 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium platy structure parting to strong fine and very fine granular; slightly hard, friable, nonsticky and slightly plastic; common very fine roots with vertical orientation on exterior of peds; few pebbles; slightly effervescent; moderately alkaline; abrupt wavy boundary.
B1—3 to 5 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure; hard, firm, sticky and plastic; common very fine roots with vertical orientation on exterior of peds; few pebbles; slightly effervescent; strongly alkaline; abrupt wavy boundary.
B2t—5 to 12 inches; pale brown (10YR 6/3) heavy clay loam, dark brown (10YR 4/3) moist; moderate

medium prismatic structure; very hard, firm, very sticky and very plastic; common very fine roots with vertical orientation on exterior of peds; thin patchy clay films on faces of peds; few pebbles; strongly effervescent; very strongly alkaline; gradual wavy boundary.

B3sa—12 to 17 inches; pale brown (10YR 6/3) clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure; hard, firm, sticky and plastic; few very fine roots with vertical orientation on exterior of peds; few pebbles; strongly effervescent; very strongly alkaline; diffuse wavy boundary.

Csa—17 to 60 inches; very pale brown (10YR 7/4) clay loam, yellowish brown (10YR 5/4) moist; massive; hard, firm, sticky and plastic; few pebbles; many large accumulations and seams of secondary gypsum that decrease in size and number with depth; strongly effervescent; strongly alkaline.

The profile is 0 to 10 percent gravel. It has hue of 10YR or 2.5Y. The A horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 2 to 4. The B2t horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 2 to 4. Texture is heavy clay loam or clay. The C horizon has value of 6 or 7 when dry and 4 or 5 when moist, and it has chroma of 2 to 4.

Bachus series

The Bachus series consists of moderately deep, well drained soils on mountainsides. These soils formed in material derived from sandstone. Slope is 2 to 25 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Bachus loam in an area of Clayburn-Bachus-Inchau association, in the SE1/4NW1/4 of sec. 17, T. 42 N., R. 86 W.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; slightly acid; abrupt smooth boundary.

A3—4 to 8 inches; dark grayish brown (10YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak medium prismatic structure parting to moderate fine subangular blocky and granular; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; slightly acid; clear wavy boundary.

B21t—8 to 16 inches; reddish gray (5YR 5/2) loam, dark reddish brown (5YR 3/2) moist; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky and slightly plastic; many very fine, fine, medium, and coarse roots; thin continuous clay films on faces of peds; slightly acid; gradual wavy boundary.

B22t—16 to 22 inches; reddish gray (5YR 5/2) loam, dark reddish brown (5YR 3/2) moist; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and plastic; many very fine, fine, medium, and coarse roots; thin continuous and thick patchy clay films on faces of peds; slightly acid; abrupt wavy boundary.

R—22 inches; hard quartzitic sandstone.

Bedrock is at a depth of 20 to 40 inches. The profile is 0 to 15 percent gravel. It is slightly acid or medium acid throughout. The A1 horizon has hue of 10YR or 2.5Y, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The B2t horizon has hue of 7.5YR or 5YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. Texture is loam or clay loam.

Barnum series

The Barnum series consists of deep, well drained soils on flood plains. These soils formed in alluvium derived from red sandstone and siltstone. Slope is 1 to 3 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of Barnum loam in the SW1/4NE1/4 of sec. 12, T. 45 N., R. 88 W.

A1—0 to 3 inches; brown (7.5YR 5/2) loam, brown (7.5YR 3/2) moist; moderate medium granular structure; slightly hard, very friable, nonsticky and nonplastic; slightly calcareous; moderately alkaline; abrupt wavy boundary.

C1—3 to 30 inches; reddish brown (5YR 5/4) loam stratified with very fine sand, loamy very fine sand, and clay loam, brown (5YR 4/4) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—30 to 60 inches; reddish brown (5YR 5/4) very fine sandy loam stratified with loam, loamy very fine sand, and clay loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; strongly effervescent; moderately alkaline.

The A1 horizon has hue of 7.5YR to 2.5YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. The C horizon has hue of 5YR to 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 to 5.

Baroid series

The Baroid series consists of deep, moderately well drained soils on flood plains. These soils formed in mixed alluvium. Slope is 0 to 3 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of Baroid sandy loam in the NE1/4NE1/4 of sec. 36, T. 47 N., R. 93 W.

A1—0 to 2 inches; light brownish gray (2.5Y 6/2) sandy loam, grayish brown (2.5Y 5/2) moist; single grain; soft, loose, nonsticky and nonplastic; slightly effervescent; common very fine, fine, and medium roots; moderately alkaline; abrupt smooth boundary.

C1—2 to 26 inches; pale brown (10YR 6/3) loamy fine sand, brown (10YR 5/3) moist; weak coarse subangular blocky structure parting to single grain; soft, loose, nonsticky and nonplastic; slightly effervescent; common very fine, fine, and medium roots; moderately alkaline; gradual wavy boundary.

C2—26 to 60 inches; pale brown (10YR 6/3) loamy fine sand, light olive brown (2.5Y 5/4) moist; single grain; soft, loose, nonsticky and nonplastic; slightly effervescent; few very fine, fine, and medium roots to a depth of 36 inches; moderately alkaline.

The profile has hue of 5Y to 7.5YR, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. It is moderately alkaline or strongly alkaline.

Bidman series

The Bidman series consists of deep, well drained soils on fans. These soils formed in alluvium derived from shale. Slope is 2 to 10 percent. The average annual precipitation is about 11 inches, and the average annual soil temperature is about 50 degrees F.

Typical pedon of a Bidman fine sandy loam in an area of Mughut-Bondman association, in the NW1/4SE1/4 of sec. 32, T. 43 N., R. 88 W.

A1—0 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; mildly alkaline; abrupt smooth boundary.

A2—5 to 11 inches; pale brown (10YR 6/3) fine sandy loam, dark brown (10YR 4/3) moist; weak medium platy structure parting to moderate medium granular; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; neutral; abrupt smooth boundary.

B2t—11 to 21 inches; grayish brown (10YR 5/2) clay, dark yellowish brown (10YR 4/4) moist; strong medium prismatic structure parting to strong medium angular blocky; bleached sand on vertical faces of peds in upper 3 inches; extremely firm, very sticky and plastic; common very fine, fine, medium, and coarse roots; thin continuous and thick patchy clay films on faces of peds; few weak pressure faces; mildly alkaline; clear wavy boundary.

B3tca—21 to 27 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium angular blocky; very hard, very firm, very sticky and plastic; few very fine, fine, medium, and coarse roots; thin continuous and thick patchy clay films on faces of peds; few weak pressure faces; many large soft masses of secondary carbonates; violently effervescent; moderately alkaline; clear wavy boundary.

C1ca—27 to 32 inches; grayish brown (2.5Y 5/2) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium angular blocky structure; hard, friable, sticky and plastic; few very fine, fine, medium, and coarse roots; many large soft masses of secondary carbonates; violently effervescent; moderately alkaline; gradual wavy boundary.

C2—32 to 56 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; massive; hard, friable, sticky and plastic; few gypsum crystals in the lower part; strongly effervescent; moderately alkaline.

The profile is 0 to 15 percent gravel. Texture of the C horizon is sandy clay loam or clay loam.

Billycreek series

The Billycreek series consists of moderately deep, somewhat excessively drained soils on mountainsides and canyon walls. These soils formed in colluvium derived from sandstone. Slope is 6 to 60 percent. The average annual precipitation is about 22 inches, and the average annual air temperature is about 37 degrees F.

Typical pedon of a Billycreek loamy fine sand in an area of Billycreek-Wetterhorn complex, 6 to 60 percent slopes, in the SE1/4NE1/4 of sec. 13, T. 47 N., R. 87 W.

O1—2 inches to 0; forest duff.

A2—0 to 8 inches; very pale brown (10YR 7/3) loamy fine sand, brown (10YR 5/3) moist; weak medium subangular blocky structure; soft, loose; common very fine and fine roots; medium acid; gradual smooth boundary.

A&B—8 to 24 inches; 80 percent very pale brown (10YR 7/3) loamy fine sand, brown (10YR 5/3) moist; 20 percent lamellae that are brown (7.5YR 5/4) sandy clay loam; weak medium subangular blocky structure; soft, loose; common very fine and fine roots; 10 percent gravel; slightly acid; clear wavy boundary.

R—24 inches; hard noncalcareous sandstone.

Bedrock is at a depth of 20 to 40 inches. The control section is fine sand, loamy sand, or loamy fine sand. The profile is 0 to 15 percent gravel. The A2 horizon has hue of 10YR or 7.5YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 1 to 3. It is slightly acid or medium acid. The A&B horizon has hue of 10YR or 7.5YR. It has lamellae averaging 1/16 to 1/4 inch in thickness. The lamellae are sandy loam or sandy clay loam. This horizon is slightly acid or medium acid.

Bondman series

The Bondman series consists of shallow, well drained soils on dip slopes and ridges of hogbacks. These soils formed in material derived from sandstone. Slope is 2 to 25 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Bondman sandy loam in an area of Mughut-Bondman association, in the NW1/4NE1/4 of sec. 5, T. 42 N., R. 88 W.

A1—0 to 3 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; neutral; abrupt smooth boundary.

B21t—3 to 8 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and plastic; many very fine, fine, and medium roots; thick clay films on faces of peds; neutral; clear wavy boundary.

B22t—8 to 12 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and plastic; many very fine, fine, and medium roots; thin clay films on faces of peds; neutral; clear wavy boundary.

C—12 to 18 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots to a depth of 16 inches and common fine roots to a depth of 18 inches; mildly alkaline; abrupt wavy boundary.

R—18 inches; hard sandstone.

Bedrock is at a depth of 8 to 20 inches. The profile is 0 to 15 percent gravel. The A horizon has hue of 2.5Y or 10YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. The B2t horizon has hue of 10YR or 7.5YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 3 to 5. It is clay loam or sandy clay loam. The C horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 3 to 5.

Burnette series

The Burnette series consists of deep, well drained soils on alluvial fans and mountainsides. These soils formed in alluvium derived from sandstone and granite. Slope is 2 to 20 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Burnette loam in an area of Burnette-Lucky Star association, in the SW1/4SW1/4 of sec. 34, T. 42 N., R. 87 W.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; neutral; abrupt smooth boundary.

B1—2 to 6 inches; dark grayish brown (10YR 4/2) clay loam, dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure parting to strong medium subangular blocky; slightly hard, very friable, slightly sticky and plastic; many very fine, fine, and medium roots; neutral; clear wavy boundary.

B21t—6 to 16 inches; dark grayish brown (10YR 4/2) heavy clay loam, dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, friable, sticky and plastic; many very fine, fine, and medium roots; few slickensides; thin coatings of bleached sand grains on vertical faces of peds; thin continuous and thick patchy clay films on faces of peds; clear wavy boundary.

B22t—16 to 25 inches; brown (10YR 4/3) heavy clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, friable, sticky and plastic; common very fine and fine roots and few medium roots; few slickensides; thin coatings of bleached sand grains on vertical faces of peds; thin continuous and thick patchy clay films on faces of peds; neutral; clear wavy boundary.

B23t—25 to 36 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to strong fine subangular blocky; very hard, firm, sticky and very plastic; few very fine and fine roots; few slickensides; thin coatings of bleached sand grains on vertical faces of peds; thin continuous and thick patchy clay films on faces of peds; neutral; gradual wavy boundary.

Cca—36 to 60 inches; light olive brown (2.5Y 5/6) silty clay loam, olive brown (2.5Y 4/4) moist; massive; very hard, firm, very sticky and very plastic; many fine soft masses of disseminated secondary calcium carbonate; violently effervescent; moderately alkaline.

The profile is 0 to 10 percent gravel above a depth of 40 inches. The A horizon ranges from slightly acid to

mildly alkaline. The B2t horizon is neutral or mildly alkaline. The C horizon is mildly alkaline to strongly alkaline.

Castino Variant

The Castino Variant consists of moderately deep, well drained soils in depressional areas and along drainageways on mountainsides. These soils formed in material derived from hard sandstone. Slope is 5 to 25 percent. The average annual precipitation is about 22 inches, and the average annual air temperature is about 37 degrees F.

Typical pedon of a Castino Variant very stony loam in an area of Meadowlake-Castino Variant-Rock outcrop association, in the NW1/4SW1/4 of sec. 2, T. 48 N., R. 86 W.

A1—0 to 4 inches; dusky red (2.5YR 3/2) very stony loam, dusky red (2.5YR 3/2) moist; moderate medium and fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots and few medium roots; 30 percent flagstones and 5 percent stones; neutral; abrupt smooth boundary.

B21t—4 to 12 inches; dusky red (2.5YR 3/2) very stony heavy clay loam, dusky red (2.5YR 3/2) moist; moderate fine prismatic structure parting to strong fine and very fine subangular blocky; hard, firm, sticky and plastic; many very fine and fine roots and few medium roots; thin continuous clay films on faces of peds; 10 percent channery fragments, 25 percent flagstones, and 15 percent stones; neutral; clear wavy boundary.

B22t—12 to 22 inches; dusky red (2.5YR 3/2) very stony heavy clay loam, dusky red (2.5YR 3/2) moist; strong fine prismatic structure parting to strong fine and very fine angular blocky; hard, firm, sticky and very plastic; common very fine and fine roots; 10 percent channery fragments, 25 percent flagstones, and 15 percent stones; thick clay films on faces of peds; neutral; clear wavy boundary.

C—22 to 30 inches; reddish brown (2.5YR 4/4) very stony sandy clay loam, dark reddish brown (2.5YR 3/4) moist; massive; slightly hard, very friable, sticky and plastic; few very fine and fine roots; 10 percent channery fragments, 25 percent flagstones, and 25 percent stones; neutral; clear wavy boundary.

R—30 inches; fractured sandstone; fractures are more than 10 centimeters apart.

Depth to bedrock is 20 to 40 inches. The profile averages 10 to 20 percent channery fragments, 10 to 35 percent flagstones, and 5 to 30 percent stones. The A1 horizon has hue of 5YR or 2.5YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The B2t horizon has hue of 5YR or 2.5YR, value of 3 to 5 when dry and 2 to 4 when moist, and chroma of 2 or 3. Texture is very stony clay loam or stony clay. The C horizon has hue of 5YR to 2.5YR.

Chittum series

The Chittum series consists of shallow, well drained soils on hogbacks. These soils formed in material derived from sandstone. Slope is 2 to 25 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Chittum gravelly loam in an area of Chittum-Rock outcrop association, in the NW1/4SW1/4 of sec. 20, T. 42 N., R. 86 W.

A1—0 to 5 inches; dark brown (7.5YR 4/2) gravelly loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; 15 percent gravel; slightly acid; abrupt smooth boundary.

B21t—5 to 11 inches; reddish brown (5YR 4/3) gravelly loam, dark reddish brown (5YR 3/2) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; thin patchy clay films on faces of peds; 15 percent gravel; slightly acid; clear wavy boundary.

B22t—11 to 17 inches; yellowish red (5YR 5/6) gravelly clay loam, reddish brown (5YR 4/4) moist; moderate medium prismatic structure parting to moderate very fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; thin continuous and thick patchy clay films on vertical faces of peds; 15 percent gravel; medium acid; abrupt wavy boundary.

R—17 inches; fractured sandstone.

Bedrock is at a depth of 8 to 20 inches. The profile is 5 to 30 percent gravel and 0 to 5 percent cobbles. The A1 horizon has hue of 7.5YR or 5YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 2 to 4 when dry and 2 or 3 when moist. The B2t horizon has hue of 5YR or 2.5YR, and it has chroma of 2 to 6.

Clayburn series

The Clayburn series consists of deep, well drained soils on mountainsides. These soils formed in alluvium derived from sandstone. Slope is 2 to 25 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Clayburn loam in an area of Clayburn-Bachus-Inchau association, in the NW1/4SW1/4 of sec. 9, T. 41 N., R. 87 W.

A11—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate medium and fine granular structure; slightly hard,

very friable, slightly sticky and slightly plastic; many very fine, fine, medium, and coarse roots; 10 percent fine channery fragments; neutral; abrupt smooth boundary.

A12—7 to 18 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to weak medium granular; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots and few coarse roots; 10 percent gravel; neutral; clear wavy boundary.

B21t—18 to 31 inches; dark brown (10YR 4/3) clay loam, dark brown (7.5YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, sticky and plastic; common very fine and fine roots and few coarse roots; few thin patchy clay films on faces of ped; 10 percent gravel; neutral; clear wavy boundary.

B22t—31 to 36 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, very friable, sticky and plastic; few very fine and fine roots; thin continuous and few thick patchy clay films on faces of ped; 15 percent gravel; neutral; clear wavy boundary.

B23t—36 to 60 inches; yellowish brown (10YR 5/4) gravelly clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, very friable, sticky and plastic; many thin clay films on faces of ped; 25 percent gravel; neutral.

The control section averages 0 to 20 percent gravel and 0 to 5 percent cobbles. The A horizon has hue of 10YR or 7.5YR, value of 3 or 4 when dry and 1 or 2 when moist, and chroma of 2 or 3. The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 3 or 4. Texture is sandy clay loam, clay loam, gravelly sandy clay loam, or gravelly clay loam. The C horizon, where present, has hue of 2.5Y to 7.5YR.

Clifterson series

The Clifterson series consists of deep, excessively drained soils on terraces. These soils formed in mixed alluvium. Slope is 2 to 30 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 50 degrees F.

Typical pedon on a Clifterson gravelly sandy clay loam in an area of Clifterson-Persayo association, in the SW1/4NW1/4 of sec. 12, T. 48 N., R. 92 1/2 W.

A1—0 to 5 inches; pale brown (10YR 6/3) gravelly sandy clay loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; slightly effervescent; many very fine and fine roots; 15 percent gravel; moderately alkaline; abrupt smooth boundary.

C1ca—5 to 18 inches; very pale brown (10YR 7/3) very gravelly loam; pale brown (10YR 6/3) moist; single grain; loose, nonsticky and nonplastic; strongly effervescent; common very fine, fine, and medium roots; 45 percent gravel and 15 percent cobbles; secondary calcium carbonate on undersides of rocks; few small soft masses of lime; few gypsum crystals; strongly alkaline; clear wavy boundary.

C2ca—18 to 60 inches; very pale brown (10YR 7/4) very gravelly loam, light yellowish brown (10YR 6/4) moist; single grain; loose, nonsticky and nonplastic; strongly effervescent; common very fine, fine, and medium roots to a depth of 24 inches; 45 percent gravel and 15 percent cobbles; thin concretions of secondary carbonates on undersides of rocks; strongly alkaline.

The control section averages 30 to 70 percent gravel and 5 to 15 percent cobbles. The profile has hue of 7.5YR to 2.5Y. The A horizon has value of 6 or 7 when dry and 4 or 5 when moist, and it has chroma of 3 or 4.

Coutis series

The Coutis series consists of deep, well drained soils on mountain foot slopes and along narrow canyon walls. These soils formed in alluvium derived from sandstone. Slope is 2 to 45 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Coutis fine sandy loam in an area of Coutis-Greenman association, in the NE1/4NE1/4 of sec. 5, T. 47 N., R. 86 W.

A11—0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak medium angular blocky structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; neutral; clear smooth boundary.

A12—4 to 25 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; neutral; gradual smooth boundary.

AC—25 to 40 inches; grayish brown (10YR 5/2) fine sandy loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; mildly alkaline; gradual smooth boundary.

C—40 to 60 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; single grain; soft, very friable, nonsticky and nonplastic; mildly alkaline.

The mollic epipedon is 16 to 40 inches thick. The profile is 0 to 15 percent gravel. It has hue of 10YR or 7.5YR. The A1 horizon has value of 4 or 5 when dry and 2 or 3 when moist, and it has chroma of 2 or 3. The C horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 3 or 4.

Decross series

The Decross series consists of deep, well drained soils on fans. These soils formed in mixed alluvium derived from limestone. Slope is 1 to 10 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Decross loam in an area of Woosley-Decross association, in the NE1/4SW1/4 of sec. 10, T. 47 N., R. 86 W.

A11—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and nonplastic; many fine, medium, and coarse roots; neutral; clear smooth boundary.

A12—5 to 16 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; weak fine subangular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots; neutral; clear smooth boundary.

B1—16 to 23 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; neutral; clear smooth boundary.

B2t—23 to 32 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, firm, slightly sticky and slightly plastic; few fine, medium, and coarse roots; medium continuous clay films; mildly alkaline; abrupt wavy boundary.

B3tca—32 to 36 inches; light grayish brown (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; moderate medium and fine subangular blocky structure; slightly hard, slightly firm, slightly sticky and slightly plastic; thin patchy clay films; violently effervescent; common streaks and seams of secondary lime; moderately alkaline; abrupt wavy boundary.

C1ca—36 to 54 inches; light gray (10YR 7/2) clay loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, firm, sticky and plastic; violently effervescent; moderately alkaline; clear wavy boundary.

C2ca—54 to 60 inches; light gray (10YR 7/2) clay loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, firm, sticky and plastic; violently effervescent; moderately alkaline.

The mollic epipedon is 16 to 40 inches thick. The solum is 20 to 50 inches thick. The A1 horizon has hue of 2.5Y or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The B2t horizon has hue of 2.5Y to 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 or 3. Texture is loam or clay loam. The C horizon has hue of 2.5Y or 10YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 to 4.

Dobent series

The Dobent series consists of deep, somewhat poorly drained soils on flood plains. These soils formed in mixed alluvium. Slope is 0 to 3 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of Dobent loam in the NE1/4NE1/4 of sec 36, T. 47 N., R. 92 W.

Ap1—0 to 7 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak very coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; strongly effervescent: strongly alkaline; abrupt smooth boundary.

Ap2—7 to 14 inches; light brownish gray (10YR 6/2) clay loam, grayish brown (10YR 5/2) moist; few medium distinct reddish brown mottles and few very fine faint light gray mottles; weak coarse subangular blocky structure; hard, friable, sticky and plastic; many fine roots; strongly effervescent; many fine roots; moderately alkaline; abrupt smooth boundary.

C1g—14 to 22 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; common medium distinct reddish brown (5YR 5/4) rust stains and few medium faint light gray (N 7/0) mottles; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; strongly effervescent; few fine roots; moderately alkaline; clear wavy boundary.

C2g—22 to 60 inches; light brownish gray (10YR 6/2) loam stratified with sandy loam, very fine sandy loam, and silty clay loam, dark grayish brown (10YR 4/2) moist; common medium faint to distinct light gray (N 7/0) mottles; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots to a depth of 30 inches; strongly effervescent; mildly alkaline.

The profile has hue of 5Y to 10YR, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 2 or less. The weighted texture of the control section is loam or clay loam.

Finnerty series

The Finnerty series consists of deep, well drained soils on fans and flood plains. These soils formed in alluvium. Slope is 0 to 3 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of Finnerty silty clay in the NW1/4SW1/4 of sec. 4, T. 48 N., R. 92 W.

Ap—0 to 9 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; weak coarse angular blocky structure parting to moderate very fine angular blocky; very hard, very firm, very sticky and very plastic; slightly effervescent; moderately alkaline; abrupt smooth boundary.

C1—9 to 15 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) moist; weak coarse prismatic structure parting to moderate medium angular blocky; extremely hard, extremely firm, extremely sticky and very plastic; slightly effervescent; moderately alkaline; clear wavy boundary.

C2—15 to 60 inches; brown (10YR 5/3) clay, brown (10YR 4/3) moist; massive; extremely hard, extremely firm, very sticky and very plastic; few small soft nests and seams of gypsum crystals; slightly effervescent; moderately alkaline.

The control section has hue of 10YR to 5Y, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. It is clay or silty clay.

Forkwood series

The Forkwood series consists of deep, well drained soils on fans and in valleys. These soils formed in alluvium. Slope is 0 to 10 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 to 47 degrees F.

Typical pedon of a Forkwood very fine sandy loam in an area of Forkwood-Kishona association, in the SW1/4NW1/4 of sec. 6, T. 43 N., R. 88 W.

A1—0 to 2 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; mildly alkaline; abrupt smooth boundary.

B21t—2 to 5 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; thin patchy clay films on faces of peds; mildly alkaline; abrupt smooth boundary.

B22t—5 to 13 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; common very fine and fine roots and few medium and coarse roots; thin patchy clay films on faces of peds; mildly alkaline; clear wavy boundary.

B3ca—13 to 19 inches; light gray (10YR 7/2) clay loam, grayish brown (10YR 5/2) moist; moderate medium and fine subangular blocky structure; hard, firm, sticky and plastic; strongly effervescent; few fine, medium, and coarse roots; many medium and coarse soft masses and seams of calcium carbonate; moderately alkaline; gradual wavy boundary.

C1ca—19 to 32 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; weak coarse subangular blocky structure; hard, firm, sticky and plastic; strongly effervescent; many coarse and common medium soft masses, seams, and streaks of calcium carbonate; strongly alkaline; gradual wavy boundary.

C2—32 to 60 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; strongly effervescent; few fine seams of calcium carbonate; strongly alkaline.

The profile is 0 to 10 percent gravel. The A horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. The B2t horizon has hue of 2.5Y to 7.5YR, value of 4 to 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. It is loam or clay loam. The C horizon has hue of 2.5Y or 10YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 or 3.

Fruita series

The Fruita series consists of deep, well drained soils on fans. These soils formed in alluvium. Slope is 1 to 10 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Fruita fine sandy loam in an area of Fruita-Neiber association, in the NE1/4NW1/4 of sec. 27, T. 46 N., R. 91 W.

A1—0 to 4 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak very thick platy structure parting to weak fine granular; slightly hard, very friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; mildly alkaline; clear wavy boundary.

B2t—4 to 16 inches; pale brown (10YR 6/3) clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, sticky and plastic; common very fine, fine, medium, and coarse roots; thin continuous clay films and thick

patchy clay films on faces of peds; slightly effervescent; moderately alkaline; gradual wavy boundary.

B3tca—16 to 24 inches; pale brown (10YR 6/3) clay loam, yellowish brown (10YR 5/4) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine, medium, and coarse roots; thin patchy clay films on most faces of peds; fine soft accumulations of calcium carbonate; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—24 to 30 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine and medium roots; fine soft masses of calcium carbonate; strongly effervescent; strongly alkaline; gradual wavy boundary.

C2—30 to 60 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine and medium roots to a depth of 32 inches; strongly effervescent; strongly alkaline.

The profile is 0 to 10 percent gravel. It has hue of 7.5YR or 10YR. The A1 horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 2 or 3. The B2t horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 3 or 4. Texture is loam or clay loam. The C horizon has value of 5 to 7 when dry and 5 or 6 when moist, and it has chroma of 3 to 5.

Garland series

The Garland series consists of deep, well drained soils on alluvial fans and terraces. These soils formed in mixed alluvium. Slope is 0 to 3 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of Garland clay loam, in lot 7 of sec. 7, T. 46 N., R. 92 W.

Ap—0 to 8 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many fine and medium roots; mildly alkaline; abrupt smooth boundary.

B2t—8 to 13 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine and medium roots; thin continuous clay films and thick patchy clay films; mildly alkaline; clear wavy boundary.

B3tca—13 to 22 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine and medium roots; thin patchy clay films; few fine masses and seams of secondary secondary carbonate on undersides of pebbles; 10 percent gravel; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—22 to 28 inches; very pale brown (10YR 7/3) very gravelly clay loam, pale brown (10YR 6/3) moist; massive; slightly hard, very friable, sticky and plastic; few fine and medium roots; soft masses and seams of secondary calcium carbonate; 60 percent gravel and 10 percent cobbles; violently effervescent; moderately alkaline; clear wavy boundary.

IIC2—28 to 60 inches; light brownish gray (2.5Y 6/2) very gravelly sand, light brownish gray (2.5Y 6/2) moist; massive; loose, nonsticky and nonplastic; 60 percent gravel and 10 percent cobbles; strongly effervescent; moderately alkaline.

The solum averages 0 to 15 percent gravel. Very gravelly sand is at a depth of 20 to 40 inches. The A horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. The B horizon has hue of 7.5YR to 2.5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 or 4. The C horizon is 30 to 60 percent gravel and 10 to 15 percent cobbles.

Glenton series

The Glenton series consists of deep, moderately well drained soils on flood plains. These soils formed in mixed alluvium. Slope is 0 to 3 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of Glenton sandy loam, moderately wet, in the NE1/4NE1/4 of sec. 6, T. 47 N., R. 92 W.

A1—0 to 3 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak medium platy structure parting to weak fine subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; many very fine, fine, and medium roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

C1—3 to 10 inches; pale brown (10YR 6/3) fine sandy loam, light olive brown (2.5Y 5/4) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; slightly effervescent; clear wavy boundary.

C2—10 to 26 inches; light brownish gray (10YR 6/2) fine sandy loam, grayish brown (10YR 5/2) moist; single grain; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots to a depth of 25 inches; slightly effervescent; moderately alkaline; clear wavy boundary.

C3—26 to 60 inches; light brownish gray (10YR 6/2) fine sandy loam stratified with lenses of loam, fine sand, and sandy loam; grayish brown (10YR 5/2) moist; single grain; slightly hard, very friable, nonsticky and nonplastic; few faint and distinct reddish brown rust stains and mottles; slightly effervescent; moderately alkaline.

The profile is moderately alkaline or strongly alkaline.

Granile series

The Granile series consists of deep, well drained soils on alluvial fans. These soils formed in mixed alluvium derived mainly from quartzitic rock. Slope is 2 to 35 percent. The average annual precipitation is about 20 inches, and the average annual air temperature is about 36 degrees F.

Typical pedon of a Granile very stony fine sandy loam in an area of Granile-Tine association, in the SW1/4SW1/4 of sec. 6, T. 48 N., R. 86 W.

O1—1 inch to 0; forest duff.
A1—0 to 3 inches; brown (10YR 5/3) very stony fine sandy loam, dark brown (10YR 4/3) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 20 percent gravel, 10 percent cobbles, and 10 percent stones; neutral; abrupt smooth boundary.
A2—3 to 20 inches; very pale brown (10YR 7/3) very cobbly fine sandy loam, brown (10YR 5/3) moist; moderate fine subangular blocky structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; many very fine, medium, and coarse roots; 25 percent gravel, 15 percent cobbles, and 5 percent stones; neutral; gradual irregular boundary.
B2t—20 to 40 inches; brown (7.5YR 5/4) very cobbly clay loam, dark brown (7.5YR 4/4) moist; strong medium and fine prismatic structure parting to strong medium and fine angular blocky; hard, friable, sticky and plastic; common fine, medium, and coarse roots; clay films on faces of peds and along channels; 20 percent gravel, 40 percent cobbles, and 5 percent stones; neutral; clear wavy boundary.
B3—40 to 45 inches; light brownish gray (10YR 6/2) very cobbly sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine, medium, and coarse roots; few pockets of B2t material; 20 percent gravel, 40 percent cobbles, and 5 percent stones; neutral; gradual wavy boundary.
C—45 to 60 inches; light brownish gray (10YR 6/2) very cobbly sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; 20 percent gravel, 40 percent cobbles, and 5 percent stones; neutral.

The profile is 20 to 40 percent gravel, 15 to 40 percent cobbles, and 0 to 10 percent stones. The A1 horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. The A2 horizon has hue of 2.5Y or 10YR, value of 5 to 8 when dry and 4 to 7 when moist, and chroma of 1 to 4. The B2t horizon has hue of 2.5Y to 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 6. It is very cobbly clay loam or very cobbly sandy clay loam. The C horizon has hue of 2.5Y to 7.5YR.

Greenman series

The Greenman series consists of moderately deep, well drained soils on hogbacks. These soils formed in material derived from sandstone. Slope is 2 to 25 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Greenman fine sandy loam in an area of Greenman-Splitro association, in the SE1/4SW1/4 of sec. 28, T. 44 N., R. 86 W.

A1—0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; neutral; abrupt smooth boundary.
A3—4 to 8 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to weak very fine and fine subangular blocky; slightly hard, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; neutral; clear wavy boundary.
B21t—8 to 15 inches; brown (10YR 5/3) fine sandy loam, dark brown (7.5YR 4/3) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; thin patchy clay films on faces of peds; weak bridging between sand grains; neutral; clear wavy boundary.
B22t—15 to 24 inches; brown (10YR 5/3) fine sandy loam, dark brown (7.5YR 4/3) moist; weak medium prismatic structure parting to moderate fine subangular blocky; hard, very friable, nonsticky and nonplastic; common fine, medium, and coarse roots; thin patchy clay films on faces of peds; neutral; clear wavy boundary.
C—24 to 34 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; single grain; slightly hard, very friable, nonsticky and nonplastic; common fine, medium, and coarse roots to a depth of 30 inches; 10 percent gravel; neutral; abrupt wavy boundary.
R—34 inches; fractured hard limestone.

Depth to lithic contact is 20 to 40 inches. The profile is 0 to 15 percent gravel and 0 to 5 percent cobbles. It is

slightly acid to mildly alkaline. The A horizon has hue of 2.5Y or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The B2 horizon has hue of 10YR or 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 or 4. Texture is sandy loam or fine sandy loam. The C horizon has hue of 2.5Y or 10YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 or 3.

Greybull series

The Greybull series consists of moderately deep, well drained soils on uplands. These soils formed in material derived from shale. Slope is 1 to 30 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 50 degrees F.

Typical pedon of a Greybull clay loam in an area of Greybull-Persayo association, in the NE1/4SW1/4 of sec. 31, T. 46 N., R. 94 W.

A1—0 to 4 inches; olive (5Y 5/3) clay loam, olive (5Y 5/3) moist; weak thin platy structure parting to weak fine granular; hard, friable, sticky and plastic; slightly effervescent; many very fine and fine roots and few medium roots; strongly alkaline; abrupt smooth boundary.

B2—4 to 8 inches; pale olive (5Y 6/3) clay loam, olive (5Y 5/3) moist; weak fine subangular blocky structure; very hard, firm, very sticky and plastic; few very fine, fine, and medium roots; strongly effervescent; strongly alkaline; clear wavy boundary.

C1ca—8 to 19 inches; pale olive (5Y 6/3) clay loam, olive (5Y 5/3) moist; weak fine subangular blocky structure; very hard, firm, very sticky and plastic; few fine roots; few small masses of secondary calcium carbonate; strongly effervescent; strongly alkaline; clear wavy boundary.

C2cs—19 to 23 inches; pale olive (5Y 6/3) clay loam, olive (5Y 5/3) moist; massive; very hard, firm, sticky and plastic; few gypsum crystals; slightly effervescent; strongly alkaline; gradual wavy boundary.

C3r—23 inches; soft calcareous shale.

Soft shale is at a depth of 20 to 40 inches, and calcareous material is at a depth of 0 to 10 inches. The profile averages 0 to 15 percent coarse fragments, mainly soft shale chips. The control section commonly is loam, clay loam, or sandy clay loam. The A horizon has hue of 5Y to 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. The B and C horizons have hue of 5Y to 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4.

Griffy series

The Griffy series consists of deep, well drained soils on fans and terraces. These soils formed in alluvium. Slope is 0 to 10 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of Griffy sandy loam, 1 to 10 percent slopes, in the NW1/4SE1/4 of sec. 11, T. 46 N., R. 94 W.

A1—0 to 3 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; weak medium platy structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; mildly alkaline; abrupt smooth boundary.

B21t—3 to 7 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; thin continuous clay films on faces of peds and in tubular pores; 10 percent gravel; mildly alkaline; clear wavy boundary.

B22t—7 to 14 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 4/3) moist; moderate coarse prismatic structure parting to moderate coarse subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; thin continuous clay films on faces of peds and in tubular pores; 10 percent gravel; mildly alkaline; clear wavy boundary.

B3tca—14 to 19 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; weak moderate prismatic structure parting to weak coarse subangular blocky; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; few thin clay films bridging sand grains; few fine soft masses of visible calcium carbonate; 10 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cca—19 to 60 inches; very pale brown (10YR 7/3) sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots to a depth of 30 inches; common fine irregular seams and soft masses of secondary calcium carbonate; 10 percent gravel; violently effervescent; strongly alkaline.

The profile is 0 to 15 percent gravel. The A1 horizon has hue of 2.5Y or 10YR, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 2 or 3. It is sandy loam or clay loam. The B2t horizon has hue of 2.5Y to 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 or 4. It is sandy clay loam or gravelly sandy clay loam. The C horizon has hue of 2.5Y or 10YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 or 3.

