United States Department of Agriculture

NRCS

Natural Resources Conservation Service

In cooperation with University of Nebraska, Conservation and Survey Division; South Platte Natural Resources District; and Kimball County Board of Commissioners

Soil Survey of Kimball County, Nebraska

How To Use This Soil Survey

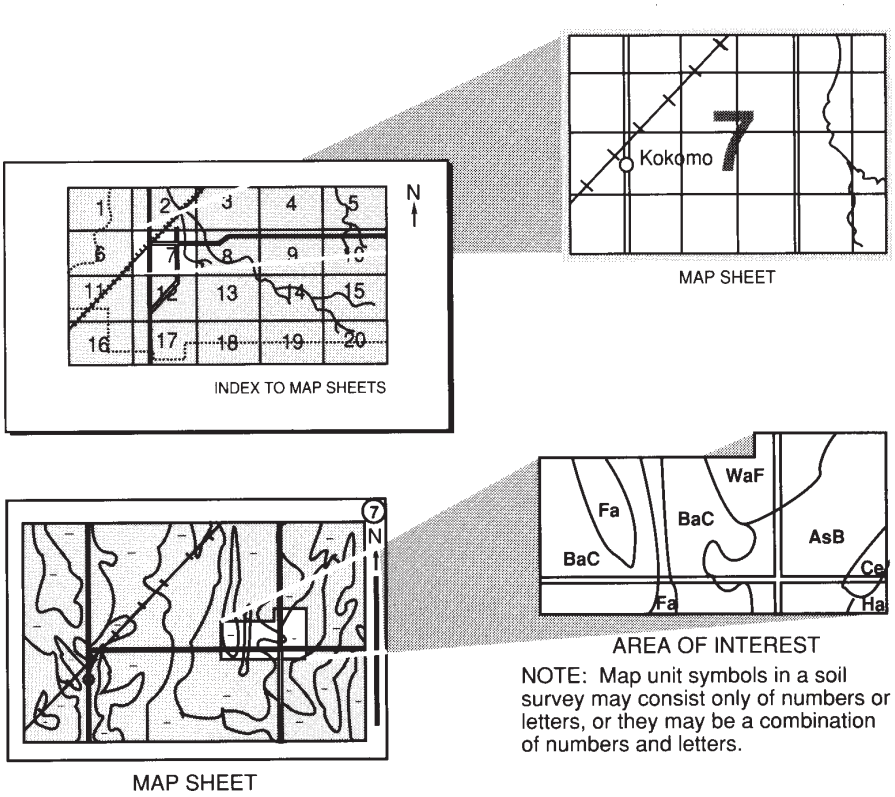
Detailed Soil Maps

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

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

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

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



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

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

Major fieldwork for this soil survey was completed in 2004. Soil names and descriptions were approved in 2004. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2004. This survey was made cooperatively by the Natural Resources Conservation Service and the University of Nebraska, Conservation and Survey Division. The survey is part of the technical assistance furnished to the South Platte Natural Resources District and the Kimball County Board of Commissioners.

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.

Cover: An area of recently planted winter wheat in the foreground and maturing millet in the background. The millet is planted in strips to reduce the hazard of soil blowing.

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

Contents

Issued 2005

Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, 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, 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 ensure 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.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. 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 Natural Resources Conservation Service or the Cooperative Extension Service.

Stephen K. Chick
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Soil Survey of
Kimball County, Nebraska

Fieldwork by Jay R. Wilson and David Vyain, Natural Resources Conservation Service, and Phillip Young, University of Nebraska, Conservation and Survey Division

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
the University of Nebraska, Conservation and Survey Division; the South Platte Natural Resources District; and the Kimball County Board of Commissioners

General Nature of the County

KIMBALL COUNTY is in the southwest corner of the Nebraska panhandle (fig. 1). The total area of the county is 952 square miles, or 609,702 acres. The county is bordered by Banner County to the north, Cheyenne County to the east, Weld County, Colorado, to the south, and Laramie County, Wyoming, to the west. The city of Kimball is the county seat.

This section gives information about the climate; the physiography, relief, and drainage; recreation; and history and development of Kimball County.