Gystrum series

The Gystrum series consists of moderately deep, well drained soils on hills and ridges. These soils formed in material derived from gyprock. Slope is 3 to 45 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Gystrum silt loam in an area of Rekop-Gystrum association, in the SW1/4NE1/4 of sec. 9, T. 47 N., R. 88 W.

A1—0 to 4 inches; reddish brown (5YR 5/3) silt loam, dark reddish brown (5YR 3/4) moist; weak thick platy structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and plastic; many very fine, fine, and medium roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.

B21—4 to 8 inches; light reddish brown (5YR 6/4) silt loam, reddish brown (5YR 5/4) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; hard, very friable, slightly sticky and plastic; many very fine, fine, and medium roots; strongly effervescent; moderately alkaline; clear wavy boundary.

B22—8 to 12 inches; light reddish brown (5YR 6/4) silt loam, reddish brown (5YR 5/4) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; strongly effervescent; moderately alkaline; clear wavy boundary.

C1cs—12 to 36 inches; mixed pink (5YR 8/3) and white (5YR 8/1) silt loam, pink (5YR 7/3) and light gray (5YR 7/1) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots to a depth of 18 inches; many gypsum crystals; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2r—36 inches; soft gyprock.

Depth to soft rock ranges from 20 to 40 inches. The profile is 0 to 5 percent gravel. It has hue of 7.5YR to 2.5YR. The A1 horizon has value of 5 or 6 when dry and 3 to 5 when moist, and it has chroma of 2 to 4. The B2 horizon has value of 6 or 7 when dry and 5 or 6 when moist, and it has chroma of 3 or 4. The C horizon has value of 6 to 8 when dry or moist, and it has chroma of 1 to 4. The Ccs horizon is 40 to 60 percent calcium sulfate.

Haverdad series

The Haverdad series consists of deep, well drained soils on flood plains. These soils formed in alluvium. Slope is 1 to 3 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Haverdad loam in an area of Forkwood-Haverdad association, in the SE1/4SE1/4 of sec. 1, T. 44 N., R. 92 W.

A1—0 to 6 inches; light yellowish brown (2.5Y 6/4) loam, light olive brown (2.5Y 5/4) moist; weak coarse granular structure; slightly hard, very friable, slightly sticky and plastic; many fine roots and common medium roots; disseminated lime; strongly effervescent; moderately alkaline; clear wavy boundary.

C—6 to 60 inches; light yellowish brown (2.5Y 6/4) loam stratified with thin lenses of fine sandy loam, sandy loam, and silty clay loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, very friable, slightly sticky and plastic; common medium and coarse roots to a depth of 26 inches; disseminated lime; strongly effervescent; strongly alkaline.

The A horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. It is mildly alkaline to strongly alkaline. The C horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. It is loam or clay loam stratified with thin lenses of very fine sandy loam, sandy loam, and silty clay loam. Reaction is moderately alkaline or strongly alkaline.

Heldt series

The Heldt series consists of deep, well drained to moderately well drained soils on fans. These soils formed in alluvium derived from interbedded sandstone and shale. Slope is 1 to 10 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Heldt silty clay loam in an area of Renohill-Heldt-Worf association, in the SE1/4SE1/4 of sec. 33, T. 48 N., R. 97 W.

A1—0 to 5 inches; pale brown (10YR 6/3) silty clay loam, dark brown (10YR 4/3) moist; weak fine and medium platy structure parting to weak fine granular; hard, firm, slightly sticky and plastic; many very fine and fine roots and few medium roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.

B1—5 to 9 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium angular blocky; very hard, firm, sticky and plastic; many very fine and fine roots and few medium roots; strongly effervescent; moderately alkaline; clear wavy boundary.

B21—9 to 18 inches; yellowish brown (10YR 5/4) clay, yellowish brown (10YR 5/4) moist; moderate medium prismatic structure parting to moderate medium angular blocky; extremely hard, very firm,

very sticky and plastic; few very fine and fine roots; few pressure faces; strongly effervescent; strongly alkaline; gradual wavy boundary.

B22—18 to 27 inches; yellowish brown (10YR 5/4) clay, yellowish brown (10YR 5/4) moist; moderate medium prismatic structure parting to moderate medium angular blocky; very hard, firm, very sticky and plastic; few very fine and fine roots; common pressure faces; strongly effervescent; strongly alkaline; gradual wavy boundary.

C1cs—27 to 55 inches; yellowish brown (10YR 5/4) clay, yellowish brown (10YR 5/4) moist; weak medium prismatic structure parting to weak medium subangular blocky; very hard, firm, sticky and plastic; many fine streaks, seams, and masses of secondary calcium carbonate and gypsum crystals; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2cs—55 to 60 inches; yellowish brown (10YR 5/4) clay, yellowish brown (10YR 5/4) moist; massive; very hard, firm, sticky and plastic; few disseminated gypsum crystals and masses of calcium carbonate; strongly effervescent; moderately alkaline.

The profile is 0 to 15 percent gravel. It has hue of 5Y to 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4. The control section is clay or silty clay.

Hoot series

The Hoot series consists of shallow, well drained soils on hillsides. These soils formed in material derived from sandstone. Slope is 3 to 30 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Hoot fine sandy loam in an area of Hoot-Rock outcrop complex, 3 to 45 percent slopes, in the SE1/4NW 1/4 of sec. 23, T. 54 N., R. 94 W.

A11—0 to 2 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; single grain; loose, soft, nonsticky and nonplastic; many very fine, fine, and medium roots; 10 percent channery fragments; noneffervescent; mildly alkaline; abrupt smooth boundary.

A12—2 to 5 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak thin platy structure parting to weak very fine granular; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; 10 percent channery fragments; mildly alkaline; clear wavy boundary.

B21—5 to 8 inches; light brown (7.5YR 6/4) very channery sandy clay loam, dark brown (7.5YR 4/4) moist; weak coarse prismatic structure parting to weak medium subangular blocky; soft, very friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; thin patchy clay films on faces of peds; 35 percent channery fragments; mildly alkaline; clear wavy boundary.

B22—8 to 12 inches; light brown (7.5YR 6/4) very channery sandy clay loam, brown (7.5YR 5/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; soft, friable, slightly sticky and slightly plastic; many very fine and fine roots and few medium roots; thin continuous and thick patchy clay films on faces of peds; 65 percent channery fragments; mildly alkaline; clear wavy boundary.

B3tca—12 to 16 inches; light yellowish brown (10YR 6/4) very channery sandy loam, yellowish brown (10YR 5/4) moist; weak thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and few medium roots; few thin patchy clay films on tops and sides of coarse fragments; common medium soft lime masses and few lime pendants on undersides of coarse fragments; 50 percent channery fragments; strongly effervescent; moderately alkaline; abrupt wavy boundary.

R—16 inches; hard fractured sandstone.

Sandstone is at a depth of 10 to 20 inches. The A horizon has hue of 10YR or 2.5Y, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 2 or 3. It is 5 to 10 percent channery fragments and 0 to 5 percent flagstones. The B horizon has hue of 7.5YR or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 to 5. It is 35 to 70 percent channery fragments and 0 to 20 percent flagstones.

Hyattville series

The Hyattville series consists of moderately deep, well drained soils on mountain foot slopes. These soils formed in material derived from limestone. Slope is 6 to 40 percent. The average annual precipitation is about 22 inches, and the average annual air temperature is about 37 degrees F.

Typical pedon of a Hyattville stony loam in an area of Limber-Hyattville-Rock outcrop association, in the NE1/4NW1/4 of sec. 2, T. 47 N., R. 86 W.

O1—2 inches to 0; partially decomposed needles, leaves, and bark.

A2—0 to 7 inches; pinkish gray (7.5YR 6/2) stony loam, dark brown (7.5YR 4/2) moist; weak medium prismatic structure parting to weak medium granular; soft, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; 5 percent channery fragments, 5 percent flagstones, and 5 percent stones; slightly acid; clear smooth boundary.

B&A—7 to 12 inches; mixed pinkish gray (7.5YR 6/2) and brown (7.5YR 5/4) very channery clay loam, dark brown (7.5YR 4/2) moist; weak medium prismatic structure parting to moderate fine and

medium angular blocky; slightly hard, very friable, sticky and slightly plastic; many very fine, fine, medium, and coarse roots; thin patchy clay films; 25 percent channery fragments, 10 percent flagstones, and 5 percent stones; slightly acid; clear wavy boundary.

B2t—12 to 20 inches; brown (7.5YR 5/4) very channery clay loam, dark brown (7.5YR 4/4) moist; moderate medium prismatic structure parting to strong fine and medium angular blocky; hard, friable, sticky and plastic; many fine, medium, and coarse roots; thin continuous and thick patchy clay films on faces of peds; 30 percent channery fragments, 10 percent flagstones, and 5 percent stones; neutral; clear wavy boundary.

B3tca—20 to 29 inches; light brown (7.5YR 6/4) very channery clay loam, brown (7.5YR 5/4) moist; weak medium prismatic structure parting to moderate medium angular blocky; hard, friable, sticky and plastic; common fine, medium, and coarse roots; thin continuous clay films on faces of peds; 40 percent channery fragments, 15 percent flagstones, and 5 percent stones; strongly effervescent; mildly alkaline; gradual wavy boundary.

Cca—29 to 36 inches; pale brown (10YR 6/3) very channery clay loam, brown (10YR 5/3) moist; massive; hard, friable, sticky and plastic; few fine and medium roots; 40 percent channery fragments, 10 percent flagstones, and 10 percent stones; strongly effervescent; moderately alkaline; gradual wavy boundary.

R—36 inches; limestone.

Bedrock is at a depth of 20 to 40 inches. The control section is 5 to 45 percent channery fragments, 10 to 50 percent flagstones, and 0 to 5 percent stones. The A horizon has hue of 10YR or 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 1 or 2. The B2t horizon has hue of 7.5YR or 5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 to 6. It is very channery clay loam or very flaggy clay loam. The C horizon has hue of 10YR or 7.5YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 3 to 6.

Inchau series

The Inchau series consists of moderately deep, well drained soils on mountainsides. These soils formed in material derived from shale. Slope is 2 to 25 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of an Inchau loam in an area of Clayburn-Bachus-Inchau association, in the NE1/4SW1/4 of sec. 17, T. 42 N., R. 86 W.

A1—0 to 6 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; slightly acid; clear wavy boundary.

B1—6 to 14 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; slightly acid; clear wavy boundary.

B21t—14 to 26 inches; yellowish brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; many very fine, fine, and medium roots; thin continuous clay films on faces of peds; 15 percent gravel; slightly acid; clear wavy boundary.

B22t—26 to 36 inches; light yellowish brown (10YR 6/4) gravelly clay loam, yellowish brown (10YR 5/4) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, firm, sticky and plastic; common very fine, fine, and medium roots; thick continuous clay films on faces of peds; few bleached sand grains on faces of peds; 20 percent gravel; slightly acid; clear wavy boundary.

C1—36 to 39 inches; very pale brown (10YR 7/4) gravelly loam, brownish yellow (10YR 6/6) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; few very fine, fine, and medium roots; 35 percent gravel; slightly acid; gradual wavy boundary.

C2r—39 inches; yellow sandy shale.

The profile is 0 to 35 percent coarse fragments. Bedrock is at a depth of 20 to 40 inches. The profile has hue of 2.5Y to 10YR. The A horizon has value of 4 or 5 when dry and 2 or 3 when moist, and it has chroma of 2 or 3. The B2t horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 3 to 6. It is clay loam, loam, gravelly clay loam, or gravelly loam. The C horizon has value of 5 to 7 when dry and 4 to 6 when moist, and it has chroma of 3 to 6. It is gravelly loam or gravelly sandy clay loam.

Irigul series

The Irigul series consists of shallow, well drained soils on the sides and ridges of mountains. These soils formed in material derived from schist. Slope is 6 to 30 percent. The average annual precipitation is about 22 inches, and the average annual air temperature is about 37 degrees F.

Typical pedon of an Irigul very channery loam in an area of Lakehelen-Irigul-Rock outcrop association, in the SW1/4NE1/4 of sec. 2, T. 48 N., R. 86 W.

A11—0 to 3 inches; dark grayish brown (10YR 4/2) very channery loam, very dark grayish brown (10YR 3/2)

moist; moderate medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and few medium roots; 35 percent channery fragments and 5 percent flagstones; mildly alkaline; abrupt smooth boundary.

A12—3 to 10 inches; brown (10YR 5/3) very channery loam, very dark brown (10YR 3/3) moist; moderate medium subangular blocky structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and few medium roots; 50 percent channery fragments and 5 percent flagstones; mildly alkaline; clear wavy boundary.

C1—10 to 14 inches; yellowish brown (10YR 5/4) very channery loam, dark yellowish brown (10YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; 50 percent channery fragments and 5 percent flagstones; neutral; abrupt smooth boundary.

R—14 inches; schist.

Lithic contact is at a depth of 4 to 20 inches. The profile is 35 to 75 percent channery fragments and 5 to 10 percent flagstones. The A horizon has hue of 2.5Y or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The C horizon has hue of 2.5Y to 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4.

Jenkinson series

The Jenkinson series consists of shallow, well drained soils on mountains. These soils formed in material derived from limestone. Slope is 2 to 30 percent. The average annual precipitation is about 18 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Jenkinson channery loam in an area of Lymanson-Turk-Jenkinson association, in the SE1/4SW1/4 of sec. 27, T. 43 N., R. 86 W.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) channery loam, very dark grayish brown (10YR 3/2) moist; moderate fine and very fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; 15 percent channery fragments; slightly effervescent; moderately alkaline; clear smooth boundary.

C—7 to 14 inches; grayish brown (2.5Y 5/2) channery clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine subangular blocky structure; slightly hard, firm, sticky and plastic; many very fine and fine roots; 20 percent channery fragments and 5 percent flagstones; strongly effervescent; moderately alkaline; clear smooth boundary.

R—14 inches; limestone.

Hard limestone is at a depth of 10 to 20 inches. The control section is channery loam or channery clay loam. The profile is 15 to 35 percent channery fragments and 0 to 5 percent flagstones. The A1 horizon has hue of 5Y to 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The C horizon has hue of 5Y to 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 or 3.

Kishona series

The Kishona series consists of deep, well drained soils on fans. These soils formed in alluvium. Slope is 1 to 30 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of Kishona loam in an area of Forkwood-Kishona association, in the NE1/4SW1/4 of sec. 28, T. 46 N., R. 80 W.

A1—0 to 4 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak fine and very fine granular structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots; strongly effervescent; moderately alkaline; abrupt wavy boundary.

C1ca—4 to 20 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak coarse prismatic structure; hard, friable, nonsticky and slightly plastic; few very fine roots; common fine soft masses, threads, and seams of secondary calcium carbonate; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—20 to 60 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; massive; hard, friable, nonsticky and slightly plastic; few very fine roots to a depth of 40 inches; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The profile is 0 to 10 percent gravel. The A horizon has hue of 2.5Y to 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. It is loam or clay loam. It is mildly alkaline or moderately alkaline. The C horizon has hue of 5Y to 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. It is loam, silty clay loam, or clay loam. It is moderately alkaline or very strongly alkaline.

Kyle series

The Kyle series consists of deep, well drained soils on undulating uplands. These soils formed in material derived from shale. Slope is 2 to 8 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Kyle clay in an area of Kyle-Shingle-Bidman association, in the NE1/4SW1/4 of sec. 27, T. 43 N., R. 88 W.

A1—0 to 2 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; very hard, very firm, very sticky and very plastic; common fine, medium, and coarse roots; cracks 1/2 inch to 2 inches wide; mildly alkaline; abrupt smooth boundary.

B2—2 to 12 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to moderate medium angular blocky; extremely hard, extremely firm, very sticky and very plastic; common fine, medium, and coarse roots; pressure faces; cracks 1/2 inch to 2 inches wide; slightly effervescent; mildly alkaline; clear wavy boundary.

B3ca—12 to 24 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to moderate medium angular blocky; extremely hard, extremely firm, very sticky and very plastic; few fine, medium, and coarse roots to a depth of 20 inches; pressure faces; cracks 1/2 inch to 2 inches wide; few fine soft masses of secondary calcium carbonate and few gypsum crystals; strongly effervescent; mildly alkaline; gradual wavy boundary.

C—24 to 60 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; extremely hard, extremely firm, very sticky and very plastic; cracks 1/2 inch to 2 inches wide; many fine gypsum crystals; slightly effervescent; mildly alkaline.

The profile has hue of 5Y to 2.5Y. The A horizon has value of 5 or 6 when dry and 3 or 4 when moist, and it has chroma of 1 to 3. The B horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 1 to 3.

Lakehelen series

The Lakehelen series consists of moderately deep, well drained soils on mountainsides. These soils formed in material derived from sandstone and granite. Slope is 5 to 35 percent. The average annual precipitation is about 22 inches, and the average annual air temperature is about 37 degrees F.

Typical pedon of a Lakehelen stony sandy loam in an area of Lakehelen-Irigul-Rock outcrop association, in the SW1/4NW1/4 of sec. 4, T. 48 N., R. 86 W.

O1—1 inch to 0; forest duff.

A2—0 to 19 inches; pale brown (10YR 6/3) stony sandy loam, dark brown (7.5YR 4/3) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; 10 percent gravel, 10 percent cobbles, and 5 percent stones; slightly acid; clear wavy boundary.

B21t—19 to 37 inches; strong brown (7.5YR 5/6) very cobbly sandy clay loam, dark brown (7.5YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and plastic; many fine, medium, and coarse roots; thin continuous clay films on faces of peds; 30 percent gravel, 20 percent cobbles, and 10 percent stones; slightly acid; gradual wavy boundary.

R—37 inches; granite.

Hard sandstone or granite is at a depth of 20 to 40 inches. The profile is 20 to 35 percent gravel, 15 to 30 percent cobbles, and 0 to 15 percent stones. The A2 horizon has hue of 10YR or 7.5YR, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 2 or 3. The B2t horizon has hue of 7.5YR or 5YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 4 to 6.

Larim series

The Larim series consists of deep, well drained soils on terraces. These soils formed in mixed alluvium. Slope is 1 to 35 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Larim very gravelly sandy loam in an area of Larim-Olney association, in the NE1/4NE1/4 of sec. 21, T. 45 N., R. 95 W.

A1—0 to 3 inches; brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; 35 percent gravel; mildly alkaline; abrupt smooth boundary.

B21t—3 to 8 inches; brown (7.5YR 5/4) very gravelly sandy clay loam, dark yellowish brown (10YR 3/4) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, sticky and plastic; common very fine, fine, and medium roots; thin continuous clay films on faces of peds; 50 percent gravel; neutral; clear wavy boundary.

B22tca—8 to 15 inches; brown (10YR 5/3) very gravelly sandy clay loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; thin patchy clay films; few soft masses of secondary calcium carbonate; 50 percent gravel; strongly effervescent; neutral; abrupt smooth boundary.

IIC1ca—15 to 34 inches; very pale brown (10YR 7/3) very gravelly loamy sand, pale brown (10YR 6/3) moist; single grain; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; many soft masses of secondary calcium carbonate; 50 percent gravel; violently effervescent; moderately alkaline; gradual wavy boundary.

IIC2—34 to 60 inches; brownish yellow (10YR 6/6) very gravelly loamy sand, yellowish brown (10YR 5/4) moist; single grain; slightly hard, very friable, nonsticky and nonplastic; 50 percent gravel and 5 percent cobbles; strongly effervescent; moderately alkaline.

The profile is 0 to 10 percent cobbles and 35 to 60 percent gravel. The A1 horizon has hue of 2.5Y to 7.5YR, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 2 or 3. The B horizon has hue of 2.5Y to 7.5YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 3 or 4. The C horizon has hue of 5Y to 10YR, value of 5 to 7 when dry or moist, and chroma of 3 to 5. Very gravelly loamy sand or very gravelly sand is at a depth of 11 to 20 inches.

Las Animas Variant

The Las Animas Variant consists of deep, somewhat poorly drained soils on flood plains. These soils formed in mixed alluvium. Slope is 0 to 3 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Las Animas Variant sandy loam in an area of Baroid-Las Animas Variant sandy loams, in the SE1/4SE1/4 of sec. 24, T. 47 N., R. 93 W.

A1—0 to 2 inches; brown (10YR 5/3) sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; strongly effervescent; strongly alkaline; abrupt smooth boundary.

C1—2 to 8 inches; light brownish gray (2.5Y 6/2) loamy fine sand, grayish brown (2.5Y 5/2) moist; single grain; loose, nonsticky and nonplastic; few yellowish brown (10YR 5/6) mottles in the lower 2 inches; many very fine and fine roots and few medium roots; strongly effervescent; strongly alkaline; abrupt irregular boundary.

C2—8 to 15 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; slightly hard, very friable, nonsticky and nonplastic; common rust stains and mottles that are olive (5Y 4/4) when moist; common very fine and fine roots and few medium roots; strongly effervescent; moderately alkaline; abrupt irregular boundary.

C3g—15 to 60 inches; light brownish gray (2.5Y 6/2) sandy loam, grayish brown (2.5Y 5/2) moist; single grain; soft, very friable, nonsticky and nonplastic; gray (10YR 6/1) mottles in the upper 10 inches; strongly effervescent; moderately alkaline.

The profile has hue of 10YR to 5Y. The A horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 1 to 3. The C horizon has chroma of 1 to 3. A fluctuating water table is at a depth of 20 to 40 inches.

Limber series

The Limber series consists of moderately deep, well drained soils on mountainsides. These soils formed in material derived from limestone. Slope is 3 to 30 percent. The average annual precipitation is about 22 inches, and the average annual air temperature is about 37 degrees F.

Typical pedon of a Limber gravelly loam in an area of Limber-Hyattville-Rock outcrop association, in the NW1/4NW1/4 of sec. 19, T. 48 N., R. 86 W.

O1—3 inches to 1 inch; needles and bark.

O2—1 inch to 0; partially decomposed needles and bark.

A1—0 to 1 inch; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; few fine roots; 15 percent gravel; neutral; abrupt smooth boundary.

A2—1 inch to 5 inches; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) moist; weak medium platy structure parting to weak fine subangular blocky; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; 20 percent gravel; slightly acid; clear wavy boundary.

B2t—5 to 14 inches; brown (7.5YR 5/2) gravelly clay loam, dark brown (7.5YR 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, very friable, slightly sticky and plastic; common fine, medium, and coarse roots; thin continuous clay films on faces of peds; 20 percent gravel; neutral; clear wavy boundary.

B3ca—14 to 20 inches; light brownish gray (10YR 6/2) gravelly clay loam, grayish brown (10YR 5/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and plastic; common fine, medium, and coarse roots; thin patchy clay films on vertical faces of peds; secondary calcium carbonate that is mainly disseminated; 25 percent gravel; strongly effervescent; moderately alkaline; clear wavy boundary.

Cca—20 to 39 inches; very pale brown (10YR 7/3) gravelly clay loam, pale brown (10YR 6/3) moist; massive; slightly hard, very friable, slightly sticky and plastic; few fine, medium, and coarse roots; secondary calcium carbonate that is mainly disseminated; 25 percent gravel; strongly effervescent; moderately alkaline; abrupt wavy boundary.

R—39 inches; fractured limestone.

Limestone is at a depth of 20 to 40 inches. Uniformly calcareous material is at a depth of 12 to 20 inches. The profile is 15 to 35 percent gravel and 0 to 10 percent cobbles. The A1 horizon has hue of 10YR or 7.5YR,

value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. It is slightly acid or neutral. The A2 horizon has hue of 10YR or 7.5YR, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. It is slightly acid or neutral. The B2t horizon has hue of 5YR or 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. It is gravelly loam or gravelly clay loam. It is slightly acid to mildly alkaline. The C horizon has hue of 10YR or 7.5YR, value of 6 to 7 when dry and 5 or 6 when moist, and chroma of 2 to 4. It is moderately alkaline or strongly alkaline.

Lostwells series

The Lostwells series consists of deep, well drained soils on valley floors and fans. These soils formed in material derived from alluvium. Slope is 0 to 10 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of Lostwells sandy clay loam in an area of Lostwells-Youngston complex, 1 to 10 percent slopes, in the SE1/4NW1/4 of sec. 36, T. 47 N., R. 90 W.

A1—0 to 3 inches; light brownish gray (2.5Y 6/2) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; weak fine and very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; strongly effervescent; moderately alkaline; abrupt wavy boundary.

C1—3 to 13 inches; light brownish gray (2.5Y 6/2) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; few splotches of calcium carbonate on faces of peds; strongly effervescent; moderately alkaline; diffuse wavy boundary.

C2—13 to 60 inches; light brownish gray (2.5Y 6/2) sandy clay loam stratified with lenses of sandy loam and clay loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; few fine soft masses of calcium carbonate; strongly effervescent; strongly alkaline.

The profile has hue of 10YR to 5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. The A horizon is clay loam or sandy clay loam. It is 0 to 10 percent gravel.

Lucky Star series

The Lucky Star series consists of deep, well drained soils on mountain foot slopes. These soils formed in alluvium derived from sandstone. Slope is 6 to 30 percent. The average annual precipitation is about 19 to 22 inches, and the average annual air temperature is about 37 to 41 degrees F.

Typical pedon of a Lucky Star very stony loam in an area of Burnette-Lucky Star association, in the SW1/4NW1/4 of sec. 21, T. 43 N., R. 86 W.

A1—0 to 2 inches; dark brown (10YR 3/3) very stony loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; 5 percent gravel and 10 percent stones; slightly acid; abrupt smooth boundary.

A2—2 to 16 inches; brown (10YR 5/3) very cobbly fine sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many roots; 20 percent gravel, 25 percent cobbles, and 5 percent stones; slightly acid; gradual wavy boundary.

A&B—16 to 32 inches; reddish brown (5YR 5/4) very cobbly sandy clay loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common roots; thin patchy clay films on some faces of peds; 20 percent gravel, 30 percent cobbles, and 5 percent stones; medium acid; gradual wavy boundary.

B2t—32 to 60 inches; brown (7.5YR 5/4) very cobbly sandy clay loam, dark brown (7.5YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, sticky and plastic; few fine, medium, and coarse roots; thin continuous and thick patchy clay films on faces of peds; 20 percent gravel, 30 percent cobbles, and 5 percent stones; medium acid.

The profile is 10 to 30 percent gravel, 15 to 40 percent cobbles, and 5 to 20 percent stones. The A1 horizon has hue of 10YR or 7.5YR, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 2 or 3. The A2 horizon has hue of 10YR or 7.5YR, value of 5 to 8 when dry and 3 to 5 when moist, and chroma of 3 or 4. The B horizon has hue of 7.5YR or 5YR, value of 4 or 5 when dry and 3 to 5 when moist, and chroma of 3 or 4.

Lymanson series

The Lymanson series consists of moderately deep, well drained soils on mountainsides and ridges. These soils formed in material derived from shale. Slope is 10 to 30 percent. The average annual precipitation is about 18 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Lymanson gravelly loam in an area of Lymanson-Turk-Jenkinson association, in the NE1/4SW1/4 of sec. 34, T. 43 N., R. 86 W.

A1—0 to 2 inches; dark grayish brown (2.5Y 4/2) gravelly loam, very dark grayish brown (2.5Y 3/2)

moist; moderate very fine granular structure; slightly hard, friable, slightly sticky and plastic; many very fine and fine roots and few medium roots; 15 percent gravel; mildly alkaline; abrupt smooth boundary.

B2t—2 to 7 inches; grayish brown (2.5Y 5/2) gravelly clay loam, very dark grayish brown (2.5Y 3/2) moist; weak medium prismatic structure parting to strong very fine subangular blocky; hard, friable, sticky and plastic; many very fine and fine roots and common medium roots; thin continuous clay films on faces of peds; 15 percent gravel; mildly alkaline; clear wavy boundary.

B3ca—7 to 21 inches; pale olive (5Y 6/3) gravelly clay loam, olive (5Y 4/3) moist; strong fine and very fine angular blocky structure; hard, friable, sticky and plastic; common very fine, fine, and medium roots; thin patchy clay films on vertical faces of peds; secondary calcium carbonate occurs as thin coatings on lower parts of coarse fragments and as fine filaments; 15 percent gravel and 5 percent cobbles; strongly effervescent; moderately alkaline; clear wavy boundary.

C4—21 inches; soft shale.

Bedrock is at a depth of 20 to 40 inches. The profile is 0 to 10 percent cobbles and 0 to 35 percent gravel. The A1 horizon has hue of 2.5Y or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. It is neutral or mildly alkaline. The B2t horizon has hue of 2.5Y to 7.5YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. It is neutral or mildly alkaline. The B3ca horizon has hue of 5Y to 10YR. It is moderately alkaline or strongly alkaline.

Meadowlake series

The Meadowlake series consists of moderately deep, well drained soils on mountainsides. These soils formed in material derived from sandstone. Slope is 10 to 30 percent. The average annual precipitation is about 22 inches, and the average annual air temperature is about 37 degrees F.

Typical pedon of a Meadowlake very flaggy sandy loam in an area of Meadowlake-Castino Variant-Rock outcrop association, in the NE1/4NW1/4 of sec. 4, T. 48 N., R. 86 W.

O1—1 inch to 0; grass litter.

A1—0 to 1 inch; dark brown (10YR 4/3) very flaggy sandy loam, very dark brown (10YR 2/2) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; 20 percent gravel and 30 percent flagstones; neutral; abrupt smooth boundary.

A2—1 inch to 16 inches; pinkish gray (7.5YR 6/2) very flaggy sandy loam, dark brown (7.5YR 4/2) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; 20 percent gravel and 30 percent flagstones; medium acid; clear wavy boundary.

B2t—16 to 22 inches; weak red (10R 4/3) very flaggy loamy sand, dusky red (10R 3/3) moist; massive; soft, very friable, nonsticky and nonplastic; few fine clay lamellae less than 1/4 inch thick; clay films on some rock fragments; many very fine, fine, and medium roots; 50 percent flagstones; slightly acid; abrupt wavy boundary.

R—22 inches; fractured hard sandstone.

Depth to bedrock ranges from 20 to 40 inches. The profile is 5 to 35 percent gravel, 25 to 45 percent flagstones, and 0 to 25 percent stones. The A2 horizon has hue of 10YR or 7.5YR, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 1 or 2. The B2t horizon has hue of 2.5YR or 10R, value of 4 or 5 when dry and 3 or 4 when moist, and chroma of 3 or 4.

Morset series

The Morset series consists of deep, well drained soils on fans. These soils formed in alluvium derived from limestone. Slope is 2 to 25 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Morset loam in an area of Woosley-Morset association, in the NE1/4SE1/4 of sec. 25, T. 47 N., R. 86 W.

A11—0 to 3 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium angular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; neutral; clear smooth boundary.

A12—3 to 10 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; moderate medium angular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; neutral; clear smooth boundary.

B21t—10 to 18 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure parting to moderate fine subangular blocky; slightly hard, firm, sticky and slightly plastic; common very fine, fine, and medium roots; thin continuous and thick patchy clay films on faces of peds; neutral; clear smooth boundary.

B22t—18 to 27 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, firm, sticky and plastic; few fine, medium, and coarse roots; thin

continuous and thick patchy clay films on faces of peds; mildly alkaline; clear wavy boundary.

B3tca—27 to 35 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine, medium, and coarse roots to a depth of 33 inches; thin patchy clay films on faces of peds; disseminated lime; violently effervescent; moderately alkaline; abrupt wavy boundary.

Cca—35 to 60 inches; very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; massive; hard, firm, slightly sticky and slightly plastic; violently effervescent; moderately alkaline.

The A1 horizon has hue of 2.5Y to 7.5YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 1 to 3. The B2t horizon has hue of 10YR or 7.5YR, value of 5 to 7 when dry and 3 to 6 when moist, and chroma of 2 to 4. The B3tca and Cca horizons have hue of 2.5Y to 7.5YR, value of 6 to 8 when dry and 5 to 7 when moist, and chroma of 2 to 4.

Muff series

The Muff series consists of moderately deep, well drained soils on hillsides and ridges of uplands. These soils formed in material derived from shale. Slope is 1 to 30 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Muff fine sandy loam in an area of Muff-Neiber fine sandy loams, 3 to 30 percent slopes, in the NW1/4SE1/4 of sec. 19, T. 46 N., R. 91 W.

A11—0 to 3 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak very thick platy structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; moderately alkaline; abrupt smooth boundary.

A12—3 to 5 inches; grayish brown (10YR 5/2) fine sandy loam, yellowish brown (10YR 5/4) moist; weak thin platy structure parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; moderately alkaline; abrupt smooth boundary.

B2t—5 to 10 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; moderate medium columnar structure parting to moderate medium angular blocky; slightly hard, friable, very sticky and plastic; many very fine and fine roots; thin continuous clay films on faces of peds; strongly alkaline; clear wavy boundary.

B3tca—10 to 19 inches; light brownish gray (10YR 6/2) sandy clay loam, yellowish brown (10YR 5/4) moist; moderate medium prismatic structure parting to moderate coarse subangular blocky; slightly hard, very friable, slightly sticky and plastic; many very fine and fine roots; thin patchy clay films on some faces of peds; fine threads of calcium carbonate on vertical faces of peds; strongly effervescent; very strongly alkaline; gradual wavy boundary.

C1ca—19 to 27 inches; light brownish gray (10YR 6/2) sandy clay loam, yellowish brown (10YR 5/4) moist; weak medium prismatic structure parting to weak coarse subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots to a depth of 24 inches and few very fine and fine roots below that depth; soft masses and seams of calcium carbonate; strongly effervescent; strongly alkaline; clear wavy boundary.

C2—27 to 30 inches; pale yellow (2.5Y 7/4) sandy loam, light yellowish brown (2.5Y 6/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; strongly effervescent; strongly alkaline; clear wavy boundary.

C3r—30 inches; soft calcareous sandy shale.

Bedrock is at a depth of 20 to 40 inches. The profile is 0 to 15 percent gravel. The A1 horizon has hue of 10YR to 5Y, and it has value of 5 to 7 when dry and 4 to 6 when moist. It is mildly alkaline or moderately alkaline. The B2t horizon has hue of 7.5YR to 2.5Y, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 5. It is strongly alkaline or very strongly alkaline. The C horizon has hue of 10YR to 5Y, value of 5 to 7 when dry and 5 or 6 when moist, and chroma of 2 to 4.

Mughut series

The Mughut series consists of moderately deep, well drained soils on hogbacks. These soils formed in material derived from interbedded sandstone and shale. Slope is 2 to 12 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Mughut fine sandy loam in an area of Mughut-Bondman association, in the SE1/4SE1/4 of sec. 20, T. 43 N., R. 88 W.

A1—0 to 3 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; neutral; abrupt wavy boundary.

B2t—3 to 13 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; many very fine, fine, and medium roots to a depth of 9 inches and common roots below that depth; thin continuous and thick patchy clay films on faces of peds; 5 percent channery fragments; mildly alkaline; clear wavy boundary.

B22—13 to 22 inches; yellowish brown (10YR 5/4) heavy clay loam, dark brown (10YR 4/3) moist;

strong medium prismatic structure parting to strong subangular blocky; hard, firm, sticky and plastic; common very fine, fine, and medium roots; thick continuous clay films on faces of peds; 5 percent channery fragments; mildly alkaline; clear wavy boundary.

B23—22 to 24 inches; yellowish brown (10YR 5/4) channery heavy clay loam, dark brown (10YR 4/3) moist; weak moderate prismatic structure parting to weak medium subangular blocky; hard, friable, sticky and plastic; few very fine, fine, and medium roots; thick continuous clay films on faces of peds; 20 percent channery fragments; mildly alkaline; abrupt wavy boundary.

R—24 inches; sandstone; slightly effervescent.

Bedrock is at a depth of 20 to 40 inches. The A horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 3 to 6 when moist, and chroma of 2 to 4. It is slightly acid to mildly alkaline. It is 0 to 15 percent channery fragments. The B horizon has hue of 2.5Y to 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. It is heavy clay loam or sandy clay. Reaction is mildly alkaline or moderately alkaline.

Mulgon series

The Mulgon series consists of deep, well drained soils on fans and mountainsides. These soils formed in material derived from alluvium. Slope is 6 to 30 percent. The average annual precipitation is about 22 inches, and the average annual air temperature is about 37 degrees F.

Typical pedon of a Mulgon very stony loam in an area of Mulgon-Lucky Star association, in the SW1/4NW1/4 of sec. 4, T. 42 N., R. 86 W.

O1—2 inches to 1 inch; needles, bark, twigs, and grass.

O2—1 inch to 0; decomposing needles, bark, twigs, and grass.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) very stony loam, dark brown (7.5YR 3/2) moist; moderate medium granular structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; 20 percent gravel, 5 percent cobbles, and 10 percent stones; medium acid; abrupt smooth boundary.

A2—3 to 8 inches; brown (7.5YR 5/2) very stony fine sandy loam, dark brown (7.5YR 4/2) moist; weak thin platy structure parting to weak fine subangular blocky; soft, very friable, nonsticky and nonplastic; common roots; 15 percent gravel, 10 percent cobbles, and 10 percent stones; medium acid; gradual wavy boundary.

B&A—8 to 15 inches; grayish brown (10YR 5/2) very stony fine sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium angular blocky; soft, very friable, nonsticky and nonplastic; common fine, medium, and coarse roots; thin patchy clay films; 15 percent gravel, 10 percent cobbles, and 10 percent stones; medium acid; gradual wavy boundary.

B2t—15 to 23 inches; reddish brown (5YR 5/4) very stony sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; thin continuous clay films on faces of peds; 25 percent gravel, 15 percent cobbles, and 10 percent stones; medium acid; gradual wavy boundary.

B3t—23 to 31 inches; reddish yellow (5YR 6/6) very stony sandy clay loam, yellowish red (5YR 5/6) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots; thin patchy clay films on vertical faces of peds; 25 percent gravel, 15 percent cobbles, and 10 percent stones; medium acid; gradual wavy boundary.

C—31 to 60 inches; reddish yellow (5YR 6/6) very stony sandy loam, yellowish red (5YR 5/6) moist; massive; soft, very friable, nonsticky and nonplastic; few fine, medium, and coarse roots to a depth of 36 inches; 25 percent gravel, 15 percent cobbles, and 10 percent stones; medium acid.

The profile is 5 to 30 percent gravel, 10 to 25 percent cobbles, and 10 to 15 percent stones. It is medium acid to slightly acid. The A horizon has hue of 10YR or 7.5YR, and it has value of 4 to 6 when dry and 3 or 4 when moist. The B2t horizon has hue of 7.5YR or 5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 3 to 6. The C horizon has hue of 7.5YR to 5YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 4 to 6.

Nathrop series

The Nathrop series consists of moderately deep, well drained soils on mountainsides and hilltops. These soils formed in material derived from limestone. Slope is 6 to 25 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Nathrop very cobbly loam in an area of Woosley-Morset association, in the SE1/4SE1/4 of sec. 23, T. 41 N., R. 86 W.

A1—0 to 3 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine, fine, and medium roots; 20 percent gravel and 15 percent cobbles; neutral; abrupt smooth boundary.

B1—3 to 8 inches; dark brown (10YR 3/3) very cobbly loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; thin patchy clay films; 20 percent gravel, 20 percent cobbles, and 5 percent stones; neutral; clear wavy boundary.

B2t—8 to 15 inches; brown (10YR 5/3) very cobbly clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate fine subangular blocky; hard, friable, sticky and plastic; common very fine, fine, and medium roots; thin continuous and thick patchy clay films on faces of peds; 20 percent gravel, 20 percent cobbles, and 5 percent stones; mildly alkaline; clear wavy boundary.

B3ca—15 to 22 inches; brown (10YR 5/3) very cobbly clay loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, sticky and plastic; common very fine, fine, and medium roots; thin patchy clay films on vertical faces of peds; lime pendants on undersides of pebbles; 20 percent gravel, 20 percent cobbles, and 5 percent stones; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—22 to 30 inches; pale brown (10YR 6/3) very cobbly loam, brown (10YR 5/3) moist; massive; slightly hard, friable, sticky and plastic; common very fine, fine, and medium roots; many soft fine masses and small lime pendants of secondary calcium carbonate on undersides of rock fragments; 20 percent gravel, 25 percent cobbles, and 10 percent stones; violently effervescent; moderately alkaline; clear wavy boundary.

C2—30 to 36 inches; pale brown (10YR 6/3) gravelly loam, brown (10YR 5/3) moist; massive; slightly hard, friable, sticky and plastic; common very fine, fine, and medium roots; 10 percent gravel and 5 percent cobbles; strongly effervescent; strongly alkaline; abrupt wavy boundary.

R—36 inches; limestone.

The profile is 10 to 20 percent gravel, 5 to 40 percent cobbles, and 0 to 10 percent stones. Bedrock is at a depth of 20 to 40 inches. The A1 horizon has hue of 10YR or 7.5YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The B2t horizon has hue of 10YR to 5YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. The C horizon has hue of 2.5Y to 7.5YR, value of 5 to 7 when dry and 5 or 6 when moist, and chroma of 2 to 4.

Neiber series

The Neiber series consists of moderately deep, well drained soils on uplands. These soils formed in alluvium derived from sandstone. Slope is 3 to 30 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Neiber fine sandy loam in an area of Muff-Neiber fine sandy loams, 3 to 30 percent slopes, in the NE1/4NE1/4 of sec. 13, T. 45 N., R. 92 W.

A11—0 to 2 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; weak medium platy structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; neutral; clear wavy boundary.

A12—2 to 8 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and few medium roots; neutral; gradual wavy boundary.

B2t—8 to 15 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable, sticky and plastic; thin continuous and thick patchy clay films on faces of peds; common very fine, fine, and medium roots; 5 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—15 to 21 inches; light gray (10YR 7/2) sandy clay loam, light brownish gray (10YR 6/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots to a depth of 18 inches and few very fine, fine, and medium roots to a depth of 21 inches; 5 percent gravel; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2r—21 inches; soft, gray sandstone.

Bedrock is at a depth of 20 to 40 inches. The profile is 0 to 10 percent gravel. The A horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 or 3. The B2t horizon has hue of 10YR or 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 or 4. The C horizon has hue of 2.5Y or 10YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 or 3.

Neville series

The Neville series consists of deep, well drained soils on fans. These soils formed in alluvium derived from red sandstone or siltstone. Slope is 0 to 10 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Neville loam in an area of Neville-Tensleep complex, 1 to 10 percent slopes, in the SE1/4SE1/4 of sec. 28, T. 47 N., R. 87 W.

A1—0 to 7 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/3) moist; weak coarse

subangular blocky structure parting to weak fine granular; slightly hard, friable, nonsticky and nonplastic; many very fine and fine roots; mildly alkaline; clear smooth boundary.

C1—7 to 22 inches; light red (2.5YR 6/6) loam, red (2.5YR 4/6) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and nonplastic; common very fine, fine, and medium roots; strongly effervescent; moderately alkaline; clear smooth boundary.

C2—22 to 36 inches; light red (2.5YR 6/6) loam, red (2.5YR 5/6) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few very fine, fine, and medium roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

C3—36 to 60 inches; light red (2.5YR 6/6) loam, red (2.5YR 4/6) moist; massive; slightly hard, friable, nonsticky and nonplastic; strongly effervescent; moderately alkaline.

The A horizon has hue of 7.5YR to 2.5YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 2 to 4. The C horizon has hue of 5YR to 2.5YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 3 to 6.

Olney series

The Olney series consists of deep, well drained soils on fans. These soils formed in material derived from mixed alluvium. Slope is 1 to 10 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of an Olney sandy loam in an area of Arvada-Olney associaton, in the SE1/4NE1/4 of sec. 28, T. 46 N., R. 96 W.

A1—0 to 5 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and few medium roots; mildly alkaline; abrupt smooth boundary.

B2t—5 to 12 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist and dark brown (7.5YR 4/2) uncrushed; moderate medium prismatic structure parting to strong medium and fine angular blocky; hard, friable, sticky and plastic; common very fine and fine roots and few medium roots; thin continuous and thick patchy clay films on faces of peds; mildly alkaline; clear wavy boundary.

B3tca—12 to 18 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common very fine and fine roots and few medium roots; thin continuous clay films on faces of peds and few thick patchy clay films on vertical faces of peds; few soft masses of secondary calcium carbonate; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—18 to 26 inches; very pale brown (10YR 7/3) sandy clay loam, pale brown (10YR 6/3) moist; weak coarse subangular blocky structure; slightly hard, very friable, sticky and plastic; few very fine, fine, and medium roots; many fine soft masses, streaks, and seams of secondary calcium carbonate and few gypsum crystals; violently effervescent; strongly alkaline; clear wavy boundary.

C2—26 to 48 inches; very pale brown (10YR 7/4) sandy clay loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; strongly effervescent; strongly alkaline; gradual wavy boundary.

C3—48 to 60 inches; very pale brown (10YR 7/4) sandy loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; strongly effervescent; moderately alkaline.

The solum is 0 to 5 percent coarse fragments. The A horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. The B2t horizon has hue of 10YR or 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 or 4. The C horizon has hue of 10YR or 2.5Y, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 3 or 4.

Persayo series

The Persayo series consists of shallow, well drained soils on uplands. These soils formed in material derived from shale. Slope is 1 to 45 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Persayo loam in an area of Persayo-Rock outcrop association, in the SW1/4SE1/4 of sec. 33, T. 46 N., R. 91 W.

A1—0 to 1 inch; light yellowish brown (2.5Y 6/4) clay loam, light olive brown (2.5Y 5/4) moist; weak fine granular structure; soft, friable, sticky and plastic; many very fine, fine, and medium roots; strongly effervescent; strongly alkaline; clear wavy boundary.

C1—1 inch to 3 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak coarse prismatic structure parting to weak medium angular blocky; hard, very friable, sticky and plastic; many very fine, fine, and medium roots; strongly effervescent; strongly alkaline; clear wavy boundary.

C2—3 to 13 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak coarse prismatic structure; hard, very friable, sticky and plastic; common very fine and fine roots; strongly effervescent; strongly alkaline; gradual wavy boundary.

C3r—13 inches; soft, variegated olive green, brown, and gray calcareous shale.

Shale is at a depth of 4 to 20 inches. The profile has hue of 10YR to 5Y, value of 5 to 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. It is moderately alkaline or strongly alkaline.

Rairdent series

The Rairdent series consists of deep, well drained soils on fans and terraces. These soils formed in alluvium derived mainly from sedimentary rock and containing concentrations of gypsum. Slope is 1 to 10 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Rairdent fine sandy loam in an area of Uffens-Rairdent complex, 1 to 10 percent slopes, in the NE1/4SE1/4 of sec. 26, T. 48 N., R. 93 W.

A1—0 to 2 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak medium platy structure parting to moderate fine granular; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; moderately alkaline; abrupt smooth boundary.

B2—2 to 7 inches; brown (10YR 5/3) clay loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to weak coarse subangular blocky; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

B3ca—7 to 17 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; weak medium prismatic structure parting to weak coarse subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; strongly effervescent; common large soft masses and seams of secondary calcium carbonate; moderately alkaline; gradual wavy boundary.

C1cs—17 to 46 inches; light yellowish brown (10YR 6/4) gravelly fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; many soft masses of gypsum crystals; 15 percent gravel; slightly effervescent; mildly alkaline; gradual wavy boundary.

C2cs—46 to 55 inches; light yellowish brown (10YR 6/4) gravelly fine sandy loam, brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; many soft masses of gypsum crystals; 15 percent gravel; strongly effervescent; mildly alkaline; gradual wavy boundary.

C3—55 to 60 inches; light yellowish brown (10YR 6/4) very gravelly loamy sand, brown (10YR 5/3) moist; single grain; soft, very friable, nonsticky and nonplastic; 50 percent gravel; strongly effervescent; moderately alkaline.

The profile is 0 to 30 percent gravel and 0 to 5 percent cobbles, but the percentage is greater below the control section in some pedons. The profile has hue of 5Y to 10YR.

Rekop series

The Rekop series consists of shallow, well drained soils on hills and ridges. These soils formed in material derived from gyprock. Slope is 10 to 60 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Rekop loam in an area of Rekop-Gystrum association, in the NE1/4SW1/4 of sec. 9, T. 47 N., R. 88 W.

A11—0 to 4 inches; reddish brown (5YR 5/3) loam, reddish brown (5YR 4/4) moist; weak thick platy structure parting to weak medium granular; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots and few medium roots; slightly effervescent; mildly alkaline; abrupt smooth boundary.

A12—4 to 9 inches; light reddish brown (5YR 6/4) loam, reddish brown (5YR 5/4) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots and few medium roots; slightly effervescent; mildly alkaline; clear smooth boundary.

C1cs—9 to 14 inches; pink (7.5YR 8/4) loam, pink (7.5YR 8/4) moist; single grain; slightly hard, very friable, nonsticky and nonplastic; many gypsum crystals; slightly effervescent; neutral; clear wavy boundary.

C2r—14 inches; soft gyprock.

Bedrock is at a depth of 8 to 20 inches. The A horizon has hue of 10YR to 5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. The Ccs horizon has hue of 7.5YR to 2.5YR.

Renohill series

The Renohill series consists of moderately deep, well drained soils on hillsides and ridges. These soils formed in material derived from soft sandstone interbedded with shale. Slope is 2 to 25 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Renohill silty clay loam in an area of Renohill-Heldt-Worf association, in the SE1/4NW1/4 of sec. 12, T. 47 N., R. 97 W.

A1—0 to 2 inches; pale brown (10YR 6/3) silty clay loam, light olive brown (2.5Y 5/3) moist; moderate very fine granular structure; soft, very friable, sticky and plastic; common very fine, fine, and medium

roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.
B1—2 to 6 inches; pale brown (10YR 6/3) silty clay loam, olive (5Y 5/4) moist; moderate medium fine subangular blocky structure; hard, friable, sticky and plastic; common very fine, fine, and medium roots; slightly effervescent; moderately alkaline; clear wavy boundary.
B2t—6 to 14 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, very sticky and plastic; common very fine, fine, and medium roots; thin continuous and thick patchy clay films; slightly effervescent; moderately alkaline; clear wavy boundary.
C1cs—14 to 21 inches; mixed light yellowish brown (2.5Y 6/4) and light gray (10YR 7/2) silty clay, light olive brown (2.5Y 5/4) and brown (10YR 5/3) moist; weak coarse prismatic structure; soft, friable, sticky and plastic; many very fine, fine, and medium roots and few coarse roots; few medium soft masses of gypsum; slightly effervescent; moderately alkaline; gradual wavy boundary.
C2r—21 inches; soft shale.

Bedrock is at a depth of 20 to 40 inches. The profile is slightly effervescent or moderately effervescent. The A1 horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. The B2t horizon has hue of 2.5Y or 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 to 5. The C horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 5.

Shingle series

The Shingle series consists of shallow, well drained soils on uplands. These soils formed in material weathered from shale. Slope is 2 to 40 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Shingle clay loam in an area of Kyle-Shingle-Bidman association, in the NW1/4SE1/4 of sec. 32, T. 43 N., R. 88 W.

A1—0 to 4 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate very fine granular structure; slightly hard, firm, sticky and plastic; common fine, medium, and coarse roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.
C1—4 to 17 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; common fine, medium, and coarse roots; strongly effervescent; strongly alkaline; clear wavy boundary.
C2r—17 inches; dark gray or gray soft shale.

Bedrock is at a depth of 4 to 20 inches. The profile has hue of 5Y to 7.5YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 to 4.

Spearfish series

The Spearfish series consists of shallow, well drained soils on hillsides and ridges. These soils formed in material derived from red siltstone. Slope is 5 to 40 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Spearfish loam in an area of Neville-Spearfish-Rock outcrop association, in the NE1/4NE1/4 of sec. 33, T. 4 N., R. 87 W.

A1—0 to 4 inches; light reddish brown (5YR 6/4) loam, reddish brown (5YR 4/4) moist; weak medium angular blocky structure parting to weak fine granular; slightly hard, friable, nonsticky and nonplastic; many very fine and fine roots; moderately alkaline; clear smooth boundary.
AC—4 to 13 inches; reddish yellow (5YR 6/6) loam, red (2.5YR 4/6) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, friable, nonsticky and nonplastic; few very fine, fine, and medium roots; 15 percent shale fragments; strongly effervescent; moderately alkaline; clear wavy boundary.
Cr—13 inches; soft platy red siltstone.

Bedrock is at a depth of 8 to 20 inches. The A horizon has hue of 7.5YR or 5YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. The C horizon has hue of 7.5YR to 2.5YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 4 to 6.

Splitro series

The Splitro series consists of shallow, well drained soils on hogbacks and ridges. These soils formed in material weathered from hard sandstone. Slope is 6 to 25 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Splitro fine sandy loam in an area of Greenman-Splitro association, in the SW1/4NW1/4 of sec. 16, T. 48 N., R. 87 W.

A11—0 to 2 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; single grain; loose; many very fine, fine, and medium roots; slightly acid; abrupt smooth boundary.
A12—2 to 7 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak coarse prismatic structure parting to weak fine subangular blocky; soft, very friable, nonsticky and nonplastic;

many very fine, fine, and medium roots; slightly acid; clear wavy boundary.
B2t—7 to 18 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; few thin clay films along some root channels; neutral; abrupt wavy boundary.
R—18 inches; fractured hard sandstone.

Bedrock is at a depth of 10 to 20 inches. The A horizon has hue of 10YR or 7.5YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The B horizon has hue of 10YR to 5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 to 5.

Starley series

The Starley series consists of shallow, well drained soils on hilltops, ridges, and mountainsides. These soils formed in material derived from limestone. Slope is 2 to 40 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Starley very channery loam in an area of Woosley-Starley-Rock outcrop association, in the SE1/4NE1/4 of sec. 10, T. 47 N., R. 86 W.

A11—0 to 2 inches; dark grayish brown (10YR 4/2) very channery loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; 25 percent channery fragments and 10 percent flagstones; slightly effervescent; mildly alkaline; abrupt smooth boundary.
A12—2 to 6 inches; dark grayish brown (10YR 4/2) very channery loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and few medium roots; 30 percent channery fragments and 15 percent flagstones; slightly effervescent; moderately alkaline; abrupt smooth boundary.
C—6 to 14 inches; pinkish gray (7.5YR 7/2) very channery loam, brown (7.5YR 5/3) moist; weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots and few medium roots; 35 percent channery fragments and 15 percent flagstones; slightly effervescent; strongly alkaline; abrupt wavy boundary.
R—14 inches; limestone.

Limestone is at a depth of 10 to 20 inches. The profile is 25 to 45 percent channery fragments and 10 to 25 percent flagstones. The A1 horizon has hue of 5Y to 7.5YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 1 to 3. The C horizon has hue of 5Y to 7.5YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 to 4.

Starman series

The Starman series consists of very shallow, well drained soils on mountainsides. These soils formed in material derived from limestone. Slope is 6 to 45 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Starman gravelly loam in an area of Rock outcrop-Starman complex, 6 to 45 percent slopes, in the NE1/4NE1/4 of sec. 5, T. 47 N., R. 87 W.

A1—0 to 3 inches; grayish brown (10YR 5/2) gravelly loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; 10 percent gravel and 5 percent cobbles; strongly effervescent; moderately alkaline; abrupt smooth boundary.
C—3 to 10 inches; pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3) moist; weak subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; 35 percent gravel and 10 percent cobbles; strongly effervescent; strongly alkaline; abrupt wavy boundary.
R—10 inches; limestone.

Bedrock is at a depth of 3 to 10 inches. The profile is 35 to 50 percent gravel. It has hue of 2.5Y to 7.5YR, value of 5 to 7 when dry and 3 to 6 when moist, and chroma of 2 or 3.

Stubbs series

The Stubbs series consists of moderately deep, well drained soils on hills and mountainsides. These soils formed in material derived from interbedded shale and siltstone. Slope is 2 to 15 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Stubbs loam in an area of Stubbs-Turk association, in the NW1/4SE1/4 of sec. 10, T. 42 N., R. 86 W.

A1—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine and very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; neutral; abrupt smooth boundary.
A3—6 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to

moderate medium subangular blocky; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; thin patchy clay films on vertical faces of peds; neutral; clear wavy boundary.

B2t—10 to 18 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, very friable, slightly sticky and plastic; common very fine, fine, and medium roots; thin continuous and thick patchy clay films on faces of peds; neutral; clear irregular boundary.

B3ca—18 to 28 inches; light olive brown (2.5Y 5/4) loam, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, slightly sticky and plastic; common very fine, fine, and medium roots; thin continuous clay films on vertical faces of peds; many fine soft masses of secondary calcium carbonate; strongly effervescent; moderately alkaline; gradual wavy boundary.

C1ca—28 to 34 inches; light yellowish brown (2.5Y 6/4) loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable, slightly sticky and plastic; common very fine, fine, and medium roots; common small soft masses and seams of secondary calcium carbonate; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2r—34 inches; calcareous soft bedrock.

Bedrock is at a depth of 20 to 40 inches. The mollic epipedon is 16 to 24 inches thick. The A1 horizon has hue of 2.5Y or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 1 or 2. The B2t horizon has hue of 2.5Y to 7.5YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 2 to 4. The B3ca and C horizons have hue of 2.5Y or 10YR, value of 5 to 7 when dry and 5 or 6 when moist, and chroma of 3 to 6.

Stutzman series

The Stutzman series consists of deep, well drained soils on fans and in valleys. These soils formed in material derived from alluvium. Slope is 0 to 10 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Stutzman silty clay loam in an area of Stutzman-Persayo association, in the SW1/4SW1/4 of sec. 26, T. 46 N., R. 91 W.

A11—0 to 3 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; weak thin platy structure parting to weak fine granular; hard, firm, sticky and plastic; few fine roots; slightly effervescent; strongly alkaline; abrupt smooth boundary.

A12—3 to 6 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; weak fine angular blocky structure; very hard, firm, sticky and plastic; few fine roots; strongly effervescent; strongly alkaline; clear wavy boundary.

C—6 to 60 inches; pale brown (10YR 6/3) silty clay, brown (10YR 5/3) moist; massive; extremely hard, extremely firm, very sticky and very plastic; few fine roots to a depth of 24 inches; strongly effervescent; strongly alkaline.

The profile has hue of 5Y to 7.5YR. The A horizon has value of 5 to 7 when dry and 3 to 5 when moist, and it has chroma of 2 or 3. The C horizon has value of 6 or 7 when dry and 5 or 6 when moist, and it has chroma of 2 or 3.

Tensleep series

The Tensleep series consists of deep, well drained soils on fans and uplands. These soils formed in alluvium derived from red siltstone and sandstone. Slope is 0 to 10 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Tensleep very fine sandy loam in an area of Vale-Tensleep association, in the SW1/4NE1/4 of sec. 16, T. 43 N., R. 87 W.

A1—0 to 5 inches; red (2.5YR 5/6) very fine sandy loam, red (2.5YR 4/6) moist; weak thin platy structure parting to moderate medium granular; soft, very friable, nonsticky and nonplastic; many very fine, fine, and medium roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

B2t—5 to 11 inches; yellowish red (5YR 5/6) silt loam, yellowish red (5YR 4/6) moist; weak medium prismatic structure parting to moderate medium subangular blocky; soft, very friable, nonsticky and nonplastic; very fine, fine, and medium roots; thin patchy clay films on faces of peds; slightly effervescent; mildly alkaline; clear wavy boundary.

B3tca—11 to 20 inches; yellowish red (5YR 5/6) very fine sandy loam, yellowish red (5YR 4/6) moist; moderate medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; few fine soft masses and seams of secondary calcium carbonate; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—20 to 26 inches; yellowish red (5YR 5/6) very fine sandy loam, reddish brown (5YR 5/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; few small soft masses and seams of secondary calcium carbonate; strongly effervescent; moderately alkaline; clear wavy boundary.

C2—26 to 60 inches; yellowish red (5YR 5/6) very fine sandy loam, reddish brown (5YR 5/4) moist;

massive; soft, very friable, nonsticky and nonplastic; very fine, fine, and medium roots to a depth of 36 inches; strongly effervescent; moderately alkaline.

The A1 horizon has hue of 7.5YR to 2.5YR, value of 5 or 6 when dry and 3 or 4 when moist, and chroma of 3 to 6. It is loam or very fine sandy loam. The B2t horizon has hue of 5YR or 2.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 3 to 6. The C horizon has hue of 7.5YR to 2.5YR, value of 5 to 7 when dry and 5 or 6 when moist, and chroma of 3 to 6. It is moderately alkaline or strongly alkaline.

Tine series

The Tine series consists of deep, somewhat excessively drained soils on fans. These soils formed in material derived from alluvial outwash. Slope is 2 to 35 percent. The average annual precipitation is about 20 inches, and the average annual air temperature is about 36 degrees F.

Typical pedon of a Tine extremely stony sandy loam in an area of Granile-Tine association, in the NW1/4SW1/4 of sec. 6, T. 48 N., R. 86 W.

O1—1 inch to 0; grass litter.
A1—0 to 12 inches; dark grayish brown (10YR 4/2) extremely stony sandy loam, very dark brown (10YR 2/2) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and few medium roots; 20 percent gravel, 15 percent cobbles, and 10 percent stones; neutral; abrupt smooth boundary.
C—12 to 60 inches; light brownish gray (10YR 6/2) extremely cobbly sand, grayish brown (10YR 5/2) moist; single grain; loose; few fine roots to a depth of 32 inches; 40 percent gravel, 25 percent cobbles, and 10 percent stones; neutral.

The profile is 30 to 60 percent gravel, 10 to 35 percent cobbles, and 5 to 15 percent stones. The A horizon has hue of 2.5Y or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 2 or 3. The C horizon has hue of 2.5Y or 10YR. It is very gravelly loamy sand, very gravelly sand, or extremely cobbly sand.

Travessilla series

The Travessilla series consists of very shallow, well drained soils on hillsides and ridges. These soils formed in material derived from sandstone. Slope is 10 to 60 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Travessilla loam in an area of Spearfish-Travessilla-Rock outcrop complex, 10 to 60 percent slopes, in the SW1/4NE1/4 of sec. 19, T. 47 N., R. 87 W.

A1—0 to 1 inch; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.
C1—1 inch to 5 inches; brown (7.5YR 5/2) channery loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; 15 percent channery fragments; slightly effervescent; moderately alkaline; gradual wavy boundary.
C2—5 to 10 inches; brown (7.5YR 5/2) channery loam, dark brown (7.5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; 15 percent channery fragments; strongly effervescent; moderately alkaline; abrupt smooth boundary.
R—10 inches; hard sandstone.

Bedrock is at a depth of 6 to 20 inches. The profile is 0 to 35 percent channery fragments. It has hue of 2.5Y to 7.5YR, value of 5 to 7 when dry and 3 to 5 when moist, and chroma of 2 to 4.

Turk series

The Turk series consists of moderately deep, well drained soils on mountainsides and ridges. These soils formed in material derived from shale. Slope is 1 to 15 percent. The average annual precipitation is about 18 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Turk silty clay loam in an area of Stubbs-Turk association, in the NE1/4SW1/4 of sec. 34, T. 43 N., R. 86 W.

A1—0 to 3 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, sticky and plastic; many very fine, fine, and medium roots; mildly alkaline; abrupt smooth boundary.
B21t—3 to 9 inches; dark brown (10YR 4/3) clay, dark brown (10YR 3/3) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky and blocky; very hard, firm, sticky and plastic; common very fine, fine, and medium roots; thin continuous clay films on faces of peds and in root channels; mildly alkaline; clear wavy boundary.
B2tca—9 to 14 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate coarse prismatic structure parting to coarse angular blocky; extremely hard, very firm, very sticky and very plastic; common very fine, fine, and medium roots; thin continuous clay films on faces of peds and in root channels; few fine seams and soft

masses of secondary calcium carbonate; strongly effervescent; moderately alkaline; clear wavy boundary.

C1ca—14 to 19 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine, fine, and medium roots; disseminated calcium carbonate; strongly effervescent; moderately alkaline; gradual wavy boundary.

C2—19 to 34 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) moist; massive; extremely hard, very firm, very sticky and very plastic; slightly effervescent; moderately alkaline; gradual wavy boundary.

C3r—34 inches; calcareous soft shale.

Bedrock is at a depth of 20 to 40 inches. The A horizon has hue of 2.5Y or 10YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 1 or 2. The B2t horizon has hue of 5Y to 10YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 or 3. The C horizon has hue of 5Y to 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4.

Uffens series

The Uffens series consists of deep, well drained soils on terraces. These soils formed in material derived from alluvium. Slope is 1 to 8 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of an Uffens loam in an area of Uffens-Rairdent complex, 1 to 10 percent slopes, in the SW1/4NW1/4 of sec. 12, T. 48 N., R. 92 1/2 W.

A2—0 to 1 inch; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak fine granular structure; vesicular crust 1/2 inch thick; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium roots; slightly effervescent; moderately alkaline; abrupt smooth boundary.

B21t—1 inch to 5 inches; pinkish gray (7.5YR 6/2) clay loam, dark brown (7.5YR 4/2) moist; weak coarse columnar structure parting to moderate fine and very fine angular blocky; hard, firm, sticky and plastic; common very fine and fine roots and few medium roots; thin continuous clay films; slightly effervescent; very strongly alkaline; clear wavy boundary.

B22tca—5 to 12 inches; pinkish gray (7.5YR 6/2) sandy clay loam, dark brown (7.5YR 4/2) moist; moderate coarse prismatic structure parting to moderate coarse angular blocky; very hard, firm, very sticky and plastic; common very fine and fine roots and few medium roots; thin continuous and thick patchy clay films; strongly effervescent; common soft masses and seams of secondary calcium carbonate; very strongly alkaline; clear wavy boundary.

B3tca—12 to 22 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; moderate coarse prismatic structure parting to moderate coarse angular blocky; very hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; thin patchy clay films; many soft masses of secondary calcium carbonate; violently effervescent; very strongly alkaline; gradual wavy boundary.

C1—22 to 40 inches; pale brown (10YR 6/3) sandy clay loam, brown (10YR 5/3) moist; massive; slightly hard; very friable, slightly sticky and slightly plastic; few small soft masses of calcium carbonate and few gypsum crystals; strongly effervescent; very strongly alkaline; clear wavy boundary.

C2—40 to 60 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly sticky and plastic; common small gypsum crystals; strongly effervescent; moderately alkaline.

The profile is 0 to 10 percent gravel. The A2 horizon has hue of 2.5Y or 10YR, value of 5 to 7 when dry and 5 or 6 when moist, and chroma of 2 or 3. The B2t horizon has hue of 2.5Y to 7.5YR, value of 6 or 7 when dry and 4 to 6 when moist, and chroma of 2 or 3. It is strongly alkaline or very strongly alkaline. The C horizon has hue of 2.5Y to 7.5YR, value of 6 to 8 when dry and 5 or 6 when moist, and chroma of 2 or 3. It is moderately alkaline to very strongly alkaline.

Vale series

The Vale series consists of deep, well drained soils on fans and uplands. These soils formed in alluvium derived from red siltstone. Slope is 1 to 15 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Vale very fine sandy loam in an area of Vale-Tensleep association, in the NW1/4NW1/4 of sec. 28, T. 43 N., R. 87 W.

A11—0 to 3 inches; brown (7.5YR 4/2) very fine sandy loam, dark brown (7.5YR 3/2) moist; weak medium platy structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and few medium and coarse roots; neutral; abrupt smooth boundary.

A12—3 to 5 inches; brown (7.5YR 4/2) very fine sandy loam, dark brown (7.5YR 3/2) moist; moderate medium platy structure parting to weak fine granular; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots and few medium and coarse roots; mildly alkaline; abrupt smooth boundary.

B21t—5 to 12 inches; reddish brown (5YR 4/3) silty clay loam, dark reddish brown (5YR 3/2) moist; moderate medium prismatic structure parting to

moderate medium subangular blocky; slightly hard, friable, sticky and plastic; common very fine and fine roots and few medium and coarse roots; moderately thick continuous clay films on faces of peds; mildly alkaline; clear wavy boundary.

B22t—12 to 16 inches; brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, sticky and plastic; common very fine and fine roots and few medium and coarse roots; moderately thick continuous clay films on faces of peds; mildly alkaline; clear wavy boundary.

B23tca—16 to 21 inches; light reddish brown (5YR 6/3) loam, reddish brown (5YR 5/4) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few very fine, fine, medium, and coarse roots; thin patchy clay films on faces of peds; many fine soft masses and few seams of secondary calcium carbonate; strongly effervescent; moderately alkaline; clear wavy boundary.

B1ca—21 to 28 inches; light reddish brown (5YR 6/3) loam, reddish brown (5YR 5/3) moist; weak fine angular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots; many fine soft masses and seams of secondary calcium carbonate; violently effervescent; moderately alkaline; gradual wavy boundary.

C2—28 to 60 inches; light brown (7.5YR 6/4) loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; strongly effervescent; moderately alkaline.

The profile is 0 to 10 percent gravel. The A horizon has hue of 7.5YR or 10YR, value of 3 or 4 when dry and 2 or 3 when moist, and chroma of 2 or 3. The B2t horizon has hue of 5YR or 7.5YR, value of 4 to 6 when dry and 3 to 5 when moist, and chroma of 2 to 4. The C horizon has hue of 7.5YR or 5YR, value of 5 to 7 when dry or moist, and chroma of 3 to 6.

Wallrock series

The Wallrock series consists of deep, somewhat poorly drained soils on fans in concave areas of mountainsides. These soils formed in mixed alluvium derived from sandstone and granite. Slope is 2 to 25 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Wallrock sandy loam in an area of Clayburn-Wallrock association, in the SW1/4NE1/4 of sec. 34, T. 47 N., R. 86 W.

A11—0 to 2 inches; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots and few medium roots; neutral; abrupt smooth boundary.

A12—2 to 10 inches; very dark gray (10YR 3/1) sandy loam, black (10YR 2/1) moist; weak medium prismatic structure parting to weak fine subangular blocky; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots and few medium roots; neutral; clear wavy boundary.

B21t—10 to 15 inches; dark brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; common strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky; slightly hard, very friable, sticky and plastic; common very fine and fine roots and few medium roots; thin patchy clay films on faces of peds; neutral; clear wavy boundary.

B22t—15 to 22 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; common strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to strong fine angular blocky; hard, firm, sticky and plastic; common very fine, fine, and medium roots; thin continuous and thick patchy clay films on faces of peds; neutral; clear wavy boundary.

C1—22 to 40 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; many strong brown (7.5YR 5/6) mottles; massive; hard, firm, sticky and plastic; few very fine, fine, and medium roots to a depth of 26 inches; neutral; clear wavy boundary.

C2ca—40 to 60 inches; mixed dark yellowish brown (10YR 4/4) and brownish yellow (10YR 6/6) sandy loam, yellowish brown (10YR 5/6) moist; massive; hard, firm, slightly sticky and slightly plastic; disseminated carbonates; strongly effervescent; mildly alkaline.

The profile is 0 to 15 percent gravel. A water table fluctuates between depths of 24 and 48 inches. The A1 horizon has hue of 2.5Y or 10YR, value of 3 to 5 when dry and 2 or 3 when moist, and chroma of 1 to 3. The B2t horizon has hue of 2.5Y or 10YR, value of 4 to 6 when dry and 2 to 4 when moist, and chroma of 3 or 4. It is clay loam or sandy clay loam. The C horizon has hue of 2.5Y or 10YR.

Wallson series

The Wallson series consists of deep, well drained soils on fans. These soils formed in material derived from alluvium. Slope is 1 to 10 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of Wallson sandy loam, 3 to 6 percent slopes, in the NW1/4SW1/4 of sec. 29, T. 46 N., R. 92 W.

Ap—0 to 7 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; 5 percent gravel; neutral; clear smooth boundary.

B2t—7 to 12 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; hard, very friable, slightly sticky and slightly plastic; thin patchy clay films on faces of peds, in pores, and as bridges between sand grains; 5 percent gravel; mildly alkaline; clear wavy boundary.

B3ca—12 to 15 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common fine soft masses of secondary calcium carbonate; 5 percent gravel; strongly effervescent; mildly alkaline; gradual wavy boundary.

C1ca—15 to 32 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common medium soft masses, seams, and streaks of secondary calcium carbonate; 5 percent gravel; violently effervescent; moderately alkaline; gradual wavy boundary.

C2ca—32 to 60 inches; light yellowish brown (2.5Y 6/4) sandy loam, light olive brown (2.5Y 5/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; few small masses of secondary calcium carbonate; 5 percent gravel; strongly effervescent; moderately alkaline.