This soil survey updates the survey of Kimball County, Nebraska, published in 1962 (USDA, 1962). It replaces outdated soil phases and miscellaneous land types with new series names and contains computer generated tables and interpretative guides. The soil survey maps are on 1:24,000 orthophotography base.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Kimball in the period 1971 to 2000. Table 2 shows probable dates of the

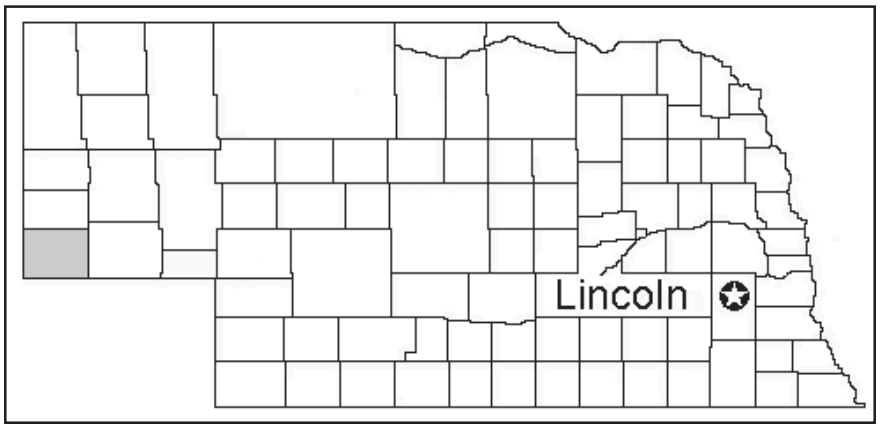

Figure 1.—Location of Kimball County in Nebraska.

first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 27.9 degrees F and the average daily minimum temperature is 14.6 degrees. The lowest temperature on record, which occurred at Kimball on January 17, 1930, is -36 degrees. In summer, the average temperature is 69 degrees and the average daily maximum temperature is 84.3 degrees. The highest temperature, which occurred at Kimball on July 16, 1934, is 110 degrees.

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

The average annual total precipitation is about 17.16 inches. Of this, about 11.69 inches, or 68 percent, usually falls in May through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 4.41 inches at Kimball on June 8, 1989. Thunderstorms occur on about 49 days each year, and most occur in May with an average of 14.

The average seasonal snowfall is 44.2 inches. The greatest snow depth at any one time during the period of record was 19 inches recorded on November 22, 1979. On an average, 38 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 18 inches recorded on March 25, 1959.

The average relative humidity in midafternoon is about 44 percent. Humidity is higher at night, and the average at dawn is about 77 percent. The sun shines 67 percent of the time possible in summer and 61 percent in winter. The prevailing wind is from the northwest. Average windspeed is highest, 12.7 miles per hour, in April.

Physiography, Relief, and Drainage

Kimball County is in the Central High Plains major land resource area and is partially in the Central High Tableland major land resource area of the Central Great Plains Region.

The dominant physiographic feature is a nearly level to gently sloping landscape called the Cheyenne Tableland. The tableland is a high plains remnant of the Laramie Range to the west. The Cheyenne Tableland is a constructional plain that was built up by deposits of rock debris which washed from the Rocky Mountain Region. It slopes eastward into Nebraska and, with the exception of the valley of Lodgepole Creek, covers most of Kimball County. Much of this tableland is covered with loess.

In the county, the highest points of the Cheyenne Tableland occur along the Nebraska-Wyoming state line, with elevations ranging from 5,400 to 5,000 feet above sea level. The highest point in Nebraska, at 5,424 feet above sea level, occurs in the southwestern part of Kimball County near the corner where Nebraska, Colorado, and Wyoming join. The elevation decreases as one moves eastward across the county. The lowest elevation is at 4,450 feet above sea level in the valley of Lodgepole Creek at the eastern end of the county.

Lodgepole Creek, a tributary of the South Platte River, is the principal drainage channel in Kimball County. Intermittent drainages generally flow eastward across the county and some of them join Lodgepole Creek. Two significant intermittent drainages in the southern half of the county are Sand Draw and Sidney Draw.

A small area in the extreme northern part of the county is drained by Rocky Hollow, which runs in a northeastern direction. Short tributary branches occur throughout the upland. The county is adequately drained, except in the small depressions on the

uplands and on some of the low bottom lands of Lodgepole Creek. The general direction of the drainage is eastward, the direction of the general slope of the plain.