The profile is 0 to 15 percent gravel. The A horizon has hue of 5Y to 10YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 or 3. It is loamy fine sand or sandy loam and is neutral to moderately alkaline. The B2t horizon has hue of 5Y to 7.5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. It is sandy loam or fine sandy loam and is mildly alkaline to strongly alkaline. The Cca horizon has hue of 2.5Y or 10YR, value of 6 or 7 when dry and 5 or 6 when moist, and chroma of 2 or 3. It is sandy loam or fine sandy loam and is moderately alkaline or strongly alkaline.

Wetterhorn series

The Wetterhorn series consists of moderately deep, well drained soils on north- and east-facing mountainsides and along canyon walls. These soils formed in colluvium derived from sandstone. Slope is 6 to 50 percent. The average annual precipitation is about 22 inches, and the average annual air temperature is about 37 degrees F.

Typical pedon of a Wetterhorn very stony loam in an area of Billycreek-Wetterhorn complex, 6 to 60 percent slopes, in the SE1/4NE1/4 of sec. 13, T. 47 N., R. 87 W.

O2—1 inch to 0; partially decomposed needles and duff.

A2—0 to 2 inches; light grayish brown (10YR 6/2) very stony loam, dark grayish brown (10YR 4/2) moist; weak medium platy structure parting to weak fine angular blocky; slightly hard, friable, nonsticky and nonplastic; common fine, medium, and coarse roots; 2 percent stones; neutral; abrupt smooth boundary.

A&B—2 to 16 inches; pinkish gray (7.5YR 6/2) flaggy very fine sandy loam, dark brown (7.5YR 4/2) moist; weak coarse angular blocky structure parting to weak medium and fine angular blocky; slightly hard, friable, nonsticky and nonplastic; many fine, medium, and coarse roots; thin patchy clay films; 60 percent tongues and coatings of bleached sand from A2 horizon; 10 percent gravel and 10 percent flagstones; slightly acid; clear wavy boundary.

B2t—16 to 27 inches; light brown (7.5YR 6/4) flaggy clay, brown (7.5YR 5/4) moist; moderate medium angular blocky structure parting to moderate fine angular blocky; hard, firm, sticky and plastic; common fine, medium, and coarse roots; moderately thick continuous clay films; 5 percent gravel and 20 percent flagstones; neutral; abrupt wavy boundary.

R—27 inches; hard limy sandstone.

The profile is 5 to 20 percent gravel, 15 to 25 percent flagstones, and 0 to 10 percent stones. Bedrock is at a depth of 20 to 40 inches. The A2 horizon has hue of 10YR or 7.5YR, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 2 to 4. The B2t horizon has hue of 10YR to 5YR, value of 5 or 6 when dry and 4 or 5 when moist, and chroma of 2 to 4. Texture is flaggy heavy clay loam or flaggy clay.

Whaley series

The Whaley series consists of shallow, somewhat excessively drained soils on ridges and dip slopes of hogbacks. These soils formed in material derived from hard sandstone. Slope is 3 to 60 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Whaley loamy very fine sand in an area of Whaley-Rock outcrop complex, 3 to 60 percent slopes, in the SW1/4SE1/4 of sec. 32, T. 47 N., R. 86 W.

A2—0 to 5 inches; light brownish gray (10YR 6/2) loamy very fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; common fine, medium, and coarse roots; medium acid; clear wavy boundary.

B&A—5 to 10 inches; brown (10YR 5/3) loamy very fine sand, brown (10YR 4/3) moist; scattered pockets of light brownish gray (10YR 6/2) mottles; weak medium angular blocky structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; common fine, medium, and coarse roots;

few brown (10YR 4/3) fine clusters of sand bridged by clay; slightly acid; abrupt smooth boundary.
R—10 inches; hard sandstone.

Hard sandstone is at a depth of 8 to 20 inches. The profile is 0 to 15 percent gravel. The A2 horizon has hue of 2.5Y to 7.5YR, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 1 or 2. It is medium acid or slightly acid. The B&A horizon has hue of 2.5Y to 7.5YR, value of 4 to 6 when dry and 4 or 5 when moist, and chroma of 3 or 4.

Woosley series

The Woosley series consists of moderately deep, well drained soils on mountainsides. These soils formed in material derived from limestone. Slope is 2 to 25 percent. The average annual precipitation is about 19 inches, and the average annual air temperature is about 41 degrees F.

Typical pedon of a Woosley loam in an area of Woosley-Morset association, in the NE1/4NE1/4 of sec. 23, T. 47 N., R. 87 W.

A11—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium angular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; 5 percent gravel; neutral; clear smooth boundary.
A12—4 to 13 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; 10 percent gravel; neutral; clear smooth boundary.
B2t—13 to 22 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, slightly firm, slightly sticky and slightly plastic; thin continuous clay films on faces of peds; common fine, medium, and coarse roots; 10 percent gravel; mildly alkaline; abrupt wavy boundary.
R—22 inches; limestone.

Bedrock is at a depth of 20 to 40 inches. The profile is 5 to 15 percent gravel. The A horizon has hue of 2.5Y to 7.5YR, value of 4 or 5 when dry and 2 or 3 when moist, and chroma of 1 to 3. The B2t horizon has hue of 10YR or 7.5YR, value of 5 or 6 when dry and 3 to 5 when moist, and chroma of 2 to 4.

Worf series

The Worf series consists of shallow, well drained soils on hills and ridges. These soils formed in material derived from interbedded sandstone and shale. Slope is 1 to 25 percent. The average annual precipitation is about 11 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Worf loam in an area of Renohill-Heldt-Worf association, in the NW1/4SW1/4 of sec. 29, T. 48 N., R. 97 W.

A11—0 to 2 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate very fine granular structure; soft, very friable, nonsticky and slightly plastic; many very fine and fine roots; mildly alkaline; abrupt smooth boundary.
A12—2 to 4 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak thin platy structure parting to moderate fine granular; slightly hard, very friable, nonsticky and slightly plastic; common very fine, fine, medium, and coarse roots; mildly alkaline; abrupt smooth boundary.
B2t—4 to 10 inches; yellowish brown (10YR 5/4) clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, sticky and plastic; common very fine, fine, medium, and coarse roots; thin continuous clay films on faces of peds; mildly alkaline; abrupt smooth boundary.
B3tca—10 to 11 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, sticky and plastic; common very fine, fine, and medium roots; thin patchy clay films on faces of peds; fine soft masses of secondary calcium carbonate; strongly effervescent; moderately alkaline; abrupt smooth boundary.
C1ca—11 to 16 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; strongly effervescent; moderately alkaline; gradual wavy boundary.
C2r—16 inches; soft sandstone.

Bedrock is at a depth of 10 to 20 inches. The profile is 0 to 15 percent coarse fragments. It has hue of 2.5Y or 10YR. The A horizon has value of 5 or 6 when dry and 3 or 4 when moist, and it has chroma of 2 or 3. The B2t horizon has value of 5 or 6 when dry and 4 or 5 when moist, and it has chroma of 3 or 4. The C horizon has value of 5 to 7 when dry and 4 to 6 when moist, and it has chroma of 3 or 4.

Worland series

The Worland series consists of moderately deep, well drained soils on uplands. These soils formed in material derived from sandstone interbedded with shale. Slope is 0 to 30 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of a Worland sandy loam in an area of Apron-Worland sandy loams, 0 to 10 percent slopes, in the SW1/4SE1/4 of sec. 7, T. 46 N., R. 92 W.

A1—0 to 3 inches; light brownish gray (10YR 6/2) sandy loam, grayish brown (10YR 5/2) moist; weak fine granular structure; loose; very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; moderately alkaline; abrupt smooth boundary.

C1—3 to 10 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to weak medium and coarse subangular blocky; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; slightly effervescent; moderately alkaline; clear wavy boundary.

C2—10 to 36 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots to a depth of 15 inches; strongly effervescent; strongly alkaline; abrupt smooth boundary.

C2*r*—36 inches; light gray sandstone.

Bedrock is at a depth of 20 to 40 inches. The profile has hue of 5Y to 10YR, value of 5 to 7 when dry and 4 to 6 when moist, and chroma of 2 or 3.

Youngston series

The Youngston series consists of deep, well drained soils on terraces, fans, and flood plains and in valleys. These soils formed in material derived from alluvium. Slope is 0 to 10 percent. The average annual precipitation is about 8 inches, and the average annual air temperature is about 45 degrees F.

Typical pedon of Youngston silty clay loam in an area of Lostwells-Youngston complex, 1 to 10 percent slopes, in the NE1/4SW1/4 of sec. 23, T. 47 N., R. 90 W.

A1—0 to 4 inches; pale brown (10YR 6/2) silty clay loam, dark brown (10YR 4/3) moist; weak coarse angular blocky structure parting to moderate medium granular; hard, firm, slightly sticky and slightly plastic; common very fine and fine roots and few medium roots; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C—4 to 60 inches; pale brown (10YR 6/3) clay loam stratified with loam, silt loam, silty clay loam, and very fine sandy loam, dark brown (10YR 4/3) moist; massive; hard, firm, slightly sticky and slightly plastic; common very fine and fine roots and few medium roots to a depth of 24 inches; strongly effervescent; moderately alkaline.

The profile has hue of 5Y to 10YR, value of 6 or 7 when dry and 4 or 5 when moist, and chroma of 2 or 3. It averages 2 to 8 millimhos of soluble salts. It is moderately alkaline or strongly alkaline.

formation of the soils

Soil is a natural formation on the surface of the earth in which plants grow. It consists of mineral and organic matter. Soils differ in their appearance, composition, productivity, and management requirements within short distances. The properties of the soil at any given place result from the integrated effects of five major factors of soil formation: parent material, living matter, climate, relief or topography, and time (*4*). No single factor is responsible for all of the soil differences. All of the factors act together, but at different rates, to form each individual soil. The relative importance of the factors varies, and in places one may be more important than others.

The five major factors of soil formation are discussed in the following pages. The formation of horizons is also discussed.

parent material

Many of the physical and chemical properties of the soils in the survey area are strongly influenced by the nature of the parent material. Very young soils, such as those of the Persayo series, are influenced more by parent material than by climate or vegetation. The soils of Washakie County formed in material derived from limestone and sandstone on mountainsides and from interbedded sandstone and shale in the Big Horn Basin.

Washakie County is in the southeastern part of the Big Horn Basin. The general slope of the bedrock east of the Big Horn River is to the north-northwest, and west of the river it is north-northeast.

The west flank of the Big Horn Mountains is a series of monoclinal ridges with short, steep front slopes and long, sloping back slopes. Starley, Starman, and Spearfish soils and Rock outcrop are on the front slopes, and Woosley, Clayburn, Chittum, Stubbs, and Vale soils are on the back slopes.

Granite and gneiss are in the northeastern corner of the county. Examples of soils that formed in material derived from granite and gneiss are the shallow and moderately deep Irigul and Lakehelen soils. There is a small area of glaciation, about 4 miles long, extending from the county line south along Tensleep Creek. Granile and Tine soils are in this area. Also in this area are Limber and Hyattville soils, which formed in material derived from limestone.

The major part of the Big Horn Basin is underlain by interbedded sandstone and shale. There are some remnant terraces in the basin. Soils of the Persayo, Greybull, and Hoot series are examples of soils on uplands in the basin. Muff and Uffens soils are examples of sodium-affected soils. Alluvial soils, such as Lostwells and Glenton soils, are along the drainageways in the basin. The remnant terraces west of the Big Horn River are underlain by gravelly sandy loam. Gypsum and sodium salts have accumulated in most of these soils on terraces. Examples of soils on the terraces are those of the Rairdent and Uffens series.

The southern part of the county is underlain by clay shale. These areas have shallow to very deep soils on rolling topography. Examples are the Shingle, Kyle, and Kishona soils.

living matter

Living matter is considered to be one of the active factors of soil formation; the other is climate. The active factors influence soil characteristics over wide areas. The term "living matter" refers to all forms of life that live on or in the soil, including man. The chief function of living matter is to provide the biological community that is essential in changing parent material into soil. The first stage of soil formation is the addition of organic matter.

The soils that formed under shrub and grass vegetation tend to have slight accumulations of organic matter in the surface layer. Different types of plant cover give rise to different soil characteristics. Very wet soils have a greater accumulation of organic matter on the surface. There are some scattered spots of Fluvaquents in Washakie County that have a thin peat horizon. In the grassland-forest area of the mountains, the grassland soils, such as those of the Stubbs and Woosley series, have a dark surface layer. The forested Lakehelen and Limber soils have a thin duff layer and a light-colored subsurface layer.

Many of the soils of the county show a strong influence of man. By cultivating and leveling the soils, man has altered the natural soil horizons. This has changed the character of these soils and, in some places, their classification. Soils that are now classified as Lostwells, for example, were classified as Fruita or Griffy soils in some places before leveling and cultivation.

Man has irrigated excessively in many areas, causing the soils to become wet or salty. A high water table in a soil causes changes in the soil. Because the soil is

saturated with water, air is excluded, chemical reduction of the soil takes place, and the soil develops mottles and gley. Examples of soils that exhibit this condition are those of the Dobent series. The presence of a water table also causes an accumulation of soluble salts in the soils. The salt accumulation adversely affects plant growth and thus retards soil formation. Examples of soils that exhibit this condition are the saline phases of the Lostwells and Youngston soils.

climate

Climate has both a direct and an indirect effect on soil formation (*6*). The chief components of climate are precipitation, temperature, humidity, wind, and sunshine. Moisture added to soil in the form of precipitation promotes leaching and physical, chemical, and biological activity. Leaching is the downward movement of soluble compounds by percolating water. The physical activity is the shrinking and swelling that occur along with changes in moisture content. Moisture combined with temperature promotes frost action. Indirectly, moisture affects the soils by its effect on vegetation. Temperature affects exposed bedrock by expansion, contraction, and frost action. Temperature has an indirect effect on soil formation by determining the length of the growing season. The main effect of humidity is through plant growth. In arid areas, such as this survey area, wind is very active in transporting parent material. Sunshine is active in promoting plant growth and in warming the soil surface. A detailed account of the climate is included in the section "General nature of the survey area."

In addition to the climatic components and their influence on vegetation, the physical characteristics of the parent material must be considered in determining the impact of climate on the formation of a particular soil. The water intake rate is determined by the texture of the parent material. As soil formation begins, structure also influences the water intake rate.

The amount of moisture available influences the amount of vegetation that soils can produce. In the basin area, where precipitation is lower, less vegetation is produced and thus the soils, such as those of the Lostwells and Griffy series, have a light-colored surface layer that is low in content of organic matter. The soils on the mountain flanks, such as those of the Woosley and Clayburn series, receive more moisture and thus support more vegetation. Therefore, their content of organic matter is higher and the surface layer is dark.

relief

Relief influences the microclimate, which influences vegetation; the vegetation, in turn, influences the development of soils. This is an example of the interrelationship of the factors of soil formation and of their varying effects on soil properties. Because of topographic position, soils such as Fluvaquents form in swales and depressional areas.

Relief and runoff are interrelated. The steeper the slope, the greater the runoff and the greater the erosion. This erosion shapes the landscape. Different kinds of rock erode at different rates and in different configurations, giving rise to varied topography. Shale of the Willwood Formation, for example, erodes to form rounded topography. The sandstone member erodes to form ledgy topography. The Persayo soils are a good example of soils that formed in areas of rounded topography. The soils of the Muff-Neiber complex formed in areas of ledgy topography.

time

The length of time required for a soil to form depends largely upon the other factors of soil formation. The age of a soil is reflected in its degree of development. An old, or mature, soil is one that is in equilibrium with its environment. A young soil is one that exhibits little horizon development and is still tending toward equilibrium.

Some soils that formed in alluvium, such as those of the Lostwells and Glenton series, are receiving fresh parent material almost every year. These soils may form thin horizons of humus accumulation. They are young soils.

Some soils on the more stable landscapes of Washakie County are beginning to form horizons that indicate aging. In addition to the accumulation of humus in the A horizon, clay is accumulating in the B2 horizon. Depletion of bases in the A horizon and the upper part of the B horizon results in the accumulation of bases in the lower part of the B horizon or the upper part of the C horizon. Rairdent and Woosley soils formed in similar parent material and are in this stage of formation. Close examination of the Rairdent and Woosley soils shows that the movement of bases is more advanced in the Woosley soils than in the Rairdent soils. Also, Woosley soils have more clay accumulation in the B2 horizon. This indicates that Woosley soils are older than Rairdent soils.

Geologic history indicates that the soils of the survey area began forming in the late Eocene period or later.

formation of horizons

The first stage in the formation of soil horizons is the accumulation of humus to form an A horizon. Soils of the Apron, Lostwells, and Youngston series are in this stage of horizon formation.

As horizon formation continues, carbonates and other bases are leached from the solum and the formation and translocation of silicate clay is begun. In some of the soils of this survey area, base accumulation in the lower part of the B horizon and in the upper part of the C horizon is becoming detectable. In some of these same soils, silicate clay is accumulating in the B2 horizon. This is evidenced by the presence of clay films on the surface

of peds and an increase in the total clay content. Rairdent soils are at this stage of formation.

As formation continues, the profile is leached of carbonates and an argillic horizon is formed (*9*). Soils representative of this stage of formation are those of the Griffy, Neiber, and Woosley series.

In some of the soils in the survey area a natric horizon, which is a sodium-charged argillic horizon, is formed. Muff and Uffens soils are the best examples of these soils.

Air is excluded from very wet soils. This causes the reduction of iron. This process gives a grayish or bluish color to the soil and is called gleying. Fluvaquents have gleyed horizons.

references

(1) American Association of State Highway [and Transportation] Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 vol., illus.

(2) American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

(3) Fenneman, Nevin M. 1931. Physiography of Western United States. 534 pp., illus.

(4) Jenny, Hans. 1941. Factors of soil formation. McGraw-Hill Book Company, Inc., 281 pp., illus.

(5) Portland Cement Association. 1962. PCA soil primer. 52 pp., illus.

(6) United States Department of Agriculture. 1941. Climate and man. U.S. Dep. Agric. Yearb., 1,248 pp., illus.

(7) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962]

(8) United States Department of Agriculture. 1961. Land capability classification. U.S. Dep. Agric. Handb. 210, 21 pp.

(9) United States Department of Agriculture. 1975. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

glossary

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

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.

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.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	More than 12

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to flooding.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.
Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.
Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.
Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.
Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.

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.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms. The Lco horizon is a limnic layer that contains many fecal pellets.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a

catastrophe in nature, for example, fire, that exposes the surface.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hogback. A sharp-crested, symmetric ridge formed by highly tilted resistant rock layers.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

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. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hummocky. Refers to a landscape of hillocks, separated by low sags, having sharply rounded tops and steep sides. Hummocky relief resembles rolling or undulating relief, but the tops of ridges are narrower and the sides are shorter and less even.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The

slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

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.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

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. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. 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).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that

water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.20 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

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. 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.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

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.

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.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range 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 range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

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.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Salty water (in tables.) Water that is too salty for consumption by livestock.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

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. For example, back slope is the geomorphic component that forms the steepest inclined surface and principal element of many hillslopes; dip slope is a slope of the land surface, roughly determined by and approximately conforming with the dip of underlying bedded rocks; and foot slope is the geomorphic component that forms the inner gently inclined surface at the base of a hillslope (the steeper part of a hill between its summit and the drainage line, valley flat or depression floor at the base of the hill).

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. 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 over periods of time.

Soil separates. Mineral particles less than 2 mm in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
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 and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (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. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

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."

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.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt 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."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial melt water. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

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 1931-60 at Worland, Wyoming. Elevation is 4,061 feet]

Month	Temperature			Precipitation		
	Average daily maximum	Average daily minimum	Average daily	Average monthly total	Average number of days with 0.10 inch or more	Average snowfall and sleet
	°F	°F	°F	In	In	In
January----	30.0	0.1	15.5	0.25	1	3.8
February---	36.6	6.6	21.6	0.22	1	3.3
March------	47.3	19.3	33.3	0.37	1	3.1
April------	60.1	31.1	45.6	0.99	3	2.3
May--------	70.6	41.6	56.1	1.34	4	0.4
June-------	79.8	49.3	64.6	1.45	4	0.0
July-------	89.9	54.1	72.0	0.74	2	0.0
August-----	84.4	51.2	69.3	0.41	1	0.0
September--	76.0	41.2	58.6	0.72	3	0.3
October----	63.0	30.8	46.9	0.64	2	1.0
November---	44.4	17.2	30.8	0.41	2	4.3
December---	33.3	7.2	20.3	0.22	1	3.5
Year-------	59.6	29.1	44.6	7.76	25	22.0

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Absted-Forkwood association	8,716	0.6
2	Apron sandy loam, 0 to 3 percent slopes	771	0.1
3	Apron-Worland sandy loams, 0 to 10 percent slopes	2,804	0.2
4	Apron-Worland sandy loams, 1 to 12 percent slopes	796	0.1
5	Arvada-Olney association	7,383	0.5
6	Barnum loam	2,870	0.2
7	Baroid sandy loam	719	*
8	Baroid-Las Animas Variant sandy loams	2,768	0.2
9	Billycreek-Wetterhorn complex, 6 to 60 percent slopes	14,124	1.0
10	Burnette-Lucky Star association	20,244	1.4
11	Chittum-Rock outcrop association	24,971	1.7
12	Clayburn-Bachus-Inchau association	32,636	2.3
13	Clayburn-Wallrock association	6,531	0.5
14	Clifterson-Persayo association	22,327	1.5
15	Coutis-Greenman association	11,718	0.8
16	Dobent loam	3,418	0.2
17	Finnerty silty clay	731	0.1
18	Finnerty silty clay, wet	6,112	0.4
19	Fluvaquents	954	0.1
20	Fluvents	1,939	0.1
21	Forkwood-Haverdad association	28,960	2.0
22	Forkwood-Kishona association	63,012	4.4
23	Fruita-Neiber association	30,483	2.1
24	Garland clay loam	2,874	0.2
25	Glenton sandy loam, moderately wet	804	0.1
26	Glenton-Baroid sandy loams, wet	3,025	0.2
27	Granile-Tine association	1,789	0.1
28	Greenman-Splitro association	8,086	0.6
29	Greybull-Persayo clay loams, 3 to 10 percent slopes	909	0.1
30	Greybull-Persayo association	26,734	1.8
31	Griffy sandy loam, 1 to 10 percent slopes	9,824	0.7
32	Griffy clay loam, 0 to 3 percent slopes	2,336	0.2
33	Hoot-Rock outcrop complex, 3 to 45 percent slopes	21,773	1.5
34	Kishona-Shingle-Rock outcrop association	105,052	7.3
35	Kishona-Shingle association	36,777	2.5
36	Kyle-Shingle-Bidman association	18,618	1.3
37	Lakehelen-Irigul-Rock outcrop association	8,209	0.6
38	Larim-Olney association	14,258	1.0
39	Limber-Hyattville-Rock outcrop association	11,136	0.8
40	Lostwells clay loam, 0 to 3 percent slopes	15,783	1.1
41	Lostwells clay loam, 3 to 6 percent slopes	3,797	0.3
42	Lostwells-Youngston complex, 1 to 10 percent slopes	16,248	1.1
43	Lostwells-Youngston complex, wet, 0 to 6 percent slopes	4,730	0.3
44	Lymanson-Turk-Jenkinson association	5,960	0.4
45	Meadowlake-Castino Variant-Rock outcrop association	5,355	0.4
46	Muff-Neiber fine sandy loams, 3 to 30 percent slopes	38,630	2.7
47	Mughut-Bondman association	22,158	1.5
48	Mulgon-Lucky Star association	6,556	0.5
49	Nathrop-Starley-Rock outcrop association	29,238	2.0
50	Neville loam, 0 to 3 percent slopes	2,546	0.2
51	Neville loam, 3 to 6 percent slopes	1,598	0.1
52	Neville loam, 6 to 10 percent slopes	486	*
53	Neville loam, wet, 0 to 3 percent slopes	2,443	0.2
54	Neville-Tensleep complex, 1 to 10 percent slopes	8,475	0.6
55	Neville-Spearfish-Rock outcrop association	34,506	2.4
56	Persayo-Muff-Rock outcrop association	15,937	1.1
57	Persayo-Rock outcrop association	198,616	13.7
58	Rekop-Gystrum association	31,854	2.2
59	Renohill-Heldt-Worf association	7,114	0.5
60	Riverwash	372	*
61	Rock outcrop-Persayo complex, 15 to 70 percent slopes	43,869	3.0
62	Rock outcrop-Spearfish complex, 1 to 60 percent slopes	5,130	0.4
63	Rock outcrop-Starman complex, 6 to 45 percent slopes	33,215	2.3
64	Spearfish-Travessilla-Rock outcrop complex, 10 to 60 percent slopes	45,571	3.1
65	Stubbs-Turk association	9,065	0.6
66	Stutzman silty clay loam, 0 to 3 percent slopes	2,585	0.2
67	Stutzman silty clay loam, wet, 0 to 3 percent slopes	1,450	0.1
68	Stutzman-Persayo association	12,133	0.8
69	Tensleep loam, 3 to 6 percent slopes	805	0.1
70	Uffens-Persayo complex, 1 to 30 percent slopes	10,676	0.7

See footnote at end of table.

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
71	Uffens-Rairdent complex, 1 to 10 percent slopes	31,098	2.1
72	Vale-Tensleep association	39,787	2.7
73	Wallson loamy fine sand, 1 to 10 percent slopes	35,925	2.5
74	Wallson sandy loam, 3 to 6 percent slopes	3,253	0.2
75	Whaley-Rock outcrop complex, 3 to 60 percent slopes	21,986	1.5
76	Woosley-Decross association	18,427	1.3
77	Woosley-Morset association	7,097	0.5
78	Woosley-Starley-Rock outcrop association	18,688	1.3
79	Worland sandy loam, 0 to 10 percent slopes	1,007	0.1
80	Worland-Persayo complex, 3 to 30 percent slopes	3,116	0.2
81	Youngston clay loam, moderately wet, 0 to 3 percent slopes	8,192	0.6
82	Youngston silty clay loam, 0 to 3 percent slopes	6,103	0.4
83	Youngston-Glenton complex, 0 to 3 percent slopes	9,864	0.7
84	Youngston-Uffens-Lostwells complex, 1 to 10 percent slopes	58,376	4.0
	Total	1,447,680	100.0

* Less than 0.1 percent.

TABLE 3.--YIELDS PER ACRE OF IRRIGATED CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Only the soils suited to irrigated crops and pasture are listed]

Soil name and map symbol	Alfalfa hay	Barley	Sugar beets	Corn silage	Corn	Dry beans	Pasture
	Ton	Bu	Ton	Ton	Bu	Bu	AUM*
2---------- Apron	4.5	100	24	20	100	35	4
3, 4---------- Apron-Worland	3.0	75	18	---	---	20	4
6---------- Barnum	5.0	110	20	---	---	---	9
7---------- Baroid	4.0	71	18	---	---	---	6
8---------- Baroid-Las Animas Variant	---	55	15	---	---	---	4
16---------- Dobent	3.0	85	20	---	---	---	5
17---------- Finnerty	4.0	50	12	12	---	---	6
18---------- Finnerty	4.0	50	12	---	---	---	3
24---------- Garland	5.0	130	29	30	125	---	9
25---------- Glenton	4.5	100	24	20	100	---	8
26---------- Glenton-Baroid	4.0	80	18	---	60	---	6
29**:							
Greybull----------	3.0	90	15	22	100	---	4
Persayo----------	2.0	60	10	11	50	---	3
32---------- Griffy	5.0	110	25	22	110	20	9
40---------- Lostwells	5.0	98	30	22	110	25	9
41---------- Lostwells	4.5	90	---	20	100	22	8
43---------- Lostwells-Youngston-Lostwells	3.0	85	24	18	80	---	8
50---------- Neville	3.5	80	---	13	---	---	8
51---------- Neville	3.0	65	---	10	---	---	7
52, 53---------- Neville	2.0	60	---	---	---	---	5
66---------- Stutzman	4.0	60	20	---	---	---	5

See footnote at end of table.

TABLE 3.--YIELDS PER ACRE OF IRRIGATED CROPS AND PASTURE--Continued

Soil name and map symbol	Alfalfa hay	Barley	Sugar beets	Corn silage	Corn	Dry beans	Pasture
	Ton	Bu	Ton	Ton	Bu	Bu	AUM*
67---------- Stutzman	2.0	60	12	---	---	---	4
69---------- Tensleep	3.0	---	---	14	---	---	5
74---------- Wallson	4.5	110	18	30	90	30	7
79---------- Worland	3.0	75	17	---	---	18	4
81---------- Youngston	5.0	130	29	30	110	---	9
82---------- Youngston	5.0	130	30	30	110	---	8

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.
** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 4.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
1*:				
Absted	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones.	Moderate: dusty.
Forkwood	Slight	Slight	Moderate: slope, small stones.	Slight.
Shingle	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight.
2 Apron	Slight	Slight	Moderate: small stones.	Severe: erodes easily.
3*:				
Apron	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.
Worland	Slight	Slight	Moderate: slope, small stones, depth to rock.	Slight.
4*:				
Apron	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.
Worland	Slight	Slight	Severe: slope.	Slight.
5*:				
Arvada	Moderate: percs slowly, dusty.	Moderate: percs slowly, dusty.	Moderate: percs slowly, slope.	Moderate: dusty.
Olney	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Rairdent	Slight	Slight	Moderate: slope, small stones.	Slight.
6 Barnum	Severe: flooding.	Moderate: excess salt, dusty.	Moderate: small stones, flooding.	Moderate: dusty.
7 Baroid	Severe: flooding.	Slight	Moderate: small stones, flooding.	Slight.
8*:				
Baroid	Severe: flooding.	Slight	Moderate: small stones, flooding.	Slight.
Las Animas Variant	Severe: flooding.	Moderate: wetness, excess salt.	Moderate: wetness, flooding.	Moderate: wetness.

See footnote at end of table.

TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
9*:				
Billycreek	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wetterhorn	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.
10*:				
Burnette	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
Lucky Star	Moderate: large stones, slope.	Moderate: large stones, slope.	Severe: large stones, slope.	Slight.
Wallrock	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Slight.
11*:				
Chittum	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight.
Rock outcrop.				
Bachus	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
12*:				
Clayburn	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Bachus	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Inchau	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
13*:				
Clayburn	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Wallrock	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Slight.
Burnette	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
14*:				
Clifterson	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: large stones, slope.
Persayo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Lostwells	Slight	Slight	Moderate: slope, small stones.	Slight.
15*:				
Coutis	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.

See footnote at end of table.

TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
15*:				
Greenman	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Chittum	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight.
16--- Dobent	Severe: flooding.	Moderate: wetness, excess salt.	Moderate: wetness, flooding.	Moderate: wetness.
17--- Finnerty	Moderate: percs slowly, too clayey, excess salt.	Moderate: too clayey, excess salt, percs slowly.	Moderate: too clayey, percs slowly.	Severe: erodes easily.
18--- Finnerty	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Severe: erodes easily.
19*. Fluvaquents				
20*. Fluvents				
21*:				
Forkwood	Slight	Slight	Severe: slope.	Slight.
Haverdad	Severe: flooding.	Moderate: excess salt.	Moderate: slope, small stones, excess salt.	Slight.
Arvada	Moderate: percs slowly, dusty.	Moderate: percs slowly, dusty.	Moderate: percs slowly, slope.	Moderate: dusty.
22*:				
Forkwood	Slight	Slight	Severe: slope.	Slight.
Kishona	Moderate: slope, excess salt.	Moderate: slope, excess salt.	Severe: slope.	Slight.
Haverdad	Severe: flooding.	Moderate: excess salt.	Moderate: slope, small stones, excess salt.	Slight.
23*:				
Fruita	Slight	Slight	Moderate: small stones, slope.	Slight.
Neiber	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Muff	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
24--- Garland	Slight	Slight	Moderate: small stones.	Slight.

See footnote at end of table.

TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
25--Glenton	Severe: flooding.	Slight	Moderate: slope, small stones, flooding.	Slight.
26*:				
Glenton	Severe: flooding, excess salt.	Severe: excess salt.	Severe: excess salt.	Moderate: wetness.
Baroid	Severe: flooding, excess salt.	Severe: excess salt.	Severe: excess salt.	Moderate: wetness.
27*:				
Granile	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.
Tine	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: small stones.
28*:				
Greenman	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Splitro	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
Coutis	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
29*:				
Greybull	Slight	Slight	Severe: slope.	Severe: erodes easily.
Persayo	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
30*:				
Greybull	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Persayo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
31--Griffy	Slight	Slight	Moderate: slope, small stones.	Slight.
32--Griffy	Slight	Slight	Moderate: small stones.	Slight.
33*:				
Hoot	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope.
Rock outcrop.				

See footnote at end of table.

TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
33*:				
Persayo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
34*:				
Kishona	Moderate: slope, excess salt.	Moderate: slope, excess salt.	Severe: slope.	Slight.
Shingle	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.
Rock outcrop.				
35*:				
Kishona	Severe: slope, excess sodium.	Severe: slope, excess sodium.	Severe: slope, excess sodium.	Severe: erodes easily.
Shingle	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.
36*:				
Kyle	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: slope, too clayey, percs slowly.	Severe: erodes easily.
Shingle	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.
Bidman	Slight	Slight	Severe: slope.	Slight.
37*:				
Lakehelen	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: large stones.
Irigul	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: small stones.
Rock outcrop.				
38*:				
Larim	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.
Olney	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Shingle	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.

See footnote at end of table.

TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
39*:				
Limber	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Hyattville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.
Rock outcrop.				
40---- Lostwells	Slight	Slight	Moderate: small stones.	Slight.
41---- Lostwells	Slight	Slight	Moderate: slope, small stones.	Slight.
42*:				
Lostwells	Slight	Slight	Moderate: slope, small stones.	Slight.
Youngston	Slight	Slight	Moderate: slope.	Severe: erodes easily.
Uffens	Moderate: dusty, excess salt.	Moderate: excess salt, dusty.	Moderate: excess salt, slope.	Moderate: dusty.
43*:				
Lostwells	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Moderate: wetness.
Youngston	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Severe: erodes easily.
Lostwells	Slight	Slight	Moderate: slope, small stones.	Slight.
44*:				
Lymanson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Turk	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
Jenkinson	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.
45*:				
Meadowlake	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: large stones.
Castino Variant	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: large stones.
Rock outcrop.				

See footnote at end of table.

TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
46*:				
Muff	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Neiber	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
47*:				
Mughut	Slight	Slight	Severe: slope.	Slight.
Bondman	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
Bidman	Slight	Slight	Severe: slope.	Slight.
48*:				
Mulgon	Severe: large stones.	Severe: large stones.	Severe: large stones, slope.	Severe: large stones.
Lucky Star	Severe: large stones.	Severe: large stones.	Severe: large stones, slope.	Severe: large stones.
49*:				
Nathrop	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.
Starley	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
Rock outcrop.				
50--- Neville	Moderate: dusty.	Moderate: dusty.	Moderate: small stones, dusty.	Moderate: dusty.
51--- Neville	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
52--- Neville	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
53--- Neville	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Severe: erodes easily.
54*:				
Neville	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
Tensleep	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.

See footnote at end of table.

TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
55*:				
Neville	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
Spearfish	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.
Rock outcrop.				
56*:				
Persayo	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: erodes easily.
Muff	Slight	Slight	Moderate: slope, small stones.	Slight.
Rock outcrop.				
57*:				
Persayo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Rock outcrop.				
58*:				
Rekop	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
Gystrum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
Spearfish	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.
59*:				
Renohill	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
Heldt	Slight	Slight	Moderate: slope.	Slight.
Worf	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: dusty.
60*.				
Riverwash				
61*:				
Rock outcrop.				
Persayo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.
62*:				
Rock outcrop.				
Spearfish	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.

See footnote at end of table.

TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
62*:				
Neville	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.
63*:				
Rock outcrop.				
Starman	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones.
64*:				
Spearfish	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Travessilla	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, erodes easily.
Rock outcrop.				
65*:				
Stubbs	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Turk	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.
Lymanson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
66--- Stutzman	Slight	Slight	Moderate: small stones.	Severe: erodes easily.
67--- Stutzman	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Severe: erodes easily.
68*:				
Stutzman	Slight	Slight	Moderate: slope, small stones.	Severe: erodes easily.
Persayo	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Youngston	Slight	Slight	Moderate: slope.	Severe: erodes easily.
69--- Tensleep	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.
70*:				
Uffens	Moderate: dusty, excess salt.	Moderate: excess salt, dusty.	Moderate: excess salt, slope.	Moderate: dusty.
Persayo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Greybull	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.

See footnote at end of table.

TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
71*:				
Uffens	Moderate: dusty, excess salt.	Moderate: excess salt, dusty.	Moderate: excess salt, slope.	Moderate: dusty.
Rairdent	Slight	Slight	Moderate: slope, small stones.	Slight.
Griffy	Slight	Slight	Moderate: slope, small stones.	Slight.
72*:				
Vale	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Moderate: dusty.
Tensleep	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.
Spearfish	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope, dusty.
73, 74 Wallson	Slight	Slight	Moderate: slope, small stones.	Slight.
75*:				
Whaley	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop.				
Splitro	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
76*:				
Woosley	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Decross	Slight	Slight	Moderate: slope, small stones.	Slight.
77*:				
Woosley	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Morset	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
78*:				
Woosley	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Starley	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
Rock outcrop.				

See footnote at end of table.

TABLE 4.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
79---------- Worland	Slight----------	Slight----------	Moderate: slope, small stones, depth to rock.	Slight.
80*:				
Worland----------	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Persayo----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Apron----------	Slight----------	Slight----------	Severe: slope.	Severe: erodes easily.
81---------- Youngston	Severe: flooding.	Slight----------	Moderate: small stones, flooding.	Slight.
82---------- Youngston	Slight----------	Slight----------	Slight----------	Severe: erodes easily.
83*:				
Youngston----------	Severe: flooding, excess salt.	Severe: excess salt.	Severe: excess salt.	Severe: erodes easily.
Glenton----------	Severe: flooding.	Slight----------	Moderate: small stones, flooding.	Slight.
Lostwells----------	Slight----------	Slight----------	Moderate: small stones.	Slight.
84*:				
Youngston----------	Slight----------	Slight----------	Moderate: slope.	Severe: erodes easily.
Uffens----------	Moderate: dusty, excess salt.	Moderate: excess salt, dusty.	Moderate: excess salt, slope.	Moderate: dusty.
Lostwells----------	Slight----------	Slight----------	Moderate: slope, small stones.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 5.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements					Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
1*:								
Absted	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Forkwood	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Shingle	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
2, Apron	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
3*, 4*:								
Apron	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Worland	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
5*:								
Arvada	Very poor	Very poor	Poor	---	Very poor	Very poor	---	Very poor.
Olney	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Rairdent	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
6, Barnum	Fair	Good	Fair	---	Fair	Good	---	Fair.
7, Baroid	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
8*:								
Baroid	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Las Animas Variant	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
9*:								
Billycreek	Very poor	Very poor	Good	Fair	---	Very poor	Fair	---
Wetterhorn	Very poor	Very poor	Good	Fair	---	Poor	Fair	---
10*:								
Burnette	Fair	Good	Good	---	Good	Good	---	Good.
Lucky Star	Poor	Fair	Good	---	Good	Fair	---	Good.
Wallrock	Poor	Poor	Good	---	Good	Fair	---	Good.
11*:								
Chittum	Very poor	Very poor	Fair	---	Fair	---	---	Fair.
Rock outcrop.								
Bachus	Poor	Poor	Good	---	Good	Fair	---	Good.
12*:								
Clayburn	Very poor	Very poor	Good	---	Good	Poor	---	Good.
Bachus	Poor	Poor	Good	---	Good	Fair	---	Good.
Inchau	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
13*:								
Clayburn	Very poor	Very poor	Good	---	Good	Poor	---	Good.
Wallrock	Poor	Poor	Good	---	Good	Fair	---	Good.

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
13*:								
Burnette	Fair	Good	Good	---	Good	Good	---	Good.
14*:								
Clifterson	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Persayo	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
Lostwells	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
15*:								
Coutis	Poor	Poor	Good	---	Good	Fair	---	Good.
Greenman	Poor	Poor	Good	---	Good	Poor	---	Good.
Chittum	Very poor	Very poor	Fair	---	Fair	---	---	Fair.
16--Dobent	Poor	Poor	Good	---	Good	Fair	---	Good.
17--Finnerty	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
18--Finnerty	Poor	Poor	Good	---	Good	Fair	---	Good.
19*. Fluvaquents								
20*. Fluvents								
21*:								
Forkwood	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Haverdad	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Arvada	Very poor	Very poor	Poor	---	Very poor	Very poor	---	Very poor.
22*:								
Forkwood	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Kishona	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Haverdad	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
23*:								
Fruita	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
Neiber	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Muff	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
24--Garland	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
25--Glenton	Poor	Poor	Good	---	Good	Fair	---	Good.
26*:								
Glenton	Poor	Poor	Good	---	Good	---	---	Good.
Baroid	Poor	Poor	Good	---	Good	---	---	Good.
27*:								
Granile	Very poor	Very poor	Good	Fair	---	Poor	Fair	---

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
27*:								
Tine	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
28*:								
Greenman	Poor	Poor	Good	---	Good	Poor	---	Good.
Splitro	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
Coutis	Poor	Poor	Good	---	Good	Fair	---	Good.
29*:								
Greybull	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
Persayo	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
30*:								
Greybull	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
Persayo	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
31, 32 Griffy	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
33*:								
Hoot	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
Rock outcrop.								
Persayo	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
34*:								
Kishona	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Shingle	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Rock outcrop.								
35*:								
Kishona	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Shingle	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
36*:								
Kyle	Poor	Fair	Good	---	Good	Poor	---	Good.
Shingle	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Bidman	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
37*:								
Lakehelen	Poor	Poor	Poor	Fair	---	Poor	Fair	---
Irigul	Poor	Poor	Fair	Very poor	---	Poor	Poor	---
Rock outcrop.								
38*:								
Larim	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Olney	Poor	Fair	Fair	---	Fair	Fair	---	Fair.
Shingle	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
39*:								
Limber	Poor	Poor	Good	Fair	---	Fair	Fair	---
Hyattville	Poor	Poor	Good	Fair	---	Fair	Fair	---

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
39*: Rock outcrop.								
40, 41---------- Lostwells	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
42*:								
Lostwells---------	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Youngston---------	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Uffens----------	Very poor	Very poor	Very poor	---	Very poor	Very poor	---	Very poor.
43*:								
Lostwells---------	Poor	Poor	Good	---	Good	Poor	---	Fair.
Youngston---------	Poor	Poor	Good	---	Good	Fair	---	Good.
Lostwells---------	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
44*:								
Lymanson----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Turk----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Jenkinson---------	Very poor	Very poor	Fair	---	Fair	Very poor	---	Fair.
45*:								
Meadowlake---------	Poor	Poor	Good	Poor	---	Fair	Poor	---
Castino Variant---	Poor	Poor	Good	Good	---	Poor	Fair	---
Rock outcrop.								
46*:								
Muff----------	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Neiber----------	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
47*:								
Mughut----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Bondman----------	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
Bidman----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
48*:								
Mulgon----------	Poor	Poor	Good	Good	---	Fair	Good	---
Lucky Star---------	Poor	Fair	Good	---	Good	Fair	---	Good.
49*:								
Nathrop----------	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Starley----------	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
Rock outcrop.								
50---------- Neville	Good	Good	Good	---	Fair	Good	---	Good.
51, 52---------- Neville	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
53---------- Neville	Poor	Fair	Good	---	Good	Fair	---	Good.

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
54*:								
Neville	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Tensleep	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
55*:								
Neville	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
Spearfish	Very poor	Very poor	Fair	Very poor	---	Very poor	Very poor	Fair.
Rock outcrop.								
56*:								
Persayo	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
Muff	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Rock outcrop.								
57*:								
Persayo	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
Rock outcrop.								
58*:								
Rekop	Very poor	Very poor	Fair	---	Fair	Very poor	---	Fair.
Gystrum	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Spearfish	Very poor	Very poor	Fair	Very poor	---	Very poor	Very poor	Fair.
59*:								
Renohill	Poor	Fair	Fair	---	Fair	Fair	---	---
Heldt	Fair	Fair	Poor	---	Poor	Fair	---	Poor.
Worf	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
60*.								
Riverwash								
61*:								
Rock outcrop.								
Persayo	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
62*:								
Rock outcrop.								
Spearfish	Very poor	Very poor	Fair	Very poor	---	Very poor	Very poor	Fair.
Neville	Fair	Fair	Fair	---	Fair	Fair	---	Fair.
63*:								
Rock outcrop.								
Starman	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
64*:								
Spearfish	Very poor	Very poor	Fair	Very poor	---	Very poor	Very poor	Fair.
Travessilla	Very poor	Very poor	Poor	---	Fair	Very poor	---	Fair.
Rock outcrop.								
65*:								
Stubbs	Poor	Poor	Good	---	Good	Fair	---	Good.

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
65*:								
Turk	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Lymanson	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
66---Stutzman	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
67---Stutzman	Poor	Poor	Good	---	Good	Poor	---	Good.
68*:								
Stutzman	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
Persayo	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
Youngston	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
69---Tensleep	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
70*:								
Uffens	Very poor	Very poor	Very poor	---	Very poor	Very poor	---	Very poor.
Persayo	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
Greybull	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
71*:								
Uffens	Very poor	Very poor	Very poor	---	Very poor	Very poor	---	Very poor.
Rairdent	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
Griffy	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
72*:								
Vale	Good	Good	Fair	---	Fair	Good	---	Fair.
Tensleep	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
Spearfish	Very poor	Very poor	Fair	Very poor	---	Very poor	Very poor	Fair.
73, 74---Wallson	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
75*:								
Whaley	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
Rock outcrop.								
Splitro	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
76*:								
Woosley	Poor	Fair	Good	---	Good	Fair	---	Good.
Decross	Fair	Fair	Good	---	Good	Fair	---	Good.
Nathrop	Poor	Poor	Fair	---	Fair	Poor	---	Fair.
77*:								
Woosley	Poor	Fair	Good	---	Good	Fair	---	Good.
Morset	Fair	Fair	Good	---	Good	Fair	---	Good.
78*:								
Woosley	Poor	Fair	Good	---	Good	Fair	---	Good.

See footnote at end of table.

TABLE 5.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements					Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Openland wildlife	Woodland wildlife	Rangeland wildlife
78*:								
Starley	Very poor	Very poor	Fair	---	Fair	Poor	---	Fair.
Rock outcrop.								
79---------- Worland	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
80*:								
Worland	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Persayo	Very poor	Very poor	Poor	---	Poor	Very poor	---	Poor.
Apron	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
81---------- Youngston	Poor	Poor	Good	---	Good	Fair	---	Good.
82---------- Youngston	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
83*:								
Youngston	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Glenton	Poor	Poor	Good	---	Good	Fair	---	Good.
Lostwells	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
84*:								
Youngston	Poor	Poor	Poor	---	Poor	Poor	---	Poor.
Uffens	Very poor	Very poor	Very poor	---	Very poor	Very poor	---	Very poor.
Lostwells	Poor	Poor	Poor	---	Poor	Poor	---	Poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
1*:					
Absted	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Forkwood	Slight	Slight	Slight	Moderate: slope.	Slight.
Shingle	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, low strength, slope.
2 Apron	Slight	Slight	Slight	Slight	Slight.
3*, 4*:					
Apron	Slight	Slight	Slight	Moderate: slope.	Slight.
Worland	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight.
5*:					
Arvada	Slight	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Olney	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Rairdent	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.
6 Barnum	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
7 Baroid	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
8*:					
Baroid	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Las Animas Variant	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
9*:					
Billycreek	Severe: depth to rock, cutbanks cave, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Wetterhorn	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
10*:					
Burnette	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
10*:					
Lucky Star	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.
Wallrock	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: frost action.
11*:					
Chittum	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.
Rock outcrop.					
Bachus	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, low strength, slope.
12*:					
Clayburn	Moderate: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Moderate: low strength, slope, shrink-swell.
Bachus	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, low strength, slope.
Inchau	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
13*:					
Clayburn	Moderate: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Moderate: low strength, slope, shrink-swell.
Wallrock	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: frost action.
Burnette	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
14*:					
Clifterson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Persayo	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Lostwells	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.
15*:					
Coutis	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
15*:					
Greenman	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.
Chittum	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.
16--- Dobent	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
17--- Finnerty	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
18--- Finnerty	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
19*. Fluvaquents					
20*. Fluvents					
21*:					
Forkwood	Slight	Slight	Slight	Moderate: slope.	Slight.
Haverdad	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Arvada	Slight	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
22*:					
Forkwood	Slight	Slight	Slight	Moderate: slope.	Slight.
Kishona	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, shrink-swell.
Haverdad	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
23*:					
Fruita	Slight	Slight	Slight	Moderate: slope.	Slight.
Neiber	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Muff	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
24--- Garland	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.
25--- Glenton	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
26*:					
Glenton	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
Baroid	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
27*:					
Granile	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Tine	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
28*:					
Greenman	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.
Splitro	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Coutis	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.
29*:					
Greybull	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Persayo	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.
30*:					
Greybull	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Persayo	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
31 Griffy	Slight	Slight	Slight	Moderate: slope.	Slight.
32 Griffy	Slight	Slight	Slight	Slight	Slight.
33*:					
Hoot	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rock outcrop.					
Persayo	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
34*:					
Kishona	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, shrink-swell.
Shingle	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
35*:					
Kishona	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Shingle	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
36*:					
Kyle	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Shingle	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Bidman	Slight	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
37*:					
Lakehelen	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Irigul	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Rock outcrop.					
38*:					
Larim	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Olney	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Shingle	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
39*:					
Limber	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Hyattville	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Rock outcrop.					

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
40---------- Lostwells	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
41---------- Lostwells	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.
42*: Lostwells---------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.
Youngston---------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Uffens----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.
43*: Lostwells---------	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: wetness, frost action, shrink-swell.
Youngston---------	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.
Lostwells---------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
44*: Lymanson---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Turk----------	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
Jenkinson---------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
45*: Meadowlake-------	Severe: depth to rock, cutbanks cave, large stones.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Castino Variant--	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Rock outcrop.					
46*: Muff----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Neiber----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
47*:					
Mughut	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Bondman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Bidman	Slight	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
48*:					
Mulgon	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.
Lucky Star	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.
49*:					
Nathrop	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Starley	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Rock outcrop.					
50--Neville	Slight	Slight	Slight	Slight	Moderate: low strength.
51--Neville	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
52--Neville	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.
53--Neville	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.
54*:					
Neville	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
Tensleep	Slight	Slight	Slight	Moderate: slope.	Slight.
55*:					
Neville	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
Spearfish	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
56*:					
Persayo	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
56*:					
Muff	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
Rock outcrop.					
57*:					
Persayo	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
58*:					
Rekop	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Gystrum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Spearfish	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
59*:					
Renohill	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.
Heldt	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Worf	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.
60*.					
Riverwash					
61*:					
Rock outcrop.					
Persayo	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
62*:					
Rock outcrop.					
Spearfish	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Neville	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
63*:					
Rock outcrop.					
Starman	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
64*:					
Spearfish	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Travessilla	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Rock outcrop.					
65*:					
Stubbs	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.
Turk	Moderate: depth to rock, too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
Lymanson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
66--- Stutzman	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
67--- Stutzman	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
68*:					
Stutzman	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Persayo	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.
Youngston	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
69--- Tensleep	Slight	Slight	Slight	Moderate: slope.	Slight.
70*:					
Uffens	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.
Persayo	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Greybull	Moderate: depth to rock, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.
71*:					
Uffens	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
71*:					
Rairdent	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.
Griffy	Slight	Slight	Slight	Moderate: slope.	Slight.
72*:					
Vale	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength, frost action.
Tensleep	Slight	Slight	Slight	Moderate: slope.	Slight.
Spearfish	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
73, 74 Wallson	Slight	Slight	Slight	Moderate: slope.	Slight.
75*:					
Whaley	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Rock outcrop.					
Splitro	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
76*:					
Woosley	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.
Decross	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Severe: low strength.
77*:					
Woosley	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.
Morset	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.
78*:					
Woosley	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: low strength.
Starley	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Rock outcrop.					

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
79---------- Worland	Moderate: depth to rock.	Slight----------	Moderate: depth to rock.	Moderate: slope.	Slight.
80*: Worland----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Persayo----------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.
Apron----------	Slight----------	Slight----------	Slight----------	Moderate: slope.	Slight.
81---------- Youngston	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
82---------- Youngston	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.
83*: Youngston--------	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding.
Glenton----------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Lostwells--------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
84*: Youngston--------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.
Uffens----------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.
Lostwells--------	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1*:					
Absted	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight	Fair: thin layer.
Forkwood	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Shingle	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
2 Apron	Slight	Severe: seepage.	Slight	Slight	Good.
3*, 4*:					
Apron	Slight	Severe: seepage.	Slight	Slight	Good.
Worland	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
5*:					
Arvada	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
Olney	Moderate: slope.	Severe: seepage, slope.	Moderate: too sandy, slope.	Moderate: slope.	Fair: too sandy, slope.
Rairdent	Severe: poor filter.	Moderate: seepage, slope.	Slight	Slight	Poor: small stones.
6 Barnum	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
7 Baroid	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, wetness.	Severe: flooding.	Fair: too sandy.
8*:					
Baroid	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, wetness.	Severe: flooding.	Fair: too sandy.
Las Animas Variant	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: too sandy, wetness.
9*:					
Billycreek	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
Wetterhorn	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, hard to pack, large stones.

See footnote at end of table.

TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
10*:					
Burnette	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
Lucky Star	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Poor: large stones.
Wallrock	Severe: wetness.	Severe: seepage, slope, wetness.	Severe: seepage, wetness.	Severe: wetness.	Fair: slope, wetness.
11*:					
Chittum	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Rock outcrop.					
Bachus	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
12*:					
Clayburn	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
Bachus	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Inchau	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
13*:					
Clayburn	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
Wallrock	Severe: wetness.	Severe: seepage, slope, wetness.	Severe: seepage, wetness.	Severe: wetness.	Fair: slope, wetness.
Burnette	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
14*:					
Clifterson	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Persayo	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Lostwells	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
15*:					
Coutis	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.

See footnote at end of table.

TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
15*:					
Greenman	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
Chittum	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
16 Dobent	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
17 Finnerty	Severe: percs slowly.	Slight	Slight	Slight	Poor: hard to pack.
18 Finnerty	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
19*. Fluvaquents					
20*. Fluvents					
21*:					
Forkwood	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Haverdad	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.
Arvada	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
22*:					
Forkwood	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Kishona	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Haverdad	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding, too clayey.	Moderate: flooding.	Fair: too clayey.
23*:					
Fruita	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Neiber	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Muff	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.

See footnote at end of table.

TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
24--Garland	Severe: poor filter.	Severe: seepage.	Moderate: too sandy.	Slight	Poor: seepage, small stones.
25--Glenton	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, wetness, too sandy.	Severe: flooding.	Poor: too sandy.
26*:					
Glenton	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, wetness, too sandy.	Severe: flooding, wetness.	Poor: too sandy.
Baroid	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too sandy, wetness.
27*:					
Granile	Severe: poor filter, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope.	Poor: large stones, slope.
Tine	Severe: poor filter, slope, large stones.	Severe: seepage, slope, large stones.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
28*:					
Greenman	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim.
Splitro	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
Coutis	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
29*:					
Greybull	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Persayo	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
30*:					
Greybull	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Persayo	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
31, 32--Griffy	Slight	Severe: seepage.	Slight	Slight	Fair: small stones.

See footnote at end of table.

TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
33*:					
Hoot	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock, small stones.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, small stones.
Rock outcrop.					
Persayo	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
34*:					
Kishona	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
Shingle	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
35*:					
Kishona	Severe: slope.	Severe: slope.	Severe: slope, excess sodium.	Severe: slope.	Poor: slope, excess sodium.
Shingle	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
36*:					
Kyle	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: hard to pack, too clayey.
Shingle	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Bidman	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
37*:					
Lakehelen	Severe: depth to rock, slope, large stones.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, large stones, slope.
Irigul	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Rock outcrop.					
38*:					
Larim	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: slope.	Poor: seepage, too sandy, small stones.
Olney	Moderate: slope.	Severe: seepage, slope.	Moderate: too sandy, slope.	Moderate: slope.	Fair: too sandy, slope.

See footnote at end of table.

TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
38*:					
Shingle	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
39*:					
Limber	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.
Hyattville	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.
Rock outcrop.					
40--- Lostwells	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
41--- Lostwells	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
42*:					
Lostwells	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Youngston	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
Uffens	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight	Good.
43*:					
Lostwells	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Youngston	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
Lostwells	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
44*:					
Lymanson	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Turk	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Jenkinson	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
45*:					
Meadowlake	Severe: depth to rock, slope, large stones.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, large stones, slope.

See footnote at end of table.

TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
45*:					
Castino Variant	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.
Rock outcrop.					
46*:					
Muff	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Neiber	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
47*:					
Mughut	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Bondman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Bidman	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
48*:					
Mulgon	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Poor: large stones.
Lucky Star	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Poor: large stones.
49*:					
Nathrop	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: area reclaim, large stones, slope.
Starley	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Rock outcrop.					
50 Neville	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
51 Neville	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
52 Neville	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
53 Neville	Severe: wetness.	Severe: wetness.	Severe: wetness, excess salt.	Severe: wetness.	Fair: wetness.

See footnote at end of table.

TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
54*:					
Neville	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Tensleep	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
55*:					
Neville	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Spearfish	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
56*:					
Persayo	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Muff	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Rock outcrop.					
57*:					
Persayo	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
58*:					
Rekop	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Gystrum	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, excess salt.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Spearfish	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
59*:					
Renohill	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Heldt	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Poor: hard to pack.
Worf	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
60*. Riverwash					

See footnote at end of table.

TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
61*: Rock outcrop.					
Persayo	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
62*: Rock outcrop.					
Spearfish	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Neville	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
63*: Rock outcrop.					
Starman	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
64*: Spearfish	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Travessilla	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
65*: Stubbs	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Turk	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Lymanson	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
66--- Stutzman	Severe: percs slowly.	Slight	Slight	Slight	Poor: hard to pack.
67--- Stutzman	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
68*: Stutzman	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Poor: hard to pack.
Persayo	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Youngston	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.

See footnote at end of table.

TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
69---------- Tensleep	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
70*: Uffens----------	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight----------	Good.
Persayo----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Greybull----------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
71*: Uffens----------	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight----------	Good.
Rairdent----------	Severe: poor filter.	Moderate: seepage, slope.	Slight----------	Slight----------	Poor: small stones.
Griffy----------	Slight----------	Severe: seepage.	Slight----------	Slight----------	Fair: small stones.
72*: Vale----------	Moderate: slope, percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Tensleep----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
Spearfish----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
73, 74----------	Slight----------	Severe: seepage.	Slight----------	Slight----------	Good.
Wallson					
75*: Whaley----------	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Rock outcrop.					
Splitro----------	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, slope.
76*: Woosley----------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Decross----------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.

See footnote at end of table.

TABLE 7.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
77*:					
Woosley	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Morset	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Moderate: too clayey, slope.
78*:					
Woosley	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
Starley	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Rock outcrop.					
79 Worland	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim.
80*:					
Worland	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Persayo	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope.
Apron	Slight	Severe: seepage.	Slight	Slight	Good.
81 Youngston	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Good.
82 Youngston	Severe: percs slowly.	Slight	Slight	Slight	Good.
83*:					
Youngston	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
Glenton	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, wetness, too sandy.	Severe: flooding.	Poor: too sandy.
Lostwells	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
84*:					
Youngston	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
Uffens	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight	Good.
Lostwells	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1*:				
Absted	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Forkwood	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Shingle	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
2 Apron	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
3*, 4*:				
Apron	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Worland	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
5*:				
Arvada	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Olney	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Rairdent	Good	Probable	Probable	Poor: small stones, area reclaim.
6 Barnum	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, excess salt.
7 Baroid	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
8*:				
Baroid	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Las Animas Variant	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, excess salt.
9*:				
Billycreek	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Wetterhorn	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
10*:				
Burnette	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
10*:				
Lucky Star	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones.
Wallrock	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
11*:				
Chittum	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Rock outcrop.				
Bachus	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
12*:				
Clayburn	Fair: low strength, shrink-swell, frost action.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, slope, small stones.
Bachus	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Inchau	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
13*:				
Clayburn	Fair: low strength, shrink-swell, frost action.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, slope, small stones.
Wallrock	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Burnette	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
14*:				
Clifterson	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Persayo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Lostwells	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
15*:				
Coutis	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Greenman	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
15*: Chittum	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
16--- Dobent	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: excess salt.
17--- Finnerty	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
18--- Finnerty	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
19*. Fluvaquents				
20*. Fluvents				
21*: Forkwood	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Haverdad	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, excess salt.
Arvada	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
22*: Forkwood	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Kishona	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Haverdad	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, excess salt.
23*: Fruita	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Neiber	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Muff	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
24--- Garland	Good	Probable	Probable	Poor: small stones, area reclaim.
25--- Glenton	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
26*: Glenton	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
26*:				
Baroid	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
27*:				
Granile	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
Tine	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: small stones, area reclaim, slope.
28*:				
Greenman	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Splitro	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Coutis	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
29*:				
Greybull	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey.
Persayo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
30*:				
Greybull	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Persayo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
31, 32 Griffy	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
33*:				
Hoot	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer, small stones.
Rock outcrop.				
Persayo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
34*:				
Kishona	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
34*:				
Shingle	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
35*:				
Kishona	Fair: slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess sodium, slope.
Shingle	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
36*:				
Kyle	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Shingle	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Bidman	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
37*:				
Lakehelen	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
Irigul	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
38*:				
Larim	Fair: slope.	Improbable: thin layer.	Probable	Poor: small stones, area reclaim, slope.
Olney	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Shingle	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
39*:				
Limber	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Hyattville	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
Rock outcrop.				

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
40, 41---------- Lostwells	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
42*: Lostwells----------	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Youngston----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Uffens----------	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
43*: Lostwells----------	Fair: wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
Youngston----------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
Lostwells----------	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
44*: Lymanson----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Turk----------	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Jenkinson----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
45*: Meadowlake----------	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
Castino Variant------	Poor: area reclaim, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, slope.
Rock outcrop.				
46*: Muff----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Neiber----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
47*: Mughut----------	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
47*:				
Bondman	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Bidman	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
48*:				
Mulgon	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones.
Lucky Star	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones.
49*:				
Nathrop	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Starley	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
50, 51---- Neville	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
52---- Neville	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
53---- Neville	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
54*:				
Neville	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Tensleep	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
55*:				
Neville	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Spearfish	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Rock outcrop.				
56*:				
Persayo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Muff	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
Rock outcrop.				

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
57*:				
Persayo	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
58*:				
Rekop	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Gystrum	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Spearfish	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
59*:				
Renohill	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Heldt	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Worf	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
60*. Riverwash				
61*:				
Rock outcrop.				
Persayo	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
62*:				
Rock outcrop.				
Spearfish	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Neville	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
63*:				
Rock outcrop.				
Starman	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
64*:				
Spearfish	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
64*:				
Travessilla	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
65*:				
Stubbs	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, slope.
Turk	Poor: area reclaim, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Lymanson	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
66--- Stutzman	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
67--- Stutzman	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
68*:				
Stutzman	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Persayo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Youngston	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
69--- Tensleep	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
70*:				
Uffens	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Persayo	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Greybull	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, slope.
71*:				
Uffens	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
71*:				
Rairdent	Good	Probable	Probable	Poor: small stones, area reclaim.
Griffy	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
72*:				
Vale	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Tensleep	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Spearfish	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
73--- Wallson	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
74--- Wallson	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
75*:				
Whaley	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
Splitro	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
76*:				
Woosley	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Decross	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
77*:				
Woosley	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Morset	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
78*:				
Woosley	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Starley	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
79--- Worland	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
80*: Worland---	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Persayo---	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Apron---	Good---	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
81--- Youngston	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
82--- Youngston	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
83*: Youngston---	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
Glenton---	Good---	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Lostwells---	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
84*: Youngston---	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Uffens---	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Lostwells---	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for--		Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation
1*:				
Absted	Moderate: slope.	Severe: excess salt.	Deep to water	Percs slowly, slope.
Forkwood	Moderate: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.
Shingle	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
2---- Apron	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, erodes easily.
3*, 4*:				
Apron	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope, erodes easily.
Worland	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.
5*:				
Arvada	Moderate: slope.	Slight	Deep to water	Droughty, percs slowly.
Olney	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, soil blowing, slope.
Rairdent	Moderate: seepage, slope.	Severe: piping.	Deep to water	Droughty, soil blowing, slope.
6---- Barnum	Moderate: seepage.	Moderate: piping.	Deep to water	Soil blowing, flooding, excess salt.
7---- Baroid	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.
8*:				
Baroid	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, soil blowing.
Las Animas Variant	Severe: seepage.	Severe: piping, wetness.	Flooding, cutbanks cave.	Wetness, soil blowing, flooding.
9*:				
Billycreek	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.
Wetterhorn	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, percs slowly.

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation
10*:				
Burnette	Severe: slope.	Slight	Deep to water	Percs slowly, slope, erodes easily.
Lucky Star	Severe: slope.	Severe: large stones.	Deep to water	Large stones.
Wallrock	Severe: slope.	Severe: piping.	Frost action, slope.	Wetness, soil blowing, slope.
11*:				
Chittum	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
Rock outcrop.				
Bachus	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
12*:				
Clayburn	Severe: slope.	Slight	Slope	Slope.
Bachus	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
Inchau	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
13*:				
Clayburn	Severe: slope.	Slight	Slope	Slope.
Wallrock	Severe: slope.	Severe: piping.	Frost action, slope.	Wetness, soil blowing, slope.
Burnette	Severe: slope.	Slight	Deep to water	Percs slowly, slope, erodes easily.
14*:				
Clifterson	Severe: seepage, slope.	Severe: seepage.	Deep to water	Large stones, droughty, slope.
Persayo	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.
Lostwells	Moderate: seepage, slope.	Slight	Deep to water	Slope.
15*:				
Coutis	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.
Greenman	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.
Chittum	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation
16---------- Dobent	Moderate: seepage.	Severe: piping, wetness.	Flooding----------	Wetness, flooding, excess salt.
17---------- Finnerty	Slight----------	Severe: hard to pack.	Deep to water---------	Slow intake, percs slowly, erodes easily.
18---------- Finnerty	Slight----------	Severe: wetness.	Percs slowly, excess salt.	Wetness, slow intake, percs slowly.
19*. Fluvaquents				
20*. Fluvents				
21*: Forkwood---------	Moderate: seepage, slope.	Severe: piping.	Deep to water---------	Soil blowing, slope.
Haverdad---------	Moderate: seepage.	Severe: piping.	Deep to water---------	Excess salt.
Arvada----------	Moderate: slope.	Slight----------	Deep to water---------	Droughty, percs slowly.
22*: Forkwood---------	Moderate: seepage, slope.	Severe: piping.	Deep to water---------	Soil blowing, slope.
Kishona----------	Severe: slope.	Severe: piping.	Deep to water---------	Slope, excess salt.
Haverdad---------	Moderate: seepage.	Severe: piping.	Deep to water---------	Excess salt.
23*: Fruita----------	Moderate: seepage, slope.	Severe: piping.	Deep to water---------	Soil blowing, slope.
Neiber----------	Severe: slope.	Severe: piping.	Deep to water---------	Soil blowing, depth to rock, slope.
Muff----------	Severe: slope.	Severe: thin layer.	Deep to water---------	Soil blowing, percs slowly, depth to rock.
24---------- Garland	Severe: seepage.	Severe: seepage.	Deep to water---------	Favorable.
25---------- Glenton	Severe: seepage.	Severe: piping.	Deep to water---------	Soil blowing, flooding.
26*: Glenton----------	Severe: seepage.	Severe: piping, wetness.	Flooding, cutbanks cave, excess salt.	Wetness, droughty, soil blowing.
Baroid----------	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, cutbanks cave, excess salt.	Wetness, droughty.

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation
27*:				
Granile	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, slope.
Tine	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, slope.
28*:				
Greenman	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.
Splitro	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, soil blowing, depth to rock.
Coutis	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope.
29*:				
Greybull	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, erodes easily.
Persayo	Severe: depth to rock.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.
30*:				
Greybull	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, erodes easily.
Persayo	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.
31 Griffy	Severe: seepage.	Moderate: seepage, piping.	Deep to water	Soil blowing, slope.
32 Griffy	Severe: seepage.	Moderate: seepage, piping.	Deep to water	Favorable.
33*:				
Hoot	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Soil blowing, depth to rock, slope.
Rock outcrop.				
Persayo	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.
34*:				
Kishona	Severe: slope.	Severe: piping.	Deep to water	Slope, excess salt.
Shingle	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
Rock outcrop.				

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation
35*:				
Kishona	Severe: slope.	Severe: piping, excess sodium.	Deep to water	Droughty, slope, erodes easily.
Shingle	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
36*:				
Kyle	Moderate: slope.	Severe: hard to pack.	Deep to water	Droughty, slow intake, percs slowly.
Shingle	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
Bidman	Moderate: slope.	Slight	Deep to water	Percs slowly, slope.
37*:				
Lakehelen	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty.
Irigul	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.
Rock outcrop.				
38*:				
Larim	Severe: seepage, slope.	Severe: seepage.	Deep to water	Droughty, slope.
Olney	Severe: seepage, slope.	Severe: piping.	Deep to water	Droughty, slope.
Shingle	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
39*:				
Limber	Severe: slope.	Severe: piping.	Deep to water	Large stones, depth to rock, slope.
Hyattville	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.
Rock outcrop.				
40 Lostwells	Moderate: seepage.	Slight	Deep to water	Favorable.
41 Lostwells	Moderate: seepage, slope.	Slight	Deep to water	Slope.
42*:				
Lostwells	Moderate: seepage, slope.	Slight	Deep to water	Slope.

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation
42*:				
Youngston	Moderate: slope.	Moderate: piping.	Deep to water	Slope, erodes easily, excess salt.
Uffens	Moderate: slope.	Severe: excess salt.	Deep to water	Droughty, slope.
43*:				
Lostwells	Moderate: seepage, slope.	Severe: wetness.	Slope, excess salt.	Wetness, slope, excess salt.
Youngston	Moderate: slope.	Severe: wetness.	Slope, excess salt.	Wetness, slope, erodes easily.
Lostwells	Moderate: seepage, slope.	Slight	Deep to water	Slope.
44*:				
Lymanson	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.
Turk	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock, slope.
Jenkinson	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
45*:				
Meadowlake	Severe: seepage, slope.	Severe: seepage, large stones.	Deep to water	Large stones, droughty, depth to rock.
Castino Variant	Severe: slope.	Severe: large stones.	Deep to water	Large stones, depth to rock, slope.
Rock outcrop.				
46*:				
Muff	Severe: slope.	Severe: thin layer.	Deep to water	Soil blowing, percs slowly, depth to rock.
Neiber	Severe: slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.
47*:				
Mughut	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Soil blowing, depth to rock, slope.
Bondman	Severe: depth to rock.	Severe: thin layer.	Deep to water	Depth to rock, slope.
Bidman	Moderate: slope.	Slight	Deep to water	Percs slowly, slope.

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation
48*:				
Mulgon	Moderate: seepage.	Severe: large stones.	Deep to water	Large stones, slope.
Lucky Star	Moderate: seepage.	Severe: large stones.	Deep to water	Large stones, slope.
49*:				
Nathrop	Severe: slope.	Severe: large stones.	Deep to water	Large stones, droughty, depth to rock.
Starley	Severe: depth to rock, slope.	Moderate: seepage, piping, large stones.	Deep to water	Large stones, droughty, depth to rock.
Rock outcrop.				
50 Neville	Moderate: seepage.	Severe: piping.	Deep to water	Favorable.
51 Neville	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope.
52 Neville	Severe: slope.	Severe: piping.	Deep to water	Slope.
53 Neville	Moderate: seepage.	Severe: piping, wetness, excess salt.	Excess salt	Wetness, erodes easily.
54*:				
Neville	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope.
Tensleep	Moderate: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope, erodes easily.
55*:				
Neville	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope.
Spearfish	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.
Rock outcrop.				
56*:				
Persayo	Severe: depth to rock.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.
Muff	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Soil blowing, percs slowly, depth to rock.
Rock outcrop.				