Recreation

Kimball County offers a wide variety of recreational activities for all types of people. The county provides many types of outdoor opportunities such as hunting, fishing, hiking, camping, picnicking, and horseback riding.

Hunting is popular in the county. White-tailed deer, mule deer, and pronghorn antelope are plentiful. Upland game birds include ring-necked pheasant, wild turkey, and prairie grouse. Waterfowl game birds include ducks and Canadian geese. Most hunting in the county is on private lands and is by permission of the landowner. A Nebraska hunting license is required.

Fishing is allowed at Oliver Reservoir and at private ponds with landowner permission. A Nebraska fishing license is required.

Another recreational opportunity is sightseeing and photography of plants, animals, and landscapes in Kimball County.

Oliver Reservoir Dam, built in 1911, provided irrigation water to Lodgepole Valley farmers until 1976, when the dam became unsafe and the lake was drained because the irrigation district could not afford the cost to repair it. After a massive local fund-raising effort, assistance from State funds, and substantial volunteer work, the dam was rebuilt in 1979-80 for use as a recreational, wildlife conservation, and flood-control facility. The 280-acre lake is used and enjoyed by area residents and tourists year-round (fig. 2). Picnicking, camping, boating, and fishing are the main recreational activities.

An 18-hole public golf course, with facilities, is located at the community of Kimball. The city of Kimball also has two public parks, four baseball fields, and a municipal swimming pool.

Figure 2.—Oliver Reservoir State Recreation Area on Lodgepole Creek.

The highest point in Nebraska, at 5,424 feet above sea level, is located in the southwestern corner of the county. This point of interest is marked by a stone monument and a private road allows public access.

History and Development

In 1868, the first permanent settlements were made (in what later became Kimball County) and the Union Pacific Railroad was extended through the area. The early settlers established ranches and raised livestock, mainly cattle.

Kimball County was named for Thomas Lord Kimball, an executive of the Union Pacific Railroad. While he was with the Union Pacific, he was active in organizing excursions along the rail line as a means of promoting settlement.

Kimball County was formed from part of Cheyenne County by a vote on November 6, 1888. The post office at Antelopeville became the village of Kimball and county seat in 1889.

Farming began on a scale about 1884 when the Union Pacific Railroad began to sell land, and some public land was opened to settlement and preemption.

The Homestead Act and the Kincad Act fostered the settlement of Kimball County in the early years of 1885 to 1910. Farming was the major source of revenue, and this improved dramatically when irrigation was developed. As the farmers prospered, so did the local businessmen, and economic development advanced rapidly. (fig. 3)

The Oliver Reservoir Dam was built in 1911, and the first irrigation waters flowed the following year. Oliver Reservoir provided irrigation water to Lodgepole Valley farmers until 1976.

During World War I, the ranchers in Kimball County planted many acres of their rangeland to wheat and other food crops. By the end of the war, about half of the county had been cultivated and winter wheat was the main crop. The planting of wheat in a large total acreage continued after the war. In 1927, about 84,000 acres

Figure 3.—An abandoned farm house built from locally mined sandstone.

were in wheat, and by 1952 the acreage in wheat had increased to almost 190,000 acres.

During the 1980s, over one-quarter of the county's agricultural land was retired from annual crops and planted to grass. This occurred during the period 1985 to 1988, when approximately 112,000 acres of dryland agriculture was enrolled in the Conservation Reserve Program.

Farming and livestock production continue to be the main economic enterprises in the county. Kimball County is one of Nebraska's largest wheat producers, with 102,950 acres planted to winter wheat (years 1999 to 2000 statistics). Other important agricultural crops produced are oats, millet, alfalfa, corn, sorghum, dry beans, and sunflowers.

Oil exploration and production provided the biggest boom in Kimball's history, following the discovery of oil in Kimball County in 1950. Kimball County's oil production grew steadily throughout the 1950s and led the state in barrels produced in 1960. Kimball earned the title "Oil Capital of Nebraska."

In 2002, an outlet for new energy technology opened in Kimball County, when a wind turbine farm, covering 260 acres, went online commercially.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

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

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of

soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

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

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

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

Detailed Soil Map Units

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

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

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

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

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

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

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown

on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Rosebud loam, 0 to 1 percent slopes, is a phase of the Rosebud series.

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

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Rosebud-Canyon loams, 1 to 3 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Eckley and Altvan soils, 9 to 50 percent slopes, is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The map unit Gravel pits is an example.