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation
57*:				
Persayo	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.
Rock outcrop.				
58*:				
Rekop	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.
Gystrum	Severe: slope.	Severe: piping, excess salt.	Deep to water	Depth to rock, slope.
Spearfish	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.
59*:				
Renohill	Severe: slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock, slope.
Heldt	Moderate: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.
Worf	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.
60*. Riverwash				
61*:				
Rock outcrop.				
Persayo	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.
62*:				
Rock outcrop.				
Spearfish	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.
Neville	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope.
63*:				
Rock outcrop.				
Starman	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, depth to rock, slope.
64*:				
Spearfish	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.
Travessilla	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation
64*: Rock outcrop.				
65*: Stubbs	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
Turk	Severe: slope.	Severe: hard to pack.	Deep to water	Percs slowly, depth to rock, slope.
Lymanson	Severe: slope.	Severe: piping.	Deep to water	Depth to rock, slope.
66--- Stutzman	Slight	Moderate: hard to pack.	Deep to water	Percs slowly.
67--- Stutzman	Slight	Severe: wetness.	Percs slowly, excess salt.	Wetness, percs slowly.
68*: Stutzman	Moderate: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.
Persayo	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.
Youngston	Moderate: slope.	Moderate: piping.	Deep to water	Slope, erodes easily, excess salt.
69--- Tensleep	Moderate: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope, erodes easily.
70*: Uffens	Moderate: slope.	Severe: excess salt.	Deep to water	Droughty, slope.
Persayo	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.
Greybull	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope, erodes easily.
71*: Uffens	Moderate: slope.	Severe: excess salt.	Deep to water	Droughty, slope.
Rairdent	Moderate: seepage, slope.	Severe: piping.	Deep to water	Droughty, soil blowing, slope.
Griffy	Severe: seepage.	Moderate: seepage, piping.	Deep to water	Soil blowing, slope.
72*: Vale	Severe: slope.	Severe: piping.	Deep to water	Soil blowing, slope.
Tensleep	Moderate: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, slope, erodes easily.

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation
72*:				
Spearfish	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope.
73--- Wallson	Severe: seepage.	Severe: piping.	Deep to water	Fast intake, soil blowing, slope.
74--- Wallson	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope.
75*:				
Whaley	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, fast intake, soil blowing.
Rock outcrop.				
Splitro	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Droughty, soil blowing, depth to rock.
76*:				
Woosley	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
Decross	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope.
77*:				
Woosley	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
Morset	Severe: slope.	Slight	Deep to water	Slope.
78*:				
Woosley	Severe: slope.	Severe: thin layer.	Deep to water	Depth to rock, slope.
Starley	Severe: depth to rock, slope.	Moderate: seepage, piping, large stones.	Deep to water	Large stones, droughty, depth to rock.
Rock outcrop.				
79--- Worland	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.
80*:				
Worland	Severe: seepage, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.
Persayo	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Depth to rock, slope, erodes easily.
Apron	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, slope, erodes easily.

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--	
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation
81---------- Youngston	Moderate: seepage.	Severe: piping.	Deep to water----------	Flooding.
82---------- Youngston	Slight----------	Moderate: piping.	Deep to water----------	Erodes easily, excess salt.
83*: Youngston--------	Slight----------	Moderate: excess salt.	Deep to water----------	Erodes easily, flooding, excess salt.
Glenton----------	Severe: seepage.	Severe: piping.	Deep to water----------	Soil blowing, flooding.
Lostwells--------	Moderate: seepage.	Slight----------	Deep to water----------	Favorable.
84*: Youngston--------	Moderate: slope.	Moderate: piping.	Deep to water----------	Slope, erodes easily, excess salt.
Uffens----------	Moderate: slope.	Severe: excess salt.	Deep to water----------	Droughty, slope.
Lostwells--------	Moderate: seepage, slope.	Slight----------	Deep to water----------	Slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--ENGINEERING INDEX PROPERTIES

[The symbol > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1*:											
Absted	0-4	Very fine sandy loam.	ML	A-4	0-5	85-100	85-100	75-95	50-65	15-20	NP-5
	4-21	Silty clay, silty clay loam, clay loam, clay.	CL	A-6	0	85-100	85-100	80-100	75-95	30-40	10-20
	21-60	Clay, clay loam, silty clay loam, sandy clay loam.	CH, CL	A-7, A-6	0	85-100	85-100	70-100	50-95	30-60	10-30
Forkwood	0-2	Very fine sandy loam.	ML	A-4	0	75-100	75-100	70-90	50-70	20-25	NP-5
	2-19	Clay loam, loam	CL	A-6	0	75-100	75-100	70-90	55-75	20-35	10-20
	19-60	Loam, clay loam	CL-ML, CL	A-4, A-6	0	75-100	75-100	70-90	55-75	20-35	5-15
Shingle	0-4	Clay loam	CL	A-6	0-5	75-100	70-100	65-100	50-80	35-40	15-20
	4-17	Clay loam, loam	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
2	0-3	Sandy loam	SM	A-2, A-4	0	75-100	75-100	65-75	30-45	15-25	NP-5
Apron	3-60	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	75-100	75-100	65-75	30-45	15-25	NP-5
3*, 4*:											
Apron	0-3	Sandy loam	SM	A-2, A-4	0	75-100	75-100	65-75	30-45	15-25	NP-5
	3-60	Fine sandy loam, sandy loam.	SM	A-2, A-4	0	75-100	75-100	65-75	30-45	15-25	NP-5
Worland	0-3	Sandy loam	SM	A-2	0	75-100	75-100	50-65	25-35	---	NP
	3-36	Sandy loam	SM	A-2	0	75-100	75-100	50-65	25-35	---	NP
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
5*:											
Arvada	0-3	Loam	CL-ML	A-4	0	90-100	90-100	85-95	60-75	15-25	5-10
	3-17	Clay, silty clay loam, clay loam.	CL, CH	A-7	0	80-100	75-100	70-100	65-95	40-65	20-35
	17-60	Clay loam, silty clay loam, clay.	CL	A-7	0	80-100	75-100	70-100	55-80	40-45	20-25
Olney	0-5	Sandy loam	SM	A-2	0	95-100	90-100	70-95	20-35	15-25	NP-5
	5-18	Sandy clay loam.	SC, CL	A-6	0	95-100	90-100	80-100	40-55	20-40	10-20
	18-60	Sandy loam, sandy clay loam, fine sandy loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0	95-100	95-100	75-95	35-55	20-35	5-15
Rairdent	0-2	Fine sandy loam	SM	A-2, A-4	0-5	75-100	75-100	70-80	30-40	---	NP
	2-17	Clay loam, gravelly clay loam.	CL-ML, CL, GM-GC, GC	A-4, A-6	0-5	50-100	50-100	40-70	40-60	20-35	5-15
	17-60	Very gravelly loamy sand, very gravelly fine sandy loam.	GP-GM	---	0-5	35-50	35-50	20-35	5-10	---	NP
6	0-3	Loam	CL-ML, CL	A-4	0	85-100	85-100	70-95	50-65	20-25	5-10
Barnum	3-60	Stratified clay loam to fine sandy loam.	CL	A-6	0	85-100	85-100	70-95	50-75	30-35	10-15

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
7----------	0-7	Sandy loam-------	SM	A-1, A-2	0-10	85-100	85-100	40-75	15-30	---	NP
Baroid	7-60	Stratified loamy sand to fine sandy loam.	SM	A-1, A-2	0-10	85-100	85-100	40-60	15-30	---	NP
8*:											
Baroid----------	0-7	Sandy loam-------	SM	A-1, A-2	0-10	85-100	85-100	40-75	15-30	---	NP
	7-60	Stratified loamy sand to fine sandy loam.	SM	A-1, A-2	0-10	85-100	85-100	40-60	15-30	---	NP
Las Animas Variant--------	0-2	Sandy loam-------	SM, ML	A-4	0	95-100	90-100	65-85	35-55	25-30	NP-5
	2-60	Stratified loamy fine sand to sandy loam.	SM	A-2, A-4	0	95-100	90-100	55-70	30-40	20-30	NP-5
9*:											
Billycreek------	0-8	Loamy fine sand	SM	A-2	0-5	75-100	75-100	50-75	10-30	---	NP
	8-24	Loamy fine sand, fine sand.	SM	A-2	0-5	75-100	75-100	50-75	10-30	---	NP
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Wetterhorn------	0-2	Very stony loam	CL-ML, SM-SC	A-4	25-40	75-85	75-85	65-70	45-55	20-30	5-10
	2-16	Flaggy very fine sandy loam.	CL-ML	A-4	10-20	65-75	65-75	60-70	50-60	20-30	5-10
	16-27	Flaggy clay loam, flaggy clay.	CL, CH	A-6, A-7	25-40	80-90	75-90	60-65	50-55	30-55	10-30
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
10*:											
Burnette--------	0-2	Loam-------------	CL-ML	A-4	0-5	85-100	80-100	65-90	55-75	20-30	5-10
	2-36	Clay, clay loam, silty clay.	CL, CH	A-7	0-10	90-100	85-100	70-95	65-90	40-55	15-30
	36-60	Clay, silty clay, silty clay loam.	CL	A-6, A-7	0-10	90-100	85-100	75-100	70-95	35-50	15-25
Lucky Star------	0-2	Very stony loam	CL-ML	A-4	15-30	60-75	75-90	40-80	40-75	15-25	5-10
	2-60	Very cobbly sandy clay loam.	SC, CL, GC	A-6, A-2	30-70	20-65	35-80	30-80	15-60	30-40	10-15
Wallrock--------	0-10	Sandy loam-------	SM	A-2	0	75-100	75-100	50-80	25-35	20-25	NP-5
	10-22	Sandy clay loam, loam, clay loam.	CL	A-6	0	75-100	75-100	70-90	55-65	25-35	10-20
	22-60	Sandy clay loam	CL, CL-ML, SC, SM-SC	A-4, A-6	0	75-100	75-100	60-75	45-55	20-30	5-15
11*:											
Chittum---------	0-5	Gravelly loam----	SM, ML, GM	A-4	0-5	70-95	55-80	50-70	35-55	25-30	NP-5
	5-11	Gravelly loam----	SM-SC, CL-ML	A-4	0-5	70-95	55-80	55-70	35-55	15-25	5-10
	11-17	Gravelly clay loam.	SC, CL	A-6	0-5	70-95	55-80	55-75	40-60	30-40	10-15
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Bachus----------	0-8	Loam-------------	ML, CL-ML	A-4	0-5	80-100	80-100	70-85	50-70	<25	NP-5
	8-22	Loam, clay loam	CL	A-6	0-10	80-100	80-100	75-90	60-75	30-35	10-15
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
12*:											
Clayburn	0-18	Loam	CL-ML	A-4	0-5	85-100	80-95	70-90	50-65	20-30	5-10
	18-36	Clay loam, loam	CL-ML, CL	A-4, A-6	5-15	85-100	80-95	70-90	50-75	20-35	5-15
	36-60	Gravelly clay loam, gravelly loam, loam.	GM-GC, CL-ML, CL, SM-SC	A-4, A-6	0-15	60-100	60-100	45-70	35-55	20-35	5-15
Bachus	0-8	Loam	ML, CL-ML	A-4	0-5	80-100	80-100	70-85	50-70	<25	NP-5
	8-22	Loam, clay loam	CL	A-6	0-10	80-100	80-100	75-90	60-75	30-35	10-15
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Inchau	0-6	Loam	CL-ML, ML	A-4	0	75-100	75-100	70-90	50-70	25-35	5-10
	6-39	Gravelly loam, gravelly clay loam, loam, clay loam.	GM-GC, GC, CL	A-4, A-6	0-10	55-85	50-85	45-80	35-60	25-35	5-15
	39	Weathered bedrock	CL-ML	---	---	---	---	---	---	---	---
13*:											
Clayburn	0-18	Loam	CL-ML	A-4	0-5	85-100	80-95	70-90	50-65	20-30	5-10
	18-36	Clay loam, loam	CL-ML, CL	A-4, A-6	5-15	85-100	80-95	70-90	50-75	20-35	5-15
	36-60	Gravelly clay loam, gravelly loam, loam.	GM-GC, CL-ML, CL, SM-SC	A-4, A-6	0-15	60-100	60-100	45-70	35-55	20-35	5-15
Wallrock	0-10	Sandy loam	SM	A-2	0	75-100	75-100	50-80	25-35	20-25	NP-5
	10-22	Sandy clay loam, loam, clay loam.	CL	A-6	0	75-100	75-100	70-90	55-65	25-35	10-20
	22-60	Sandy clay loam	CL, CL-ML, SC, SM-SC	A-4, A-6	0	75-100	75-100	60-75	45-55	20-30	5-15
Burnette	0-2	Loam	CL-ML	A-4	0-5	85-100	80-100	65-90	55-75	20-30	5-10
	2-36	Clay, clay loam, silty clay.	CL, CH	A-7	0-10	90-100	85-100	70-95	65-90	40-55	15-30
	36-60	Clay, silty clay, silty clay loam.	CL	A-6, A-7	0-10	90-100	85-100	75-100	70-95	35-50	15-25
14*:											
Clifterson	0-5	Gravelly sandy clay loam.	GM-GC	A-4	5-10	50-75	50-75	45-65	35-50	25-30	5-10
	5-60	Very gravelly loam, very gravelly clay loam.	GM-GC	A-2	5-10	20-55	20-55	20-40	10-25	25-30	5-10
Persayo	0-13	Clay loam	CL	A-6	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
Lostwells	0-3	Sandy clay loam	SC	A-6	0-5	80-100	80-100	70-100	35-50	30-40	10-15
	3-60	Stratified sandy loam to clay loam.	SC	A-6	0-5	80-100	80-100	70-100	35-50	30-40	10-15
15*:											
Coutis	0-25	Fine sandy loam	SM	A-4	0	75-100	75-100	60-85	40-50	---	NP
	25-60	Fine sandy loam, sandy loam, gravelly sandy loam, sandy loam.	SM, SM-SC	A-4	0	75-100	75-100	60-85	40-50	---	NP
Greenman	0-8	Fine sandy loam	SM	A-2, A-4	0-5	75-100	75-100	50-70	25-35	---	NP
	8-34	Fine sandy loam, sandy loam.	SM	A-2, A-4	0-5	75-100	75-100	50-70	25-35	---	NP
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
15*:											
Chittum	0-5	Gravelly loam	SM, ML, GM	A-4	0-5	70-95	55-80	50-70	35-55	25-30	NP-5
	5-11	Gravelly loam	SM-SC, CL-ML	A-4	0-5	70-95	55-80	55-70	35-55	15-25	5-10
	11-17	Gravelly clay loam.	SC, CL	A-6	0-5	70-95	55-80	55-75	40-60	30-40	10-15
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
16	0-7	Loam	CL-ML, CL	A-4, A-6	0	100	100	85-95	60-80	20-40	5-15
Dobent	7-60	Stratified sandy loam to silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	85-95	60-80	20-40	5-15
17	0-9	Silty clay	CH	A-7	0	90-100	90-100	90-100	85-95	60-75	35-45
Finnerty	9-60	Clay	CH	A-7	---	90-100	90-100	90-100	85-95	60-75	35-45
18	0-9	Silty clay	CH, CL	A-7	0	90-100	90-100	90-100	85-95	45-65	25-35
Finnerty	9-60	Silty clay, clay	CH, CL	A-7	0	90-100	90-100	90-100	85-95	45-65	25-35
19*. Fluvaquents											
20*. Fluvents											
21*:											
Forkwood	0-2	Very fine sandy loam.	ML	A-4	0	75-100	75-100	70-90	50-70	20-25	NP-5
	2-19	Clay loam, loam	CL	A-6	0	75-100	75-100	70-90	55-75	20-35	10-20
	19-60	Loam, clay loam	CL-ML, CL	A-4, A-6	0	75-100	75-100	70-90	55-75	20-35	5-15
Haverdad	0-6	Loam	CL-ML	A-4	0	75-100	75-100	70-90	50-70	20-25	5-10
	6-60	Stratified fine sandy loam to silty clay loam.	CL-ML	A-4	0	75-100	75-100	70-90	50-60	20-25	5-10
Arvada	0-3	Loam	CL-ML	A-4	0	90-100	90-100	85-95	60-75	15-25	5-10
	3-17	Clay, silty clay loam, clay loam.	CL, CH	A-7	0	80-100	75-100	70-100	65-95	40-65	20-35
	17-60	Clay loam, silty clay loam, clay.	CL	A-7	0	80-100	75-100	70-100	55-80	40-45	20-25
22*:											
Forkwood	0-2	Very fine sandy loam.	ML	A-4	0	75-100	75-100	70-90	50-70	20-25	NP-5
	2-19	Clay loam, loam	CL	A-6	0	75-100	75-100	70-90	55-75	20-35	10-20
	19-60	Loam, clay loam	CL-ML, CL	A-4, A-6	0	75-100	75-100	70-90	55-75	20-35	5-15
Kishona	0-4	Loam	ML	A-4	0	85-100	75-100	65-85	55-75	25-30	NP-5
	4-60	Loam, clay loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	85-100	75-100	70-90	65-80	20-30	5-15
Haverdad	0-6	Loam	CL-ML	A-4	0	75-100	75-100	70-90	50-70	20-25	5-10
	6-60	Stratified fine sandy loam to silty clay loam.	CL-ML	A-4	0	75-100	75-100	70-90	50-60	20-25	5-10
23*:											
Fruita	0-4	Fine sandy loam	SM, ML	A-4	0-5	90-100	80-100	60-90	35-65	---	NP
	4-24	Loam, clay loam.	CL	A-6	0-5	90-100	90-100	75-90	55-70	25-35	10-15
	24-60	Loam, fine sandy loam, sandy clay loam.	ML, SM, SC	A-4, A-6	0-5	90-95	80-95	75-85	40-70	15-30	NP-10

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
23*:											
Neiber	0-8	Fine sandy loam	SM	A-4	0	85-100	85-100	60-85	35-50	---	NP
	8-21	Sandy clay loam	CL, SC, CL-ML, SM-SC	A-4, A-6	0	85-100	85-100	65-100	40-65	25-40	5-15
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
Muff	0-5	Fine sandy loam	SM	A-4	0	90-100	75-100	50-85	35-50	---	NP
	5-30	Sandy clay loam	SC	A-6	0	90-100	75-100	65-90	30-50	30-40	15-20
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
24	0-8	Clay loam	CL	A-6	0-10	80-100	75-100	65-95	55-70	30-40	10-15
Garland	8-22	Sandy clay loam	SC	A-6, A-2	0-10	80-100	75-100	65-85	30-50	30-35	10-15
	22-60	Very gravelly loamy sand, very gravelly sand.	GP, GP-GM	A-1	15-25	20-50	20-50	15-25	0-10	---	NP
25	0-7	Sandy loam	SM	A-4	0-5	75-100	75-100	60-80	35-50	---	NP
Glenton	7-60	Stratified fine sand to very fine sandy loam.	SM	A-4	0-5	75-100	75-100	60-80	35-50	---	NP
26*:											
Glenton	0-7	Sandy loam	SM	A-4	0-5	80-100	80-100	60-80	35-50	---	NP
	7-60	Stratified fine sand to loam.	SM	A-4	0-5	80-100	80-100	60-80	35-50	---	NP
Baroid	0-7	Sandy loam	SM	A-2	0-10	90-100	85-100	55-80	15-30	---	NP
	7-60	Loamy fine sand, sandy loam.	SM	A-2	0-10	90-100	85-100	55-80	15-30	---	NP
27*:											
Granile	0-20	Very stony fine sandy loam.	GM, SM	A-1, A-2, A-4	35-50	55-80	50-75	30-65	15-40	---	NP
	20-40	Very cobbly clay loam, very cobbly sandy clay loam.	GC, SC	A-6, A-2	25-75	50-75	40-70	35-65	30-50	25-40	10-20
	40-60	Very cobbly sandy loam.	GM, SM	A-1, A-2	40-75	30-75	25-70	20-40	10-30	---	NP
Tine	0-12	Extremely stony sandy loam.	GM	A-1	25-50	25-50	25-50	15-35	10-20	---	NP
	12-60	Very gravelly sand, extremely cobbly sand, very cobbly sand.	GP, GP-GM	A-1	30-60	25-50	25-50	10-35	0-10	---	NP
28*:											
Greenman	0-8	Fine sandy lmam	SM	A-2, A-4	0-5	75-100	75-100	50-70	25-35	---	NP
	8-34	Fine sandy loam, sandy loam.	SM	A-2, A-4	0-5	75-100	75-100	50-70	25-35	---	NP
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Splitro	0-18	Fine sandy loam	SM	A-4	0-5	90-100	90-100	60-80	35-50	---	NP
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Coutis	0-25	Fine sandy loam	SM	A-4	0	75-100	75-100	60-85	40-50	---	NP
	25-60	Fine sandy loam, sandy loam, loam.	SM	A-4	0	75-100	75-100	60-85	40-50	---	NP

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
29*:											
Greybull	0-7	Clay loam	CL	A-6	0	100	100	90-100	70-80	35-40	15-20
	7-23	Clay loam, loam, sandy clay loam.	CL	A-6	0	100	100	90-100	70-80	35-40	15-20
	23	Weathered bedrock	---	---	---	---	---	---	---	---	---
Persayo	0-13	Clay loam	CL	A-6	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
30*:											
Greybull	0-4	Clay loam	CL	A-6	0	100	100	90-100	70-80	35-40	15-20
	4-23	Clay loam, loam, sandy clay loam.	CL	A-6	0	100	100	90-100	70-80	35-40	15-20
	23	Weathered bedrock	---	---	---	---	---	---	---	---	---
Persayo	0-13	Clay loam	CL	A-6	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
31	0-3	Sandy loam	SM	A-2, A-4	0	80-100	80-100	60-70	30-40	---	NP
Griffy	3-14	Sandy clay loam, gravelly sandy clay loam.	GC, CL	A-2, A-6	0	50-100	50-100	40-90	25-55	25-35	10-15
	14-60	Sandy loam	SM	A-4	0	75-90	75-90	55-80	35-50	---	NP
32	0-8	Clay loam	CL-ML	A-4	0	75-100	75-100	65-80	50-75	20-30	5-10
Griffy	8-14	Sandy clay loam, gravelly sandy clay loam.	GC, CL	A-2, A-6	0	50-100	50-100	40-90	25-55	25-35	10-15
	14-60	Sandy loam	SM	A-4	0	75-90	75-90	55-80	35-50	---	NP
33*:											
Hoot	0-5	Fine sandy loam	SM	A-4	0-10	75-90	75-90	60-75	35-50	---	NP
	5-16	Very channery sandy clay loam, very channery sandy loam.	GC, GP-GC	A-2	10-30	10-50	10-50	10-40	5-30	25-35	10-20
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Persayo	0-13	Clay loam	CL	A-6	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
34*:											
Kishona	0-4	Loam	ML	A-4	0	85-100	75-100	65-85	55-75	25-30	NP-5
	4-60	Loam, clay loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	85-100	75-100	70-90	65-80	20-30	5-15
Shingle	0-4	Clay loam	CL	A-6	0-5	75-100	70-100	65-100	50-80	35-40	15-20
	4-17	Clay loam, loam	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
35*:											
Kishona	0-3	Clay loam	CL	A-6	0	85-100	75-100	70-90	70-80	30-40	10-20
	3-60	Loam, clay loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	85-100	75-100	70-90	65-80	20-30	5-15
Shingle	0-4	Clay loam	CL	A-6	0-5	75-100	70-100	65-100	50-80	35-40	15-20
	4-17	Clay loam, loam	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
36*:											
Kyle	0-2	Clay	CH, MH	A-7	0	100	100	90-100	80-100	55-75	25-45
	2-60	Clay	CH, MH	A-7	0	100	100	90-100	80-100	60-90	29-55
Shingle	0-4	Clay loam	CL	A-6	0-5	75-100	70-100	65-100	50-80	35-40	15-20
	4-17	Clay loam, loam	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bidman	0-11	Fine sandy loam	ML, SM	A-4	0	80-100	80-100	65-90	40-75	30-35	5-10
	11-27	Clay, clay loam	CH	A-7	0	80-100	80-100	80-100	70-90	50-60	30-40
	27-60	Sandy clay loam, clay loam.	CL, SC	A-6	0	80-100	80-100	60-80	45-55	20-30	10-15
37*:											
Lakehelen	0-19	Stony sandy loam	SM	A-1	0-15	85-100	85-100	50-70	15-25	---	NP
	19-37	Very gravelly sandy clay loam, very cobbly sandy clay loam.	GM, SM	A-2	25-60	60-80	40-70	45-55	25-35	30-40	5-10
	37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Irigul	0-14	Very channery loam.	GC, GM-GC	A-2	10-15	15-50	15-50	10-30	10-30	20-30	5-10
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
38*:											
Larim	0-3	Very gravelly sandy loam.	GM	A-1, A-2	0	40-50	40-50	30-40	20-30	15-20	NP-5
	3-15	Very gravelly sandy clay loam, very gravelly clay loam.	GC	A-2	0-15	25-50	25-50	20-40	20-30	35-40	15-20
	15-60	Very gravelly loamy sand, very gravelly sand.	GP, GP-GM	A-1	0-15	25-50	25-50	15-35	0-10	---	NP
Olney	0-5	Sandy loam	SM	A-2	0	95-100	90-100	70-95	20-35	15-25	NP-5
	5-18	Sandy clay loam	SC, CL	A-6	0	95-100	90-100	80-100	40-55	20-40	10-20
	18-60	Sandy loam, sandy clay loam, fine sandy loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0	95-100	95-100	75-95	35-55	20-35	5-15
Shingle	0-4	Clay loam	CL	A-6	0-5	75-100	70-100	65-100	50-80	35-40	15-20
	4-17	Clay loam, loam	CL	A-6	0	75-100	75-100	65-100	50-80	30-40	10-20
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
39*:											
Limber	0-5	Gravelly loam	GM-GC, SM-SC	A-4, A-2	0-10	50-80	50-75	45-70	30-50	25-35	5-10
	5-39	Gravelly clay loam, gravelly loam.	SC, CL	A-6	10-20	70-80	65-75	60-70	40-60	30-40	10-15
	39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
39*:											
Hyattville	0-7	Stony loam	ML	A-4	5-15	70-90	70-90	60-85	50-65	25-35	NP-5
	7-29	Very channery clay loam, very channery loam.	CL, GC, SC	A-6	15-65	40-90	40-90	35-65	30-60	35-40	15-20
	29-36	Very channery clay loam, very flaggy clay loam	GC, SC, CL	A-6	15-65	40-90	40-90	35-65	30-60	35-40	15-20
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
40, 41	0-8	Clay loam	CL	A-6	0-5	80-100	80-100	75-100	60-75	35-40	15-20
Lostwells	8-60	Stratified sandy loam to clay loam.	SC	A-6	0-5	80-100	80-100	70-100	35-50	30-40	10-15
42*:											
Lostwells	0-3	Sandy clay loam	SC	A-6	0-5	80-100	80-100	70-100	35-50	30-40	10-15
	3-60	Stratified sandy loam to clay loam.	SC	A-6	0-5	80-100	80-100	70-100	35-50	30-40	10-15
Youngston	0-3	Silty clay loam	CL	A-6	0	100	100	90-100	70-85	30-40	10-20
	3-60	Stratified very fine sandy loam to silty clay loam.	CL	A-6	0	100	100	80-100	60-80	30-40	10-20
Uffens	0-1	Loam	CL, CL-ML	A-6, A-4	0	100	100	85-95	55-75	25-35	5-15
	1-22	Sandy clay loam, clay loam, silty clay loam.	CL	A-6	0	100	100	85-95	65-85	30-40	10-20
	22-60	Sandy clay loam, loam, clay loam.	CL	A-6	0	100	100	85-95	55-75	30-40	10-15
43*:											
Lostwells	0-8	Clay loam	CL	A-6, A-7	0	95-100	95-100	85-100	60-75	35-45	15-20
	8-60	Sandy clay loam	SC	A-6	0	95-100	95-100	75-90	35-50	30-40	10-15
Youngston	0-8	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	35-40	15-20
	8-60	Stratified loam to silty clay loam.	CL	A-6	0	100	100	95-100	85-95	35-40	15-20
Lostwells	0-3	Sandy clay loam	SC	A-6	0-5	80-100	80-100	70-100	35-50	30-40	10-15
	3-60	Stratified sandy loam to clay loam.	SC	A-6	0-5	80-100	80-100	70-100	35-50	30-40	10-15
44*:											
Lymanson	0-2	Gravelly loam	SM-SC, SM GM-GC, GM	A-4	5-15	65-90	50-75	40-65	35-50	25-35	5-10
	2-21	Gravelly clay loam.	GC, SC, CL	A-6	5-13	65-90	50-75	45-65	40-60	25-35	10-15
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
Turk	0-3	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	85-100	80-95	35-45	15-20
	3-34	Clay	CH	A-7	0	90-100	90-100	85-100	75-95	50-75	25-45
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Jenkinson	0-7	Channery loam	GC, CL	A-6	0-5	50-80	50-75	45-65	40-55	30-40	10-20
	7-14	Channery clay loam, channery loam.	GC, CL	A-6	0-5	50-80	50-75	45-65	40-55	30-40	10-20
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
45*:											
Meadowlake------	0-16	Very flaggy sandy loam.	GM, SM	A-2, A-1	45-60	50-75	50-70	30-50	15-30	---	NP
	16-22	Very flaggy loamy sand.	GM, SM	A-2, A-1	45-60	50-75	50-70	25-55	10-20	5-15	NP-5
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Castino Variant-	0-4	Very stony loam	CL-ML, CL, SC	A-4	35-65	75-85	70-80	60-80	45-60	15-30	5-10
	4-22	Very flaggy clay loam, very stony clay loam.	CL	A-6, A-7	35-65	75-85	70-85	60-80	50-65	35-45	15-20
	22-30	Very stony sandy clay loam, stony clay.	SC	A-6	35-65	75-85	70-85	55-75	25-45	30-40	10-15
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
46*:											
Muff----------	0-5	Fine sandy loam	SM	A-4	0	90-100	75-100	50-85	35-50	---	NP
	5-30	Sandy clay loam	SC	A-6	0	90-100	75-100	65-90	30-50	30-40	15-20
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
Neiber----------	0-8	Fine sandy loam	SM	A-4	0	85-100	85-100	60-85	35-50	---	NP
	8-21	Sandy clay loam	CL, SC, CL-ML, SM-SC	A-4, A-6	0	85-100	85-100	65-100	40-65	25-40	5-15
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
47*:											
Mughut----------	0-3	Fine sandy loam	SM	A-2, A-4	0-5	80-100	75-100	45-85	25-50	---	NP
	3-24	Clay loam, clay, sandy clay.	CL, CH	A-7	0-5	80-100	75-100	60-80	50-70	40-55	15-25
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bondman---------	0-3	Sandy loam-------	SM	A-2, A-4	0	80-100	80-100	50-70	25-40	---	NP
	3-12	Sandy clay loam, clay loam.	CL, SC	A-6	0	80-100	80-100	65-90	30-55	30-35	10-15
	12-18	Sandy loam-------	SM	A-2, A-4	0	80-100	80-100	50-70	25-40	---	NP
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bidman----------	0-11	Fine sandy loam	ML, SM	A-4	0	80-100	80-100	65-90	40-75	30-35	5-10
	11-27	Clay, clay loam	CH	A-7	0	80-100	80-100	80-100	70-90	50-60	30-40
	27-60	Clay loam, loam, sandy clay loam.	CL, SC	A-6, A-7	0	80-100	80-100	60-100	45-80	20-45	10-30
48*:											
Mulgon----------	0-3	Very stony loam	ML, GM	A-4	25-65	60-90	45-75	50-70	35-65	25-35	NP-10
	3-15	Very stony fine sandy loam.	GM, SM	A-1, A-2, A-4	25-65	60-90	45-75	40-75	20-50	25-30	NP-5
	15-31	Very stony sandy clay loam.	GM, SM	A-1, A-2, A-4	25-65	60-90	35-75	45-75	20-50	30-40	5-10
	31-60	Very stony sandy loam, very cobbly sandy clay loam.	GM, SM	A-1, A-2	25-65	60-90	35-75	30-65	15-30	25-30	NP-5
Lucky Star------	0-16	Very stony loam	GM-GC	A-2	20-65	65-90	50-80	35-50	10-35	15-25	5-10
	16-60	Very cobbly sandy clay loam.	GC	A-2	20-65	65-90	50-80	35-50	10-35	30-40	10-15