In the descriptions, “LEP” means linear extensibility percent.

Table 4 gives the acreage and proportionate extent of each map unit. Other 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 or miscellaneous areas.

1080—Albinas-Cheyenne loams, 0 to 1 percent slopes

Map Unit Composition

Albinas: 50 percent
Cheyenne: 35 percent
Minor components: 15 percent

Component Descriptions

Albinas
MLRA: 72—Central High Tableland
Landform: Stream terraces in valleys
Parent material: Alluvium
Slope: 0 to 1 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Moderate (about 8.5 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: Rare
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Loamy Upland
Land capability (irrigated): 2c
Land capability (nonirrigated): 3c

Typical Profile:
Ap—0 to 7 inches; loam
Bt1—7 to 22 inches; clay loam
Bt2—22 to 24 inches; clay loam
BC—24 to 34 inches; sandy clay loam

Ck—34 to 45 inches; loam
2C—45 to 80 inches; gravelly coarse sand

Cheyenne
MLRA: 72—Central High Tableland
Landform: Stream terraces in valleys
Parent material: Loamy alluvium
Slope: 0 to 1 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 0.60 inch per hour)
Available water capacity: Low (about 5.6 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Loamy Upland
Land capability (irrigated): 2s
Land capability (nonirrigated): 3c

Typical Profile:
Ap—0 to 6 inches; loam
AB—6 to 10 inches; loam
Bw—10 to 24 inches; loam
C1—24 to 32 inches; gravelly loamy sand
2C2—32 to 60 inches; very gravelly coarse sand

Minor Components

Bayard
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 1 percent
Drainage class: Well drained

Chappell
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 1 percent
Drainage class: Well drained

Paoli
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 1 percent
Drainage class: Well drained

1132—Alliance loam, 3 to 6 percent slopes

Map Unit Composition

Alliance: 85 percent
Minor components: 15 percent

Component Descriptions

Alliance
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands

Parent material: Loess over weakley cemented, fine grained sandstone
Slope: 3 to 6 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Moderate (about 8.4 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Loamy Upland
Land capability (irrigated): 3e
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 6 inches; loam
Bt1—6 to 17 inches; clay loam
Bt2—17 to 24 inches; loam
BCk—24 to 34 inches; loam
C1—34 to 47 inches; very fine sandy loam
2C2—47 to 54 inches; loamy fine sand
Cr—54 to 80 inches; weathered bedrock

Minor Components

Rosebud
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 6 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained

Altvan
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 6 percent
Drainage class: Well drained

1180—Altvan loam, 0 to 1 percent slopes

Map Unit Composition

Altvan: 90 percent
Minor components: 10 percent

Component Descriptions

Altvan
MLRA: 72—Central High Tableland
Landform: Plains on tablelands (fig. 4)
Parent material: Loess over sandy and gravelly alluvium
Slope: 0 to 1 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Moderate (about 8.1 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None

Figure 4.—No-till dryland corn planted in wheat stubble in an area of Altvan loam, 0 to 1 percent slopes.

Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Loamy Upland
Land capability (irrigated): 2s
Land capability (nonirrigated): 3c

Typical Profile:
Ap—0 to 6 inches; loam
A—6 to 8 inches; loam
BA—8 to 12 inches; loam
Bt—12 to 23 inches; clay loam
Bk—23 to 26 inches; loam
C1—26 to 35 inches; loam
2C2—35 to 60 inches; gravelly sand

Minor Components

Eckley
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 1 percent
Drainage class: Well drained

Satanta
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 1 percent
Drainage class: Well drained

1185—Altvan fine sandy loam, 1 to 3 percent slopes

Map Unit Composition

Altvan: 85 percent
Minor components: 15 percent

Component Descriptions

Altvan
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Loess over sandy and gravelly alluvium
Slope: 1 to 3 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Moderate (about 6.6 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Loamy Upland
Land capability (irrigated): 3e
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 6 inches; fine sandy loam
Bt1—6 to 11 inches; clay loam
Bt2—11 to 22 inches; clay loam
BCk—22 to 26 inches; loam
C1—22 to 29 inches; sandy loam
2C2—29 to 80 inches; coarse sand

Minor Components

Satanta
Extent: About 10 percent of the unit
Landform: Plains on tablelands
Slope: 1 to 3 percent
Drainage class: Well drained