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
49*:											
Nathrop	0-8	Very cobbly loam	GM-GC, SM-SC, GC, SC	A-4, A-6	25-40	70-80	60-75	50-65	40-50	20-30	5-15
	8-22	Very cobbly clay loam.	GC, SC	A-6, A-7	30-40	70-80	60-75	50-65	40-50	35-45	15-20
	22-36	Very cobbly loam	GM-GC, GC, SM-SC, SC	A-4, A-6	30-50	70-80	60-75	50-65	40-50	20-30	5-15
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Starley	0-6	Very channery loam.	GM-GC, GM	A-2	0-10	35-60	35-50	30-40	25-35	25-35	5-10
	6-14	Very cobbly loam, very channery loam, very gravelly clay loam.	GM-GC, GM	A-2, A-4	20-50	40-60	40-60	25-45	20-40	25-35	5-10
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
50, 51, 52	0-8	Loam	CL-ML	A-4	0-5	90-100	75-100	60-90	50-65	20-30	5-10
Neville	8-60	Loam, clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0-5	90-100	85-100	85-95	60-80	20-40	5-15
53	0-8	Loam	CL-ML, CL	A-4, A-6	0	100	100	85-95	60-75	25-30	5-10
Neville	8-60	Loam, clay loam	CL-ML, CL	A-4, A-6	0	100	75-100	85-95	60-75	25-35	5-15
54*:											
Neville	0-7	Loam	CL-ML	A-4	0-5	90-100	75-100	60-90	50-65	20-30	5-10
	7-60	Loam, clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0-5	90-100	85-100	85-95	60-80	20-40	5-15
Tensleep	0-5	Very fine sandy loam.	ML	A-4	0	95-100	90-100	90-100	55-80	20-30	NP-5
	5-20	Very fine sandy loam, silt loam.	ML	A-4,	0	95-100	90-100	90-100	55-95	20-40	NP-5
	20-60	Very fine sandy loam, silt loam.	ML	A-4	0	95-100	90-100	90-100	55-90	20-30	NP-5
55*:											
Neville	0-7	Loam	CL-ML	A-4	0-5	90-100	75-100	60-90	50-65	20-30	5-10
	7-60	Loam, clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0-5	90-100	85-100	85-95	60-80	20-40	5-15
Spearfish	0-4	Loam	ML, CL	A-4, A-6	0	100	100	85-100	65-90	25-40	NP-15
	4-13	Loam, very fine sandy loam, silt loam.	ML, CL	A-4, A-6	0	95-100	80-100	70-100	50-90	25-40	NP-15
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
56*:											
Persayo	0-13	Clay loam	CL	A-6	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
Muff	0-5	Fine sandy loam	SM	A-4	0	90-100	75-100	50-85	35-50	---	NP
	5-30	Sandy clay loam	SC	A-6	0	90-100	75-100	65-90	30-50	30-40	15-20
	30	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
57*:											
Persayo	0-13	Clay loam	CL	A-6	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
58*:											
Rekop	0-14	Loam	ML	A-4	0-5	95-100	95-100	85-95	60-75	30-35	5-10
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Gystrum	0-4	Silt loam	ML	A-4	0	95-100	90-100	90-100	85-90	30-35	5-10
	4-36	Silty clay loam, silt loam.	ML	A-4, A-6	0	95-100	95-100	90-100	85-95	30-40	5-15
	36	Unweathered bedrock.	---	---	---	---	90-100	---	---	---	---
Spearfish	0-4	Loam	ML, CL	A-4, A-6	0	100	100	85-100	65-90	25-40	NP-15
	4-14	Loam, very fine sandy loam, silt loam.	ML, CL	A-4, A-6	0	95-100	80-100	70-100	50-90	25-40	NP-15
	14	Weathered bedrock	---	---	---	---	---	---	---	---	---
59*:											
Renohill	0-2	Silty clay loam	CL	A-6	0	85-100	80-100	80-95	70-80	25-40	10-20
	2-14	Clay, clay loam	CL, CH	A-7, A-6	0	95-100	90-100	90-100	75-95	35-65	20-35
	14-21	Clay loam, silty clay.	CL	A-6	0	85-100	80-100	80-95	70-80	30-40	15-25
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
Heldt	0-5	Silty clay loam	CH, CL	A-7	0	95-100	95-100	95-100	75-95	45-55	25-35
	5-60	Silty clay, clay loam, clay.	CH, CL	A-7	0	95-100	95-100	95-100	75-95	45-55	25-35
Worf	0-4	Loam	CL-ML	A-4	0	80-100	75-100	65-95	50-65	20-30	5-10
	4-10	Clay loam	CL	A-6	0	80-100	75-100	65-85	60-75	25-35	10-15
	10-16	Loam	CL-ML	A-4	0	80-100	75-100	65-95	50-65	20-30	5-10
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
60*. Riverwash											
61*:											
Rock outcrop.											
Persayo	0-13	Clay loam	CL	A-6	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
62*:											
Rock outcrop.											
Spearfish	0-4	Loam	ML, CL	A-4, A-6	0	100	100	85-100	65-90	25-40	NP-15
	4-13	Loam, very fine sandy loam, silt loam.	ML, CL	A-4, A-6	0	95-100	80-100	70-100	50-90	25-40	NP-15
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
Neville	0-7	Loam	CL-ML	A-4	0-5	90-100	75-100	60-90	50-65	20-30	5-10
	7-60	Loam, clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0-5	90-100	85-100	85-95	60-80	20-40	5-15
63*:											
Rock outcrop.											
Starman	0-3	Gravelly loam	GM	A-1, A-2	0-15	35-55	30-50	30-45	20-35	30-40	5-10
	3-10	Gravelly loam, very gravelly loam.	GM	A-1, A-2	0-15	35-55	30-50	30-45	20-35	30-40	5-10
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
64*:											
Spearfish	0-4	Loam	ML, CL	A-4, A-6	0	100	100	85-100	65-90	25-40	NP-15
	4-13	Loam, very fine sandy loam, silt loam.	ML, CL	A-4, A-6	0	95-100	80-100	70-100	50-90	25-40	NP-15
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
Travessilla	0-1	Loam	ML	A-4	0-5	85-100	80-100	70-90	50-70	25-30	NP-5
	1-10	Loam, channery loam, stony loam.	GM, SM, ML	A-4	0-20	60-90	55-85	50-75	35-55	20-30	NP-5
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
65*:											
Stubbs	0-34	Loam	ML	A-4	0	80-100	75-100	70-90	50-70	30-35	5-10
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Turk	0-3	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	85-100	80-95	35-45	15-20
	3-34	Clay	CH	A-7	0	90-100	90-100	85-100	75-95	50-75	25-45
	34	Weathered bedrock	---	---	---	---	---	---	---	---	---
Lymanson	0-2	Gravelly loam	GM-GC, GM SM-SC, SM	A-4	5-15	65-90	50-75	40-65	35-30	25-35	5-10
	2-21	Gravelly clay loam.	GC, SC, CL	A-6	5-15	65-90	50-75	25-65	40-60	25-35	10-15
	21	Weathered bedrock	---	---	---	---	---	---	---	---	---
66 Stutzman	0-8	Silty clay loam	CL, CH	A-7	0	75-100	75-100	75-100	70-95	40-55	20-30
	8-60	Silty clay loam, silty clay.	CL, CH	A-7	0	75-100	75-100	75-100	70-95	40-55	20-30
67 Stutzman	0-8	Silty clay loam	CL	A-6, A-7	0	95-100	95-100	90-100	80-95	35-45	20-30
	8-60	Silty clay loam, silty clay.	CL, CH	A-6, A-7	0	95-100	95-100	90-100	80-95	35-55	20-30
68*:											
Stutzman	0-6	Silty clay loam	CL, CH	A-7	0	75-100	75-100	75-100	70-95	40-55	20-30
	6-60	Silty clay loam, silty clay.	CL, CH	A-7	0	75-100	75-100	75-100	70-95	40-55	20-30
Persayo	0-13	Clay loam	CL	A-6	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
Youngston	0-4	Silty clay loam	CL	A-6	0	100	100	90-100	70-85	30-40	10-20
	4-60	Stratified very fine sandy loam to silty clay loam.	CL	A-6	0	100	100	80-100	60-80	30-40	10-20
69 Tensleep	0-7	Loam	ML	A-4	0	95-100	90-100	90-100	55-80	20-30	NP-5
	7-11	Silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	95-100	90-100	90-100	70-95	25-40	5-15
	11-60	Very fine sandy loam, silt loam.	ML	A-4	0	95-100	90-100	90-100	55-90	20-30	NP-5
70*:											
Uffens	0-1	Loam	CL, CL-ML	A-6, A-4	0	100	100	85-95	55-75	25-35	5-15
	1-5	Sandy clay loam, clay loam, silty clay loam.	CL	A-6	0	100	100	85-95	65-85	30-40	10-20
	5-60	Sandy clay loam, loam, clay loam.	CL	A-6	0	100	100	85-95	55-75	30-40	10-15

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
70*:											
Persayo	0-13	Clay loam	CL	A-6	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
Greybull	0-4	Clay loam	CL	A-6	0	100	100	90-100	70-80	35-40	15-20
	4-23	Clay loam, loam, sandy clay loam.	CL	A-6	0	100	100	90-100	70-80	35-40	15-20
	23	Weathered bedrock	---	---	---	---	---	---	---	---	---
71*:											
Uffens	0-1	Loam	CL, CL-ML	A-6, A-4	0	100	100	85-95	55-75	25-35	5-15
	1-5	Sandy clay loam, clay loam, silty clay loam.	CL	A-6	0	100	100	85-95	65-85	30-40	10-20
	5-60	Sandy clay loam, loam, clay loam.	CL	A-6	0	100	100	85-95	55-75	30-40	10-15
Rairdent	0-2	Fine sandy loam	SM	A-2, A-4	0-5	75-100	75-100	70-80	30-40	---	NP
	2-17	Clay loam, gravelly clay loam.	CL-ML, CL, GM-GC, GC	A-4, A-6	0-5	50-100	50-100	40-70	40-60	20-35	5-15
	17-60	Very gravelly loamy sand, very gravelly fine sandy loam.	GP-GM	---	0-5	35-50	35-50	20-35	5-10	---	NP
Griffy	0-3	Sandy loam	SM	A-2, A-4	0	80-100	80-100	60-70	30-40	---	NP
	3-14	Sandy clay loam, gravelly sandy clay loam.	GC, CL	A-2, A-6	0	50-100	50-100	40-90	25-55	25-35	10-15
	14-60	Sandy loam	SM	A-4	0	75-90	75-90	55-80	35-50	---	NP
72*:											
Vale	0-5	Very fine sandy loam.	ML, SM	A-4	0	100	85-100	70-100	40-65	20-30	NP-5
	5-16	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0	100	85-100	65-100	65-95	30-45	10-25
	16-60	Loam, silty clay loam, silt loam.	CL, CL-ML	A-4, A-6	0	100	85-100	60-100	50-95	25-40	5-15
Tensleep	0-5	Very fine sandy loam.	ML	A-4	0	95-100	90-100	90-100	55-80	20-30	NP-5
	5-11	Silty clay loam, silt loam.	CL-ML, CL	A-4, A-6	0	95-100	90-100	90-100	70-95	25-40	5-15
	11-60	Very fine sandy loam, silt loam.	ML	A-4	0	95-100	90-100	90-100	55-90	20-30	NP-5
Spearfish	0-4	Loam	ML, CL	A-4, A-6	0	100	100	85-100	65-90	25-40	NP-15
	4-13	Loam, very fine sandy loam, silt loam.	ML, CL	A-4, A-6	0	95-100	80-100	70-100	50-90	25-40	NP-15
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
73 Wallson	0-4	Loamy fine sand	SM	A-2	0	75-100	75-100	50-75	15-30	---	NP
	4-60	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	75-100	75-100	50-75	30-45	---	NP
74 Wallson	0-8	Sandy loam	SM	A-2, A-4	0	75-100	75-100	50-75	30-45	---	NP
	8-60	Sandy loam, fine sandy loam.	SM	A-2, A-4	0	75-100	75-100	50-75	30-45	---	NP

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
75*:											
Whaley	0-5	Loamy very fine sand.	SM	A-2	0-10	75-100	75-100	45-75	25-35	---	NP
	5-10	Loamy fine sand, loamy very fine sand.	SM	A-2	0-10	75-100	75-100	45-75	25-35	---	NP
	10	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Splitro	0-18	Fine sandy loam	SM	A-4	0-5	90-100	90-100	60-80	35-50	---	NP
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
76*:											
Woosley	0-13	Loam	ML	A-4	0	80-90	75-90	70-80	55-70	30-35	5-10
	13-22	Clay loam, silty clay loam.	CL	A-6	0	80-90	75-90	70-90	55-70	35-40	15-20
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Decross	0-5	Loam	CL	A-6	0	75-100	75-100	65-90	50-75	30-35	10-15
	5-60	Clay loam, loam	CL	A-6	0	75-100	75-100	70-95	60-80	30-40	10-20
Nathrop	0-3	Very cobbly loam	GM-GC, SM-SC, GC, SC	A-4, A-6	25-40	70-80	60-75	50-65	40-50	20-30	5-15
	3-22	Very cobbly clay loam.	GC, SC	A-6, A-7,	30-40	70-80	60-75	50-65	40-50	35-45	15-20
	22-36	Very cobbly loam	GM-GC, GC, SM-SC, SC	A-4, A-6 A-2	30-50 20-50	70-80 30-60	60-75 20-50	50-65 15-50	40-50 15-35	20-30 15-25	5-15 5-10
		Unweathered bedrock.	---	---	---	---	---	---	---	---	---
77*:											
Woosley	0-13	Loam	ML	A-4	0	80-90	75-90	70-80	55-70	30-35	5-10
	13-22	Clay loam, silty clay loam.	CL	A-6	0	80-90	75-90	70-90	55-70	35-40	15-20
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Morset	0-3	Loam	ML, CL-ML	A-4, A-6	0	85-95	85-95	80-85	55-70	20-35	5-15
	3-60	Clay loam	CL	A-6	0	90-100	90-100	80-90	60-70	30-40	10-20
78*:											
Woosley	0-13	Loam	ML	A-4	0	80-90	75-90	70-80	55-70	30-35	5-10
	13-22	Clay loam, silty clay loam.	CL	A-6	0	80-90	75-90	70-90	55-70	35-40	15-20
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Starley	0-14	Very channery loam.	GM-GC, GM	A-2	0-35	35-60	35-50	30-40	25-35	25-35	5-10
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
79	0-8	Sandy loam	SM	A-2	0	75-100	75-100	50-65	25-35	---	NP
Worland	8-36	Sandy loam	SM	A-2	0	75-100	75-100	50-65	25-35	---	NP
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 10.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
80*:											
Worland	0-3	Sandy loam	SM	A-2	0	75-100	75-100	50-65	25-35	---	NP
	3-36	Sandy loam	SM	A-2	0	75-100	75-100	50-65	25-35	---	NP
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Persayo	0-13	Clay loam	CL	A-6	0-10	80-100	75-100	75-95	60-85	25-40	10-20
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---
Apron	0-60	Sandy loam	SM	A-2, A-4	0	75-100	75-100	65-75	30-45	15-25	NP-5
81	0-9	Clay loam	CL, ML	A-6	0-5	80-100	80-100	75-95	60-75	35-40	10-15
Youngston	9-60	Stratified clay loam to sandy loam.	ML, CL, CL-ML	A-4, A-6	0-5	80-100	80-100	70-90	50-70	20-35	5-15
82	0-9	Silty clay loam	CL	A-6	0	100	100	90-100	70-85	30-40	10-20
Youngston	9-60	Stratified very fine sandy loam to silty clay loam.	CL	A-6	0	100	100	80-100	60-80	30-40	10-20
83*:											
Youngston	0-3	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	35-40	15-20
	3-60	Stratified very fine sandy loam to silty clay loam.	CL	A-6	0	100	100	95-100	85-95	35-40	15-20
Glenton	0-3	Sandy loam	SM	A-4	0-5	75-100	75-100	60-80	35-50	---	NP
	3-60	Stratified fine sand to very fine sandy loam.	SM	A-4	0-5	75-100	75-100	60-80	35-50	---	NP
Lostwells	0-4	Sandy clay loam	SC	A-6	0-5	80-100	80-100	70-100	35-50	30-40	10-15
	4-60	Stratified sandy loam to clay loam.	SC	A-6	0-5	80-100	80-100	70-100	35-50	30-40	10-15
84*:											
Youngston	0-4	Silty clay loam	CL	A-6	0	100	100	90-100	70-85	30-40	10-20
	4-60	Stratified very fine sandy loam to silty clay loam.	CL	A-6	0	100	100	80-100	60-80	30-40	10-20
Uffens	0-1	Loam	CL, CL-ML	A-6, A-4	0	100	100	85-95	55-75	25-35	5-15
	1-5	Sandy clay loam, clay loam, silty clay loam.	CL	A-6	0	100	100	85-95	65-85	30-40	10-20
	5-60	Sandy clay loam, loam, clay loam.	CL	A-6	0	100	100	85-95	55-75	30-40	10-15
Lostwells	0-3	Sandy clay loam	SC	A-6	0-5	80-100	80-100	70-100	35-50	30-40	10-15
	3-60	Stratified sandy loam to clay loam.	SC	A-6	0-5	80-100	80-100	70-100	35-50	30-40	10-15

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
1*:											
Absted	0-4	10-20	2.0-6.0	0.15-0.17	6.6-7.8	<2	Low	0.32	4	3	1-2
	4-21	35-45	0.06-0.2	0.16-0.20	>7.8	2-8	Moderate	0.43			
	21-60	35-50	0.06-0.2	0.11-0.13	>7.8	>16	High	0.55			
Forkwood	0-2	12-20	0.6-2.0	0.15-0.17	6.6-8.4	2-4	Low	0.28	5	3	1-2
	2-19	18-30	0.6-2.0	0.19-0.21	6.6-8.4	2-4	Moderate	0.32			
	19-60	20-35	0.6-2.0	0.16-0.18	7.9-9.0	2-4	Low	0.28			
Shingle	0-4	27-35	0.6-2.0	0.19-0.21	7.4-9.0	<2	Moderate	0.32	2	4L	<1
	4-17	20-35	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.49			
	17	---	---	---	---	---	---	---			
2	0-3	5-18	2.0-6.0	0.11-0.13	7.4-9.0	<2	Low	0.20	5	3	.5-1
Apron	3-60	5-18	2.0-6.0	0.11-0.13	7.9-9.0	<2	Low	0.20			
3*, 4*:											
Apron	0-3	5-18	2.0-6.0	0.11-0.13	7.4-9.0	<2	Low	0.20	5	3	.5-1
	3-60	5-18	2.0-6.0	0.11-0.13	7.9-9.0	<2	Low	0.20			
Worland	0-3	10-18	2.0-6.0	0.11-0.13	7.4-9.0	<2	Low	0.20	3	3	<1
	3-36	10-18	2.0-6.0	0.11-0.13	7.4-9.0	<4	Low	0.24			
	36	---	---	---	---	---	---	---			
5*:											
Arvada	0-3	15-27	0.6-2.0	0.16-0.18	6.6-9.0	<4	Low	0.32	5	6	.5-1
	3-17	35-45	<0.06	0.07-0.09	>7.8	<4	High	0.32			
	17-60	28-45	0.06-0.2	0.09-0.11	>7.8	<8	High	0.32			
Olney	0-5	10-20	0.6-6.0	0.11-0.15	6.6-7.8	<2	Low	0.20	5	3	1-2
	5-18	20-35	0.6-2.0	0.13-0.15	6.6-7.8	<2	Moderate	0.24			
	18-60	15-30	0.6-6.0	0.11-0.15	7.9-9.0	<2	Low	0.24			
Rairdent	0-2	10-18	2.0-6.0	0.13-0.15	7.4-8.4	2-4	Low	0.32	5	3	.5-1
	2-17	30-40	0.6-2.0	0.10-0.15	7.4-9.0	2-8	Moderate	0.32			
	17-60	3-7	6.0-20	0.02-0.04	7.4-8.4	2-8	Low	0.17			
6	0-3	10-20	0.6-2.0	0.15-0.17	7.4-9.0	4-8	Low	0.28	5	5	2-3
Barnum	3-60	18-35	0.6-2.0	0.16-0.18	7.4-9.0	4-8	Moderate	0.28			
7	0-7	5-12	6.0-20	0.06-0.08	7.9-9.0	<8	Low	0.28	5	3	<.5
Baroid	7-60	3-5	6.0-20	0.06-0.08	7.9-9.0	<8	Low	0.28			
8*:											
Baroid	0-7	5-12	6.0-20	0.06-0.08	7.9-9.0	<8	Low	0.28	5	3	<.5
	7-60	3-5	6.0-20	0.06-0.08	7.9-9.0	<8	Low	0.28			
Las Animas Variant	0-2	12-18	2.0-6.0	0.13-0.15	8.5-9.0	2-8	Low	0.20	5	3	1-2
	2-60	9-18	2.0-6.0	0.11-0.13	7.9-9.0	2-8	Low	0.20			
9*:											
Billycreek	0-8	0-5	2.0-6.0	0.08-0.10	5.6-6.5	<2	Low	0.17	2	2	<.5
	8-24	3-10	2.0-6.0	0.08-0.10	5.6-6.5	<2	Low	0.17			
	24	---	---	---	---	---	---	---			
Wetterhorn	0-2	10-20	0.6-2.0	0.10-0.15	5.6-7.3	<2	Low	0.24	3	8	.5-1
	2-16	10-20	0.6-2.0	0.10-0.15	5.6-7.3	<2	Low	0.28			
	16-27	35-45	0.06-0.2	0.08-0.12	5.6-7.3	<2	Moderate	0.20			
	27	---	---	---	---	---	---	---			

See footnote at end of table.

TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
10*:											
Burnette	0-2	15-27	0.6-2.0	0.16-0.20	6.1-7.8	<2	Low	0.37	5	6	3-6
	2-36	35-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.28			
	36-60	35-45	0.06-0.2	0.14-0.18	7.4-9.0	<2	High	0.28			
Lucky Star	0-2	10-20	0.6-2.0	0.11-0.13	6.1-6.5	<2	Low	0.20	5	8	---
	2-60	20-30	0.6-2.0	0.10-0.12	5.6-6.5	<2	Low	0.24			
Wallrock	0-10	8-16	2.0-6.0	0.11-0.13	6.1-7.3	<2	Low	0.24	5	3	2-3
	10-22	18-35	0.6-2.0	0.17-0.19	6.1-7.3	<2	Moderate	0.32			
	22-60	20-35	0.6-2.0	0.14-0.16	6.6-7.8	<2	Moderate	0.32			
11*:											
Chittum	0-5	15-25	0.6-2.0	0.12-0.14	6.1-6.5	<2	Low	0.24	1	5	2-3
	5-11	18-25	0.6-2.0	0.12-0.14	6.1-6.5	<2	Low	0.24			
	11-17	18-35	0.6-2.0	0.14-0.16	5.6-6.5	<2	Moderate	0.28			
	17	---	---	---	---	---	---	---			
Rock outcrop.											
Bachus	0-8	15-25	0.6-2.0	0.16-0.18	5.6-6.5	<2	Low	0.32	2	5	2-3
	8-22	18-35	0.6-2.0	0.16-0.18	5.6-6.5	<2	Low	0.32			
	22	---	---	---	---	---	---	---			
12*:											
Clayburn	0-18	15-25	0.6-2.0	0.16-0.18	6.1-7.3	<2	Low	0.20	4	5	2-5
	18-36	20-35	0.6-2.0	0.14-0.16	6.1-7.3	<2	Moderate	0.28			
	36-60	20-35	0.6-2.0	0.10-0.12	6.1-7.3	<2	Moderate	0.20			
Bachus	0-8	15-25	0.6-2.0	0.16-0.18	5.6-6.5	<2	Low	0.32	2	5	2-3
	8-22	18-35	0.6-2.0	0.16-0.18	5.6-6.5	<2	Low	0.32			
	22	---	---	---	---	---	---	---			
Inchau	0-6	15-27	0.6-2.0	0.16-0.18	6.1-7.8	---	Low	0.32	3	5	2-5
	6-39	20-35	0.6-2.0	0.11-0.15	6.1-7.8	---	Moderate	0.28			
	39	---	---	---	---	---	---	---			
13*:											
Clayburn	0-18	15-25	0.6-2.0	0.16-0.18	6.1-7.3	<2	Low	0.20	4	5	2-5
	18-36	20-35	0.6-2.0	0.14-0.16	6.1-7.3	<2	Moderate	0.28			
	36-60	20-35	0.6-2.0	0.10-0.12	6.1-7.3	<2	Moderate	0.20			
Wallrock	0-10	8-16	2.0-6.0	0.11-0.13	6.1-7.3	<2	Low	0.24	5	3	2-3
	10-22	18-35	0.6-2.0	0.17-0.19	6.1-7.3	<2	Moderate	0.32			
	22-60	20-35	0.6-2.0	0.14-0.16	6.6-7.8	<2	Moderate	0.32			
Burnette	0-2	15-27	0.6-2.0	0.16-0.20	6.1-7.8	<2	Low	0.37	5	6	3-6
	2-36	35-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.28			
	36-60	35-45	0.06-0.2	0.14-0.18	7.4-9.0	<2	High	0.28			
14*:											
Clifterson	0-5	18-27	2.0-6.0	0.09-0.13	7.9-9.0	<2	Low	0.28	5	5	.5-1
	5-60	18-35	0.6-6.0	0.04-0.09	7.9-9.0	<2	Low	0.24			
Persayo	0-13	27-35	0.2-0.6	0.15-0.17	7.9-9.0	<8	Moderate	0.37	1	4L	.5-1
	13	---	---	---	---	---	---	---			
Lostwells	0-3	20-30	0.6-2.0	0.11-0.16	7.4-9.0	<4	Moderate	0.32	5	5	<1
	3-60	20-30	0.6-2.0	0.11-0.16	7.9-9.0	<4	Moderate	0.32			
15*:											
Coutis	0-25	12-18	2.0-6.0	0.13-0.15	6.1-7.8	<2	Low	0.20	5	3	2-4
	25-60	12-18	2.0-6.0	0.13-0.15	6.6-7.8	<2	Low	0.20			
Greenman	0-8	5-15	2.0-6.0	0.13-0.15	6.1-7.8	<2	Low	0.20	2	3	2-3
	8-34	10-18	2.0-6.0	0.13-0.15	6.1-7.8	<2	Low	0.20			
	34	---	---	---	---	---	---	---			

See footnote at end of table.

TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
15*:											
Chittum	0-5	15-25	0.6-2.0	0.12-0.14	6.1-6.5	<2	Low	0.24	1	6	2-3
	5-11	18-25	0.6-2.0	0.12-0.14	6.1-6.5	<2	Low	0.24			
	11-17	18-35	0.6-2.0	0.14-0.16	5.6-6.5	<2	Moderate	0.28			
	17	---	---	---	---	---	---	---			
16	0-7	15-30	0.6-2.0	0.16-0.18	7.4-9.0	4-8	Low	0.28	---	4L	1-2
Dobent	7-60	18-27	0.6-2.0	0.16-0.18	7.4-9.0	4-8	Low	0.24			
17	0-9	40-80	<0.06	0.15-0.17	7.4-9.0	2-8	High	0.37	5	4	<1
Finnerty	9-60	60-80	<0.06	0.14-0.16	7.4-9.0	2-8	High	0.37			
18	0-9	40-60	<0.06	0.10-0.12	8.5-9.0	8-16	High	0.43	5	4	<1
Finnerty	9-60	40-80	<0.06	0.15-0.17	7.9-9.0	2-8	High	0.43			
19*.											
Fluvaquents											
20*.											
Fluvents											
21*:											
Forkwood	0-2	12-20	0.6-2.0	0.15-0.17	6.6-8.4	2-4	Low	0.28	5	3	1-2
	2-19	18-30	0.6-2.0	0.19-0.21	6.6-8.4	2-4	Moderate	0.32			
	19-60	20-35	0.6-2.0	0.16-0.18	7.9-9.0	2-4	Low	0.28			
Haverdad	0-6	18-27	0.6-2.0	0.16-0.18	7.4-9.0	2-8	Low	0.28	5	4L	1-2
	6-60	20-35	0.6-2.0	0.16-0.18	7.9-9.0	2-4	Low	0.28			
Arvada	0-3	15-27	0.6-2.0	0.16-0.18	6.6-9.0	<4	Low	0.32	5	6	.5-1
	3-17	35-45	<0.06	0.07-0.09	>7.8	<4	High	0.32			
	17-60	28-45	0.06-0.2	0.09-0.11	>7.8	<8	High	0.32			
22*:											
Forkwood	0-2	12-20	0.6-2.0	0.15-0.17	6.6-8.4	2-4	Low	0.28	5	3	1-2
	2-19	18-30	0.6-2.0	0.19-0.21	6.6-8.4	2-4	Moderate	0.32			
	19-60	20-35	0.6-2.0	0.16-0.18	7.9-9.0	2-4	Low	0.28			
Kishona	0-4	18-27	0.6-2.0	0.16-0.18	7.4-8.4	2-4	Low	0.28	5	4L	.5-1
	4-60	20-35	0.6-2.0	0.10-0.17	7.9->9.0	2-8	Moderate	0.32			
Haverdad	0-6	18-27	0.6-2.0	0.16-0.18	7.4-9.0	2-8	Low	0.28	5	4L	1-2
	6-60	20-35	0.6-2.0	0.16-0.18	7.9-9.0	2-4	Low	0.28			
23*:											
Fruita	0-4	15-20	2.0-6.0	0.12-0.15	7.4-7.8	<2	Low	0.20	5	3	.5-1
	4-24	20-30	0.6-2.0	0.15-0.17	7.4-8.4	<2	Low	0.24			
	24-60	18-27	0.6-2.0	0.13-0.17	7.9-9.0	<2	Low	0.24			
Neiber	0-8	8-18	2.0-6.0	0.13-0.15	6.6-7.8	2-4	Low	0.20	3	3	.5-1
	8-21	20-35	0.6-2.0	0.14-0.16	7.9-8.4	2-4	Moderate	0.24			
	21	---	---	---	---	---	---	---			
Muff	0-5	5-15	0.6-2.0	0.13-0.15	7.4-8.4	2-4	Low	0.20	3	3	<1
	5-30	20-30	0.06-0.2	0.14-0.16	>8.4	4-8	Moderate	0.24			
	30	---	---	---	---	---	---	---			
24	0-8	27-35	0.6-2.0	0.19-0.21	7.4-8.4	2-4	Moderate	0.32	4	6	<1
Garland	8-22	20-30	0.6-2.0	0.14-0.16	7.4-9.0	2-4	Moderate	0.28			
	22-60	3-5	>6.0	0.03-0.05	7.9-8.4	<2	Low	0.10			
25	0-7	5-18	2.0-6.0	0.13-0.15	7.9-9.0	2-4	Low	---	---	3	.4-1
Glenton	7-60	---	2.0-6.0	0.13-0.15	7.9-9.0	2-4	Low	---			
26*:											
Glenton	0-7	5-18	2.0-6.0	0.09-0.11	>8.4	8-16	Low	0.20	5	3	.4-1
	7-60	5-18	2.0-6.0	0.09-0.11	>8.4	4-8	Low	0.20			

See footnote at end of table.

TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
26*:											
Baroid	0-7	5-15	2.0-6.0	0.15-0.17	8.5-9.0	8-16	Low	0.10	5	3	<1
	7-60	5-15	6.0-20	0.08-0.11	7.9-9.0	8-16	Low	0.10			
27*:											
Granile	0-20	10-20	2.0-6.0	0.06-0.09	5.6-7.3	<2	Low	0.10	5	8	.5-1
	20-40	20-35	0.6-2.0	0.08-0.11	6.1-7.3	<2	Low	0.10			
	40-60	10-20	6.0-20	0.05-0.08	6.1-7.3	<2	Low	0.10			
Tine	0-12	5-10	6.0-20	0.07-0.09	6.6-7.3	<2	Low	0.10	3	8	.5-1
	12-60	0-5	>20	0.05-0.07	6.6-7.8	<2	Low	0.10			
28*:											
Greenman	0-8	5-15	2.0-6.0	0.13-0.15	6.1-7.8	<2	Low	0.20	2	3	2-3
	8-34	10-18	2.0-6.0	0.13-0.15	6.1-7.8	<2	Low	0.20			
	34	---	---	---	---	---	---	---			
Splitro	0-18	10-20	2.0-6.0	0.11-0.15	6.1-7.8	<2	Low	0.20	1	3	2-4
	18	---	---	---	---	---	---	---			
Coutis	0-25	12-18	2.0-6.0	0.13-0.15	6.1-7.8	<2	Low	0.20	5	3	2-4
	25-60	12-18	2.0-6.0	0.13-0.15	6.6-7.8	<2	Low	0.20			
29*:											
Greybull	0-7	27-35	0.2-0.6	0.19-0.21	7.9-9.0	2-4	Moderate	0.37	3	4L	.5-1
	7-23	25-35	0.2-0.6	0.19-0.21	7.9-9.0	2-4	Moderate	0.43			
	23	---	---	---	---	---	---	---			
Persayo	0-13	27-35	0.2-0.6	0.15-0.17	7.9-9.0	<8	Moderate	0.37	1	4L	.5-1
	13	---	---	---	---	---	---	---			
30*:											
Greybull	0-4	27-35	0.2-0.6	0.19-0.21	7.9-9.0	2-4	Moderate	0.37	3	4L	.5-1
	4-23	25-35	0.2-0.6	0.19-0.21	7.9-9.0	2-4	Moderate	0.43			
	23	---	---	---	---	---	---	---			
Persayo	0-13	27-35	0.2-0.6	0.15-0.17	7.9-9.0	<8	Moderate	0.37	1	4L	.5-1
	13	---	---	---	---	---	---	---			
31	0-3	5-18	2.0-6.0	0.11-0.13	7.4-7.8	<4	Low	0.24	5	3	.5-1
Griffy	3-14	25-35	0.6-2.0	0.14-0.16	7.4-8.4	<4	Moderate	0.28			
	14-60	8-20	2.0-6.0	0.10-0.12	7.9-9.0	<4	Low	0.20			
32	0-8	20-35	0.6-2.0	0.16-0.18	7.4-7.8	<4	Low	0.32	5	6	.5-1
Griffy	8-14	25-35	0.6-2.0	0.14-0.16	7.4-8.4	<4	Moderate	0.28			
	14-60	8-20	2.0-6.0	0.10-0.12	7.9-9.0	<4	Low	0.20			
33*:											
Hoot	0-5	10-20	2.0-6.0	0.10-0.12	7.4-7.8	<2	Low	0.24	1	3	---
	5-16	18-30	0.2-0.6	0.05-0.09	7.4-8.4	<2	Low	0.17			
	16	---	---	---	---	---	---	---			
Rock outcrop.											
Persayo	0-13	27-35	0.2-0.6	0.15-0.17	7.9-9.0	<8	Moderate	0.37	1	4L	.5-1
	13	---	---	---	---	---	---	---			
34*:											
Kishona	0-4	18-27	0.6-2.0	0.16-0.18	7.4-8.4	2-4	Low	0.28	5	4L	.5-1
	4-60	20-35	0.6-2.0	0.10-0.17	7.9-9.0	2-8	Moderate	0.32			
Shingle	0-4	27-35	0.6-2.0	0.19-0.21	7.4-9.0	<2	Moderate	0.32	2	4L	<1
	4-17	20-35	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.49			
	17	---	---	---	---	---	---	---			
Rock outcrop.											
35*:											
Kishona	0-3	27-35	0.2-0.6	0.16-0.18	>9.0	4-8	Moderate	0.37	5	4L	.5-1
	3-60	20-35	0.2-0.6	0.05-0.12	>9.0	4-16	Moderate	0.37			

See footnote at end of table.

TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
35*:											
Shingle	0-4	27-35	0.6-2.0	0.19-0.21	7.4-9.0	<2	Moderate	0.32	2	4L	<1
	4-17	20-35	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.49			
	17	---	---	---	---	---	---	---			
36*:											
Kyle	0-2	50-70	<0.06	0.08-0.12	6.6-7.8	<2	Very high	0.37	5	4	1-3
	2-60	60-70	<0.06	0.08-0.12	7.4-8.4	<4	Very high	0.37			
Shingle	0-4	27-35	0.6-2.0	0.19-0.21	7.4-9.0	<2	Moderate	0.32	2	4L	<1
	4-17	20-35	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.49			
	17	---	---	---	---	---	---	---			
Bidman	0-11	10-20	0.6-2.0	0.16-0.18	6.1-7.8	<2	Low	0.28	5	3	1-2
	11-27	35-50	0.06-0.2	0.14-0.16	6.6-7.8	<2	High	0.32			
	27-60	20-30	0.6-2.0	0.14-0.16	7.9-9.0	<2	Moderate	0.32			
37*:											
Lakehelen	0-19	8-15	2.0-6.0	0.04-0.05	5.6-6.5	<2	Low	0.17	2	8	<.5
	19-37	20-25	0.6-2.0	0.04-0.05	5.6-6.5	<2	Low	0.17			
	37	---	---	---	---	---	---	---			
Irigul	0-14	18-27	0.6-2.0	0.05-0.07	6.6-7.8	<2	Low	0.28	1	8	1-3
	14	---	---	---	---	---	---	---			
Rock outcrop.											
38*:											
Larim	0-3	10-20	2.0-6.0	0.06-0.08	6.1-7.8	<2	Low	0.20	5	3	1-1
	3-15	22-35	0.6-2.0	0.05-0.08	6.6-9.0	<2	Moderate	0.24			
	15-60	0-10	6.0-20	0.03-0.04	7.9-9.0	<2	Low	0.15			
Olney	0-5	10-20	0.6-6.0	0.11-0.15	6.6-7.8	<2	Low	0.20	5	3	1-2
	5-18	20-35	0.6-2.0	0.13-0.15	6.6-7.8	<2	Moderate	0.24			
	18-60	15-30	0.6-6.0	0.11-0.15	7.9-9.0	<2	Low	0.24			
Shingle	0-4	27-35	0.6-2.0	0.19-0.21	7.4-9.0	<2	Moderate	0.32	2	4L	<1
	4-17	20-35	0.6-2.0	0.16-0.21	7.4-9.0	<2	Moderate	0.49			
	17	---	---	---	---	---	---	---			
39*:											
Limber	0-5	15-25	0.6-2.0	0.12-0.15	6.1-7.3	<2	Low	0.24	2	8	.5-1
	5-39	18-35	0.6-2.0	0.12-0.15	6.6-8.4	<2	Low	0.20			
	39	---	---	---	---	---	---	---			
Hyattville	0-7	15-25	0.6-2.0	0.13-0.16	6.1-6.5	<2	Low	0.24	2	8	<.5
	7-29	20-35	0.6-2.0	0.06-0.12	6.1-7.8	<2	Moderate	0.24			
	29-36	27-35	0.6-2.0	0.06-0.12	7.9-9.0	<2	Moderate	0.24			
	36	---	---	---	---	---	---	---			
Rock outcrop.											
40, 41 Lostwells	0-8	27-35	0.2-0.6	0.19-0.21	7.9-9.0	<4	Moderate	0.32	5	4L	<1
	8-60	20-30	0.6-2.0	0.11-0.16	7.9-9.0	<4	Moderate	0.32			
42*:											
Lostwells	0-3	20-30	0.6-2.0	0.11-0.16	7.4-9.0	<4	Moderate	0.32	5	5	<1
	3-60	20-30	0.6-2.0	0.11-0.16	7.9-9.0	<4	Moderate	0.32			
Youngston	0-3	27-35	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.37	5	4L	<1
	3-60	18-30	0.2-0.6	0.19-0.21	7.9-9.0	2-8	Moderate	0.37			
Uffens	0-1	15-25	0.6-2.0	0.13-0.16	>7.3	4-8	Low	0.28	1	6	.5-1
	1-22	25-35	0.2-0.6	0.05-0.10	>8.4	>16	Moderate	0.32			
	22-60	20-30	0.2-0.6	0.05-0.10	>8.4	>16	Moderate	0.28			

See footnote at end of table.

TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
43*:											
Lostwells	0-8	27-35	0.6-2.0	0.19-0.21	>9.0	8-16	Moderate	0.32	5	4L	.1
	8-60	20-30	0.6-2.0	0.14-0.16	8.5-9.0	2-8	Moderate	0.24			
Youngston	0-8	27-35	0.2-0.6	0.19-0.21	>8.4	8-16	Moderate	0.37	5	4L	<1
	8-60	18-35	0.2-0.6	0.19-0.21	>8.4	<8	Moderate	0.37			
Lostwells	0-3	20-30	0.6-2.0	0.11-0.16	7.4-9.0	<4	Moderate	0.32	5	5	<1
	3-60	20-30	0.6-2.0	0.11-0.16	7.9-9.0	<4	Moderate	0.32			
44*:											
Lymanson	0-21	20-27	0.6-2.0	0.10-0.15	6.6-8.4	<2	Low	0.20	3	8	2-4
	2-21	27-35	0.6-2.0	0.12-0.18	6.6-9.0	<2	Low	0.32			
	21	---	---	---	---	---	---	---			
Turk	0-3	30-40	0.2-0.6	0.19-0.21	6.6-7.8	<2	Moderate	0.37	3	7	2-3
	3-34	60-10	0.06-0.2	0.14-0.16	6.6-9.0	<2	High	0.24			
	34	---	---	---	---	---	---	---			
Jenkinson	0-7	18-35	0.6-2.0	0.10-0.13	7.9-9.0	<2	Moderate	0.24	1	8	2-3
	7-14	18-35	0.6-2.0	0.10-0.13	7.9-9.0	<2	Moderate	0.28			
	14	---	---	---	---	---	---	---			
45*:											
Meadowlake	0-16	3-10	2.0-6.0	0.06-0.08	5.6-6.5	<2	Low	0.10	2	8	<.5
	16-22	3-8	2.0-6.0	0.03-0.05	6.1-6.5	<2	Low	0.10			
	22	---	---	---	---	---	---	---			
Castino Variant	0-4	15-25	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low	0.20	2	8	2-3
	4-22	35-40	0.6-2.0	0.19-0.21	6.6-7.3	<2	Moderate	0.28			
	22-30	25-45	0.6-2.0	0.14-0.16	6.6-7.3	<2	Moderate	0.20			
	30	---	---	---	---	---	---	---			
Rock outcrop.											
46*:											
Muff	0-5	5-15	0.6-2.0	0.13-0.15	7.4-8.4	2-4	Low	0.20	3	3	<1
	5-30	20-30	0.06-0.2	0.14-0.16	>8.4	4-8	Moderate	0.24			
	30	---	---	---	---	---	---	---			
Neiber	0-8	8-18	2.0-6.0	0.13-0.15	6.6-7.8	2-4	Low	0.20	3	3	.5-1
	8-21	20-35	0.6-2.0	0.14-0.16	7.9-8.4	2-4	Moderate	0.24			
	21	---	---	---	---	---	---	---			
47*:											
Mughut	0-3	8-20	2.0-6.0	0.12-0.14	6.1-7.8	<2	Low	0.20	3	3	2-3
	3-24	35-50	0.6-2.0	0.15-0.19	7.4-8.4	<2	High	0.24			
	24	---	---	---	---	---	---	---			
Bondman	0-3	10-20	2.0-6.0	0.13-0.13	6.6-7.3	<2	Low	0.20	1	3	---
	3-12	20-30	0.6-2.0	0.14-0.16	6.6-7.8	<2	Moderate	0.24			
	12-18	10-20	2.0-6.0	0.11-0.13	7.4-7.8	<2	Low	0.20			
	18	---	---	---	---	---	---	---			
Bidman	0-11	10-20	0.6-2.0	0.16-0.18	6.1-7.8	<2	Low	0.28	5	3	1-2
	11-27	35-50	0.06-0.2	0.14-0.16	6.6-7.8	<2	High	0.32			
	27-60	25-35	0.2-0.6	0.19-0.21	7.9-9.0	<2	High	0.43			
48*:											
Mulgon	0-3	15-25	0.6-2.0	0.05-0.12	5.6-6.5	<2	Low	0.28	5	8	<.5
	3-15	8-15	2.0-6.0	0.04-0.10	5.6-6.5	<2	Low	0.20			
	15-31	20-35	0.6-2.0	0.05-0.11	5.6-6.5	<2	Low	0.24			
	31-60	3-15	2.0-6.0	0.04-0.08	5.6-6.5	<2	Low	0.20			
Lucky Star	0-16	10-20	0.6-2.0	0.11-0.13	6.1-6.5	<2	Low	0.20	5	8	---
	16-60	20-30	0.6-2.0	0.10-0.12	5.6-6.5	<2	Low	0.24			

See footnote at end of table.

TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
49*:											
Nathrop	0-8	15-25	0.6-2.0	0.05-0.07	6.6-7.8	<2	Low	0.24	5	8	2-3
	8-22	27-35	0.6-2.0	0.06-0.08	6.6-7.8	<2	Moderate	0.28			
	22-36	15-25	0.6-2.0	0.05-0.07	7.9-8.4	<2	Low	0.28			
	36	---	---	---	---	---	---	---			
Starley	0-6	18-27	0.6-2.0	0.05-0.12	6.6-8.4	<2	Low	0.20	1	8	1-3
	6-14	18-35	0.6-2.0	0.05-0.12	7.9-9.0	<2	Low	0.20			
	14	---	---	---	---	---	---	---			
Rock outcrop.											
50, 51, 52 Neville	0-8	15-25	0.6-2.0	0.15-0.18	7.4-8.4	<2	Low	0.24	5	4L	.5-1
	8-60	18-35	0.6-2.0	0.15-0.18	7.9-8.4	<2	Low	0.24			
53 Neville	0-8	18-25	0.6-2.0	0.16-0.18	7.4-8.4	>8	Low	0.37	5	4L	1-1
	8-60	18-30	0.6-2.0	0.16-0.18	7.4-8.4	2-4	Low	0.37			
54*:											
Neville	0-7	15-25	0.6-2.0	0.15-0.18	7.4-8.4	<2	Low	0.24	5	4L	.5-1
	7-60	18-35	0.6-2.0	0.15-0.18	7.9-8.4	<2	Low	0.24			
Tensleep	0-5	10-18	0.6-2.0	0.15-0.17	6.6-8.4	<2	Low	0.43	5	3	1-2
	5-20	18-20	0.6-2.0	0.19-0.21	6.6-7.8	<2	Moderate	0.49			
	20-60	8-20	0.6-2.0	0.15-0.17	7.9-9.0	<2	Low	0.55			
55*:											
Neville	0-7	15-25	0.6-2.0	0.15-0.18	7.4-8.4	<2	Low	0.24	5	4L	.5-1
	7-60	18-35	0.6-2.0	0.15-0.18	7.9-8.4	<2	Low	0.24			
Spearfish	0-4	10-18	0.6-2.0	0.16-0.22	6.6-8.4	<2	Low	0.32	2	5	1-3
	4-13	15-32	0.6-2.0	0.15-0.20	7.4-8.4	<2	Low	0.32			
	13	---	---	---	---	---	---	---			
Rock outcrop.											
56*:											
Persayo	0-13	27-35	0.2-0.6	0.15-0.17	7.9-9.0	<8	Moderate	0.37	1	4L	.5-1
	13	---	---	---	---	---	---	---			
Muff	0-5	5-15	0.6-2.0	0.13-0.15	7.4-8.4	2-4	Low	0.20	3	3	<1
	5-30	20-30	0.06-0.2	0.14-0.16	>8.4	4-8	Moderate	0.24			
	30	---	---	---	---	---	---	---			
Rock outcrop.											
57*:											
Persayo	0-13	27-35	0.2-0.6	0.15-0.17	7.9-9.0	<8	Moderate	0.37	1	4L	.5-1
	13	---	---	---	---	---	---	---			
Rock outcrop.											
58*:											
Rekop	0-14	15-25	0.6-2.0	0.16-0.18	7.4-9.0	2-4	Low	0.37	1	4L	<.5
	14	---	---	---	---	---	---	---			
Gystrum	0-4	15-27	0.6-2.0	0.19-0.21	7.4-8.4	2-4	Low	0.43	2	4L	1-1
	4-36	20-35	0.6-2.0	0.19-0.21	7.4-9.0	>2	Moderate	0.49			
	36	---	---	---	---	---	---	---			
Spearfish	0-4	10-18	0.6-2.0	0.16-0.22	6.6-8.4	<2	Low	0.32	2	5	1-3
	4-14	15-32	0.6-2.0	0.15-0.20	7.4-8.4	<2	Low	0.32			
	14	---	---	---	---	---	---	---			

See footnote at end of table.

TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
59*:											
Renohill	0-2	18-35	0.2-0.6	0.17-0.21	6.6-8.4	<2	Moderate	0.37	3	7	.5-1
	2-14	35-50	0.06-0.2	0.14-0.16	6.6-8.4	<2	High	0.32			
	14-21	30-45	0.2-0.6	0.19-0.21	7.9-9.0	<4	Moderate	0.37			
	21	---	---	---	---	---	---	---			
Heldt	0-5	30-45	0.06-0.6	0.12-0.17	7.9-9.0	<8	High	0.28	5	7	.5-2
	5-60	35-50	0.06-0.2	0.12-0.17	7.9-9.0	<8	High	0.28			
Worf	0-4	15-25	0.6-2.0	0.16	6.6-7.8	<2	Low	0.28	2	6	1-2
	4-10	27-35	0.6-2.0	0.19-0.21	6.6-7.8	<2	Moderate	0.37			
	10-16	15-25	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low	0.32			
	16	---	---	---	---	---	---	---			
60*. Riverwash											
61*: Rock outcrop.											
Persayo	0-13	27-35	0.2-0.6	0.15-0.17	7.9-9.0	<8	Moderate	0.37	1	4L	.5-1
	13	---	---	---	---	---	---	---			
62*: Rock outcrop.											
Spearfish	0-4	10-18	0.6-2.0	0.16-0.22	6.6-8.4	<2	Low	0.32	2	5	1-3
	4-13	15-32	0.6-2.0	0.15-0.20	7.4-8.4	<2	Low	0.32			
	13	---	---	---	---	---	---	---			
Neville	0-7	15-25	0.6-2.0	0.15-0.18	7.4-8.4	<2	Low	0.24	5	4L	.5-1
	7-60	18-35	0.6-2.0	0.15-0.18	7.9-8.4	<2	Low	0.24			
63*: Rock outcrop.											
Starman	0-3	15-23	0.6-2.0	0.09-0.11	7.4-9.0	<2	Low	0.24	1	4L	1-2
	3-10	20-27	0.6-2.0	0.09-0.11	7.4-9.0	<2	Low	0.28			
	10	---	---	---	---	---	---	---			
64*:											
Spearfish	0-4	10-18	0.6-2.0	0.16-0.22	6.6-8.4	<2	Low	0.32	2	5	1-3
	4-13	15-32	0.6-2.0	0.15-0.20	7.4-8.4	<2	Low	0.32			
	13	---	---	---	---	---	---	---			
Travessilla	0-1	10-18	0.6-2.0	0.16-0.18	6.6-8.4	<2	Low	0.37	1	5	---
	1-10	10-18	0.6-2.0	0.13-0.15	6.6-8.4	<2	Low	0.32			
	10	---	---	---	---	---	---	---			
Rock outcrop.											
65*:											
Stubbs	0-34	15-25	0.6-2.0	0.16-0.18	6.6-8.4	<2	Low	0.28	3	6	2-3
	34	---	---	---	---	---	---	---			
Turk	0-3	30-40	0.2-0.6	0.19-0.21	6.6-7.8	<2	Moderate	0.37	3	7	2-3
	3-34	60-10	0.06-0.2	0.14-0.16	6.6-9.0	<2	High	0.24			
	34	---	---	---	---	---	---	---			
Lymanson	0-2	20-27	0.6-2.0	0.10-0.15	6.6-8.4	<2	Low	0.20	3	8	2-4
	2-21	27-35	0.6-2.0	0.12-0.18	6.6-9.0	<2	Low	0.32			
	21	---	---	---	---	---	---	---			
66 Stutzman	0-8	35-50	0.06-0.2	0.19-0.21	7.4-9.0	<2	High	0.37	5	4	<1
	8-60	35-50	0.06-0.2	0.19-0.21	7.4-9.0	<2	High	0.37			
67 Stutzman	0-8	27-40	0.06-0.2	0.19-0.21	>8.4	8-16	High	0.37	5	4	<1
	8-60	27-45	0.06-0.2	0.19-0.21	7.9-9.0	<4	High	0.37			

See footnote at end of table.

TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
68*:											
Stutzman	0-6	35-50	0.06-0.2	0.19-0.21	7.4-9.0	<2	High	0.37	5	4	<1
	6-60	35-50	0.06-0.2	0.19-0.21	7.4-9.0	<2	High	0.37			
Persayo	0-13	27-35	0.2-0.6	0.15-0.17	7.9-9.0	<8	Moderate	0.37	1	4L	.5-1
	13	---	---	---	---	---	---	---			
Youngston	0-4	27-35	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.37	5	4L	<1
	4-60	18-30	0.2-0.6	0.19-0.21	7.9-9.0	2-8	Moderate	0.37			
69	0-7	10-18	0.6-2.0	0.15-0.17	6.6-8.4	<2	Low	0.43	5	5	1-2
Tensleep	7-11	18-35	0.6-2.0	0.19-0.21	6.6-7.8	<2	Moderate	0.49			
	11-60	8-20	0.6-2.0	0.15-0.17	7.9-9.0	<2	Low	0.55			
70*:											
Uffens	0-1	15-25	0.6-2.0	0.13-0.16	>7.3	4-8	Low	0.28	1	6	.5-1
	1-5	25-35	0.2-0.6	0.05-0.10	>8.4	>16	Moderate	0.32			
	5-60	20-30	0.2-0.6	0.05-0.10	>8.4	>16	Moderate	0.28			
Persayo	0-13	27-35	0.2-0.6	0.15-0.17	7.9-9.0	<8	Moderate	0.37	1	4L	.5-1
	13	---	---	---	---	---	---	---			
Greybull	0-4	27-35	0.2-0.6	0.19-0.21	7.9-9.0	2-4	Moderate	0.37	3	4L	.5-1
	4-23	25-35	0.2-0.6	0.19-0.21	7.9-9.0	2-4	Moderate	0.43			
	23	---	---	---	---	---	---	---			
71*:											
Uffens	0-1	15-25	0.6-2.0	0.13-0.16	>7.3	4-8	Low	0.28	1	6	.5-1
	1-5	25-35	0.2-0.6	0.05-0.10	>8.4	>16	Moderate	0.32			
	5-60	20-30	0.2-0.6	0.05-0.10	>8.4	>16	Moderate	0.28			
Rairdent	0-2	10-18	2.0-6.0	0.13-0.15	7.4-8.4	2-4	Low	0.32	5	3	.5-1
	2-17	30-40	0.6-2.0	0.10-0.15	7.4-9.0	2-8	Moderate	0.32			
	17-60	3-7	6.0-20	0.02-0.04	7.4-8.4	2-8	Low	0.17			
Griffy	0-3	5-18	2.0-6.0	0.11-0.13	7.4-7.8	<4	Low	0.32	5	3	.5-1
	3-14	25-35	0.6-2.0	0.14-0.16	7.4-8.4	<4	Moderate	0.28			
	14-60	8-20	2.0-6.0	0.10-0.12	7.9-9.0	<4	Low	0.20			
72*:											
Vale	0-5	15-20	0.6-2.0	0.17-0.19	6.1-7.8	<2	Low	0.32	5	3	2-4
	5-16	25-35	0.6-2.0	0.17-0.22	6.6-8.4	<2	Moderate	0.43			
	16-60	15-30	0.6-2.0	0.13-0.20	7.4-9.0	<2	Low	0.43			
Tensleep	0-5	10-18	0.6-2.0	0.15-0.17	6.6-8.4	<2	Low	0.43	5	3	1-2
	5-11	18-35	0.6-2.0	0.19-0.21	6.6-7.8	<2	Moderate	0.49			
	11-60	8-20	0.6-2.0	0.15-0.17	7.9-9.0	<2	Low	0.55			
Spearfish	0-4	10-18	0.6-2.0	0.16-0.22	6.6-8.4	<2	Low	0.32	2	5	1-3
	4-13	15-32	0.6-2.0	0.15-0.20	7.4-8.4	<2	Low	0.32			
	13	---	---	---	---	---	---	---			
73	0-4	0-10	>6.0	0.06-0.11	6.6-7.3	<2	Low	0.17	5	2	---
Wallson	4-60	10-18	2.0-6.0	0.11-0.14	6.6-9.0	2-4	Low	0.28			
74	0-8	10-18	2.0-6.0	0.11-0.14	6.6-7.3	<2	Low	0.28	5	3	---
Wallson	8-60	10-18	2.0-6.0	0.11-0.14	6.6-9.0	2-4	Low	0.28			
75*:											
Whaley	0-5	0-10	2.0-20	0.08-0.10	5.6-6.0	<2	Low	0.17	1	2	---
	5-10	0-10	2.0-20	0.08-0.10	6.1-6.5	<2	Low	0.17			
	10	---	---	---	---	---	---	---			
Rock outcrop.											
Splitro	0-18	10-20	2.0-6.0	0.11-0.15	6.1-7.8	<2	Low	0.20	1	3	2-4
	18	---	---	---	---	---	---	---			

See footnote at end of table.

TABLE 11.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	Mmhos/cm					Pct
76*:											
Woosley	0-13	18-25	0.6-2.0	0.16-0.18	6.1-7.3	<2	Low	0.28	2	6	2-3
	13-22	28-35	0.6-2.0	0.19-0.21	6.6-7.8	<2	Moderate	0.43			
	22	---	---	---	---	---	---	---			
Decross	0-5	15-25	0.6-2.0	0.16-0.18	6.6-7.8	<2	Moderate	0.28	5	6	2-3
	5-60	18-35	0.6-2.0	0.19-0.21	6.6-7.8	<2	Moderate	0.37			
Nathrop	0-3	20-25	0.6-2.0	0.15-0.17	6.6-7.8	<2	Low	0.17	3	8	---
	3-22	27-35	0.6-2.0	0.10-0.13	7.4-8.4	<2	Low	0.17			
	22-36	20-25	0.6-2.0	0.10-0.13	7.9-8.4	<2	Low	0.17			
77*:											
Woosley	0-13	18-25	0.6-2.0	0.16-0.18	6.1-7.3	<2	Low	0.28	2	5	2-3
	13-22	28-35	0.6-2.0	0.19-0.21	6.6-7.8	<2	Moderate	0.43			
	22	---	---	---	---	---	---	---			
Morset	0-3	20-25	0.6-2.0	0.15-0.19	6.6-7.8	<2	Low	0.24	5	5	---
	3-60	27-35	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.28			
78*:											
Woosley	0-13	18-25	0.6-2.0	0.16-0.18	6.1-7.3	<2	Low	0.28	2	6	2-3
	13-22	28-35	0.6-2.0	0.19-0.21	6.6-7.8	<2	Moderate	0.43			
	22	---	---	---	---	---	---	---			
Starley	0-14	18-27	0.6-2.0	0.05-0.12	6.6-8.4	<2	Low	0.20	1	8	1-3
	14	---	---	---	---	---	---	---			
Rock outcrop.											
79	0-8	10-18	2.0-6.0	0.11-0.13	7.4-9.0	<2	Low	0.20	3	3	<1
Worland	8-36	10-18	2.0-6.0	0.11-0.13	7.4-9.0	<4	Low	0.24			
	36	---	---	---	---	---	---	---			
80*:											
Worland	0-3	10-18	2.0-6.0	0.11-0.13	7.4-9.0	<2	Low	0.20	3	3	<1
	3-36	10-18	2.0-6.0	0.11-0.13	7.4-9.0	<4	Low	0.24			
	36	---	---	---	---	---	---	---			
Persayo	0-13	27-35	0.2-0.6	0.15-0.17	7.9-9.0	<8	Moderate	0.37	1	4L	.5-1
	13	---	---	---	---	---	---	---			
Apron	0-60	5-18	2.0-6.0	0.11-0.13	7.4-9.0	<2	Low	0.20	5	3	.5-1
81	0-9	27-35	0.6-2.0	0.19-0.21	7.9-8.4	2-4	Moderate	---	---	4L	<1
Youngston	9-60	18-35	0.6-2.0	0.16-0.18	7.9-9.0	2-4	Moderate	---			
82	0-9	27-35	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.37	5	4L	<1
Youngston	9-60	18-30	0.2-0.6	0.19-0.21	7.9-9.0	2-8	Moderate	0.37			
83*:											
Youngston	0-3	27-35	0.2-0.6	0.19-0.21	7.9-90	4-16	Moderate	0.37	5	4L	<1
	3-60	20-30	0.2-0.6	0.19-0.21	7.9-90	4-16	Moderate	0.37			
Glenton	0-3	5-18	2.0-6.0	0.13-0.15	7.9-9.0	2-4	Low	---	---	3	.4-1
	3-60	---	2.0-6.0	0.13-0.15	7.9-9.0	2-4	Low	---			
Lostwells	0-4	20-30	0.6-2.0	0.11-0.16	7.4-9.0	<4	Moderate	0.32	5	5	<1
	4-60	20-30	0.6-2.0	0.11-0.16	7.9-9.0	<4	Moderate	0.32			
84*:											
Youngston	0-4	27-35	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.37	5	4L	<1
	4-60	18-30	0.2-0.6	0.19-0.21	7.9-9.0	2-8	Moderate	0.37			
Uffens	0-1	15-25	0.6-2.0	0.13-0.16	>7.3	4-8	Low	0.28	1	6	.5-1
	1-5	25-35	0.2-0.6	0.05-0.10	>8.4	>16	Moderate	0.32			
	5-60	20-30	0.2-0.6	0.05-0.10	>7.9	>16	Moderate	0.28			
Lostwells	0-3	20-30	0.6-2.0	0.11-0.16	7.4-9.0	<4	Moderate	0.32	5	5	<1
	3-60	20-30	0.6-2.0	0.11-0.16	7.9-9.0	<4	Moderate	0.32			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "brief" and "apparent" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
1*:												
Absted	D	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Forkwood	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Shingle	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.
2 Apron	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
3*, 4*:												
Apron	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Worland	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Moderate.
5*:												
Arvada	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Olney	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Rairdent	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
6 Barnum	B	Occasional	Brief	May-Jul	>6.0	---	---	>60	---	Low	High	High.
7 Baroid	A	Occasional	Brief	May-Jul	4.0-6.0	Apparent	Jun-Nov	>60	---	Low	High	Moderate.
8*:												
Baroid	A	Occasional	Brief	May-Jul	4.0-6.0	Apparent	Jun-Nov	>60	---	Low	High	Moderate.
Las Animas Variant	D	Occasional	Brief	May-Aug	1.5-3.5	Apparent	Jan-Dec	>60	---	Moderate	High	High.
9*:												
Billycreek	C	None	---	---	>6.0	---	---	20-40	Hard	Low	High	Low.
Wetterhorn	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
10*:												
Burnette	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Lucky Star	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
Wallrock	C	None	---	---	2.0-4.0	Apparent	Jun-Aug	>60	---	High	High	Moderate.

See footnote at end of table.

TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
11*:												
Chittum	D	None	---	---	>6.0	---	---	8-20	Hard	Moderate	High	Low.
Rock outcrop.												
Bachus	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Low.
12*:												
Clayburn	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Bachus	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Low.
Inchau	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
13*:												
Clayburn	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Wallrock	C	None	---	---	2.0-4.0	Apparent	Jun-Aug	>60	---	High	High	Moderate.
Burnette	C	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
14*:												
Clifterson	B	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Persayo	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.
Lostwells	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
15*:												
Coutis	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Greenman	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Low.
Chittum	D	None	---	---	>6.0	---	---	8-20	Hard	Moderate	High	Low.
16--Dobent	C	Occasional	Brief	Feb-Aug	1.5-3.5	Apparent	Jun-Nov	>60	---	Moderate	High	High.
17--Finnerty	D	None	---	---	>6.0	---	---	>60	---	Low	High	High.
18--Finnerty	D	None	---	---	1.5-3.5	Apparent	Jun-Nov	>60	---	Low	High	High.
19*. Fluvaquents												
20*. Fluvents												

See footnote at end of table.

TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
21*:												
Forkwood	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Haverdad	B	Rare	---	---	>6.0	---	---	>60	---	Low	High	High.
Arvada	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
22*:												
Forkwood	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Kishona	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Haverdad	B	Rare	---	---	>6.0	---	---	>60	---	Low	High	High.
23*:												
Fruita	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Neiber	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
Muff	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
24--Garland	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
25--Glenton	B	Occasional	Brief	Feb-Jun	4.0-6.0	Apparent	May-Nov	>60	---	Low	High	High.
26*:												
Glenton	C	Occasional	Brief	Feb-Jun	1.5-3.5	Apparent	Jun-Nov	>60	---	Moderate	High	High.
Baroid	D	Occasional	Brief	Feb-Jun	1.5-3.5	Apparent	Jun-Nov	>60	---	Moderate	High	High.
27*:												
Granile	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Tine	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
28*:												
Greenman	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Low.
Splitro	D	None	---	---	>6.0	---	---	10-20	Hard	Low	High	Low.
Coutis	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
29*, 30*:												
Greybull	C	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
Persayo	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.

See footnote at end of table.

TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
31, 32--Griffy	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
33*:												
Hoot	D	None	---	---	>6.0	---	---	10-20	Hard	Low	High	High.
Rock outcrop.												
Persayo	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.
34*:												
Kishona	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Shingle	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.
Rock outcrop.												
35*:												
Kishona	C	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Shingle	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.
36*:												
Kyle	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Shingle	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.
Bidman	C	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
37*:												
Lakehelen	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Moderate.
Irigul	D	None	---	---	>6.0	---	---	4-20	Hard	Low	High	Low.
Rock outcrop.												
38*:												
Larim	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
Olney	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Shingle	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.
39*:												
Limber	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Low.
Hyattville	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Low.
Rock outcrop.												

See footnote at end of table.

TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
40, 41---------- Lostwells	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
42*:												
Lostwells--------	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
Youngston--------	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Moderate.
Uffens-----------	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	High.
43*:												
Lostwells--------	D	None---------	---	---	1.5-3.5	Apparent	Jun-Nov	>60	---	Moderate	High------	High.
Youngston--------	D	None---------	---	---	1.5-3.5	Apparent	Jun-Nov	>60	---	Moderate	High------	High.
Lostwells--------	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
44*:												
Lymanson---------	C	None---------	---	---	>6.0	---	---	20-40	Soft	Moderate	High------	Low.
Turk-------------	D	None---------	---	---	>6.0	---	---	20-40	Soft	Moderate	High------	Low.
Jenkinson--------	D	None---------	---	---	>6.0	---	---	10-20	Hard	Moderate	High------	Low.
45*:												
Meadowlake-------	A	None---------	---	---	>6.0	---	---	20-40	Hard	Low-------	High------	Low.
Castino Variant--	B	None---------	---	---	>6.0	---	---	20-40	Hard	Moderate	High------	Low.
Rock outcrop.												
46*:												
Muff-------------	D	None---------	---	---	>6.0	---	---	20-40	Soft	Low-------	High------	High.
Neiber-----------	B	None---------	---	---	>6.0	---	---	20-40	Soft	Low-------	High------	High.
47*:												
Mughut-----------	B	None---------	---	---	>6.0	---	---	20-40	Hard	Low-------	High------	Low.
Bondman----------	D	None---------	---	---	>6.0	---	---	8-20	Hard	Low-------	High------	Low.
Bidman-----------	C	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
48*:												
Mulgon-----------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.
Lucky Star-------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.

See footnote at end of table.

TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
49*:												
Nathrop	B	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Low.
Starley	D	None	---	---	>6.0	---	---	10-20	Hard	Low	High	Low.
Rock outcrop.												
50, 51, 52 Neville	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
53 Neville	C	None	---	---	1.5-3.5	Apparent	Apr-Oct	>60	---	Moderate	High	High.
54*:												
Neville	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Tensleep	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
55*:												
Neville	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Spearfish	D	None	---	---	>6.0	---	---	8-20	Soft	Low	High	High.
Rock outcrop.												
56*:												
Persayo	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.
Muff	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
Rock outcrop.												
57*:												
Persayo	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.
Rock outcrop.												
58*:												
Rekop	D	None	---	---	>6.0	---	---	8-20	Soft	Low	High	High.
Gystrum	C	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
Spearfish	D	None	---	---	>6.0	---	---	8-20	Soft	Low	High	High.
59*:												
Renohill	C	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Low.
Heldt	C	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Worf	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.

See footnote at end of table.

TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
60*. Riverwash												
61*: Rock outcrop.												
Persayo	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.
62*: Rock outcrop.												
Spearfish	D	None	---	---	>6.0	---	---	8-20	Soft	Low	High	High.
Neville	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
63*: Rock outcrop.												
Starman	D	None	---	---	>6.0	---	---	3-10	Hard	Moderate	High	Low.
64*:												
Spearfish	D	None	---	---	>6.0	---	---	8-20	Soft	Low	High	High.
Travessilla	D	None	---	---	>6.0	---	---	6-20	Hard	Low	Moderate	Low.
Rock outcrop.												
65*:												
Stubbs	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Turk	D	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Lymanson	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
66. Stutzman	C	None	---	---	>6.0	---	---	>60	---	Low	High	High.
67. Stutzman	D	None	---	---	1.5-3.5	Apparent	Jun-Nov	>60	---	Moderate	High	High.
68*:												
Stutzman	C	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Persayo	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.
Youngston	B	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
69. Tensleep	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.

See footnote at end of table.

TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
70*:												
Uffens	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Persayo	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.
Greybull	C	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
71*:												
Uffens	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Rairdent	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Griffy	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
72*:												
Vale	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Tensleep	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Spearfish	D	None	---	---	>6.0	---	---	8-20	Soft	Low	High	High.
73, 74---------- Wallson	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
75*:												
Whaley	D	None	---	---	>6.0	---	---	8-20	Hard	Low	High	Low.
Rock outcrop.												
Splitro	D	None	---	---	>6.0	---	---	10-20	Hard	Low	High	Low.
76*:												
Woosley	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Low.
Decross	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Nathrop	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Low.
77*:												
Woosley	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Low.
Morset	B	None	---	---	>6.0	---	---	>60	---	High	High	Low.
78*:												
Woosley	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	High	Low.
Starley	D	None	---	---	>6.0	---	---	10-20	Hard	Low	High	Low.
Rock outcrop.												
79---------- Worland	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Moderate.
80*:												
Worland	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Moderate.

See footnote at end of table.

TABLE 12.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Persayo	D	None	---	---	>6.0	---	---	4-20	Soft	Low	High	Low.
Apron	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
81 Youngston	B	Occasional	Brief	Feb-Jun	4.0-6.0	Apparent	Jun-Nov	>60	---	Moderate	High	High.
82 Youngston	B	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
83*:												
Youngston	B	Occasional	Brief	May-Aug	>6.0	---	---	>60	---	Low	High	High.
Glenton	B	Occasional	Brief	May-Aug	4.0-6.0	Apparent	Feb-Nov	>60	---	Low	High	High.
Lostwells	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
84*:												
Youngston	B	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Uffens	B	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Lostwells	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Absted	Fine, montmorillonitic, mesic Haplustollic Natrargids
Apron	Coarse-loamy, mixed (calcareous), mesic Typic Torriorthents
Arvada	Fine, montmorillonitic, mesic Ustollic Natrargids
Bachus	Fine-loamy, mixed Argic Pachic Cryoborolls
Barnum	Fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Baroid	Sandy, mixed, mesic Typic Torrifluvents
Bidman	Fine, montmorillonitic, mesic Ustollic Paleargids
Billycreek	Sandy, mixed Typic Cryochrepts
Bondman	Loamy, mixed, mesic Lithic Ustollic Haplargids
Burnette	Fine, montmorillonitic Argic Pachic Cryoborolls
Castino Variant	Clayey-skeletal, montmorillonitic Argic Pachic Cryoborolls
Chittum	Loamy, mixed Argic Lithic Cryoborolls
Clayburn	Fine-loamy, mixed Argic Pachic Cryoborolls
Clifterson	Loamy-skeletal, mixed (calcareous), mesic Typic Torriorthents
Coutis	Coarse-loamy, mixed Pachic Cryoborolls
Decross	Fine-loamy, mixed Argic Pachic Cryoborolls
Dobent	Fine-loamy, mixed (calcareous), mesic Typic Fluvaquents
Finnerty	Very-fine, montmorillonitic (calcareous), mesic Vertic Torriorthents
Forkwood	Fine-loamy, mixed, mesic Ustollic Haplargids
Fruita	Fine-loamy, mixed, mesic Typic Haplargids
Garland	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Haplargids
Glenton	Coarse-loamy, mixed (calcareous), mesic Typic Torrifluvents
Granile	Loamy-skeletal, mixed Typic Cryoboralfs
Greenman	Coarse-loamy, mixed Argic Cryoborolls
Greybull	Fine-loamy, mixed (calcareous), mesic Typic Torriorthents
Griffy	Fine-loamy, mixed, mesic Typic Haplargids
Gystrum	Fine-silty, gypsic, mesic Ustollic Camborthids
Haverdad	Fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Heldt	Fine, montmorillonitic, mesic Ustertic Camborthids
Hoot	Loamy-skeletal, mixed, mesic Lithic Haplargids
Hyattville	Loamy-skeletal, mixed Typic Cryoboralfs
Inchau	Fine-loamy, mixed Argic Cryoborolls
Irigul	Loamy-skeletal, mixed Lithic Cryoborolls
Jenkinson	Loamy, mixed Lithic Cryoborolls
Kishona	Fine-loamy, mixed (calcareous), mesic Ustic Torriorthents
Kyle	Very-fine, montmorillonitic, mesic Ustertic Camborthids
Lakehelen	Loamy-skeletal, mixed Typic Cryoboralfs
Larim	Loamy-skeletal, mixed, mesic Ustollic Haplargids
Las Animas Variant	Coarse-loamy, mixed (calcareous), mesic Typic Fluvaquents
Limber	Fine-loamy, mixed Typic Cryoboralfs
Lostwells	Fine-loamy, mixed (calcareous), mesic Typic Torrifluvents
Lucky Star	Loamy-skeletal, mixed Cryic Paleborolls
Lymanson	Fine-loamy, mixed Argic Cryoborolls
Meadowlake	Sandy-skeletal, mixed Alfic Cryochrepts
Morset	Fine-loamy, mixed Argic Cryoborolls
Muff	Fine-loamy, mixed, mesic Typic Natrargids
Mughut	Fine, montmorillonitic, mesic Ustollic Haplargids
Mulgon	Loamy-skeletal, mixed Mollic Cryoboralfs
Nathrop	Loamy-skeletal, mixed Argic Cryoborolls
Neiber	Fine-loamy, mixed, mesic Typic Haplargids
Neville	Fine-loamy, mixed (calcareous), mesic Ustic Torriorthents
Olney	Fine-loamy, mixed, mesic Ustollic Haplargids
Persayo	Loamy, mixed (calcareous), mesic, shallow Typic Torriorthents
Rairdent	Fine-loamy, mixed, mesic Cambic Gypsiorthids
Rekop	Loamy, gypsic, mesic, shallow Ustic Torriorthents
Renohill	Fine, montmorillonitic, mesic Ustollic Haplargids
Shingle	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Spearfish	Loamy, mixed (calcareous), mesic, shallow Ustic Torriorthents
Splitro	Loamy, mixed Lithic Cryoborolls
Starley	Loamy-skeletal, mixed Lithic Cryoborolls
Starman	Loamy-skeletal, mixed (calcareous) Lithic Cryorthents
Stubbs	Fine-loamy, mixed Argic Pachic Cryoborolls
Stutzman	Fine, montmorillonitic (calcareous), mesic Typic Torriorthents
Tensleep	Fine-silty, mixed, mesic Ustollic Haplargids
Tine	Sandy-skeletal, mixed Typic Cryoborolls
Travessilla	Loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents
Turk	Very-fine, illitic Argic Cryoborolls
Uffens	Fine-loamy, mixed, mesic Typic Natrargids

TABLE 13.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Vale	Fine-silty, mixed, mesic Aridic Argiustolls
Wallrock	Fine-loamy, mixed, mesic Argiaquic Cryoborolls
Wallson	Coarse-loamy, mixed, mesic Typic Haplargids
Wetterhorn	Fine, montmorillonitic Typic Cryoboralfs
Whaley	Sandy, mixed Lithic Cryochrepts
Woosley	Fine-loamy, mixed Argic Cryoborolls
Worf	Loamy, mixed, mesic, shallow Ustollic Haplargids
Worland	Coarse-loamy, mixed (calcareous), mesic Typic Torriorthents
Youngston	Fine-loamy, mixed (calcareous), mesic Typic Torrifluvents

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