Eckley
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 1 to 3 percent
Drainage class: Well drained

1196—Altvan-Eckley complex, 3 to 9 percent slopes

Map Unit Composition

Altvan: 55 percent
Eckley: 35 percent
Minor components: 10 percent

Component Descriptions

Altvan
MLRA: 72—Central High Tableland

Landform: Hillslopes on uplands
Parent material: Loess over sandy and gravelly alluvium
Slope: 3 to 9 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Low (about 5.8 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland
Land capability (irrigated): 4e
Land capability (nonirrigated): 4e

Typical Profile:
Ap—0 to 7 inches; fine sandy loam
Bt1—7 to 12 inches; loam
Bt2—12 to 17 inches; clay loam
BCk—17 to 25 inches; very fine sandy loam
2C1—25 to 31 inches; loamy sand
2C2—31 to 80 inches; gravelly coarse sand

Eckley
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands
Parent material: Alluvium
Slope: 3 to 9 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Low (about 3.1 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Gravelly Hills
Land capability (nonirrigated): 6s

Typical Profile:
Ap—0 to 5 inches; gravelly sandy loam
Bt—7 to 9 inches; gravelly sandy clay loam
BC—9 to 15 inches; gravelly sandy loam
2C—15 to 80 inches; gravelly coarse sand

Minor Components

Satanta
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 9 percent
Drainage class: Well drained

Dix
Extent: About 3 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 9 percent
Drainage class: Excessively drained

Blanche
Extent: About 2 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 9 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained

1199—Altvan-Satanta fine sandy loams, 1 to 3 percent slopes

Map Unit Composition

Altvan: 55 percent
Satanta: 30 percent
Minor components: 15 percent

Component Descriptions

Altvan
MLRA: 72—Central High Tableland
Landform: Plains on uplands (fig. 5 and fig. 6)
Parent material: Loess over sandy and gravelly alluvium
Slope: 1 to 3 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Moderate (about 6.4 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None

Figure 5.—Harvesting winter wheat in an area of Altvan-Satanta fine sandy loams, 1 to 3 percent slopes.

Figure 6.—Winter wheat in contour strips with summer fallow in an area of Altvan-Satanta fine sandy loams, 1 to 3 percent slopes, in the background. Rangeland in the foreground in an area of Tassel-Blanche sandy loams, 3 to 9 percent slopes.

Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Loamy Upland
Land capability (irrigated): 3s
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 5 inches; fine sandy loam
Bt1—5 to 10 inches; clay loam
Bt2—10 to 17 inches; clay loam
BCk—17 to 24 inches; loam
C1—24 to 30 inches; loam
2C2—30 to 80 inches; coarse sand

Satanta
MLRA: 72—Central High Tableland
Landform: Plains on uplands
Parent material: Loess
Slope: 1 to 3 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 10.3 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Loamy Upland

Land capability (irrigated): 2e
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 9 inches; fine sandy loam
A—9 to 14 inches; fine sandy loam
Bt—14 to 26 inches; clay loam
BCk—26 to 31 inches; loam
C1—31 to 55 inches; very fine sandy loam
2C2—55 to 80 inches; sand

Minor Components

Albinas
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 1 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 1

Bayard
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 1 to 3 percent
Drainage class: Well drained

Eckley
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 1 to 3 percent
Drainage class: Well drained

1200—Altvan-Eckley-Tassel complex, 3 to 9 percent slopes

Map Unit Composition

Altvan: 40 percent
Eckley: 30 percent
Tassel: 15 percent
Minor components: 15 percent

Component Descriptions

Altvan
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands
Parent material: Loess over sandy and gravelly alluvium
Slope: 3 to 9 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Low (about 5.8 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland

Land capability (irrigated): 4e
Land capability (nonirrigated): 4e

Typical Profile:
Ap—0 to 7 inches; fine sandy loam
Bt1—7 to 12 inches; loam
Bt2—12 to 17 inches; clay loam
BCk—17 to 25 inches; very fine sandy loam
2C1—25 to 31 inches; loamy sand
2C2—31 to 80 inches; gravelly coarse sand

Eckley
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands
Parent material: Alluvium
Slope: 3 to 9 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Very low (about 2.9 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Gravelly Hills
Land capability (nonirrigated): 6s

Typical Profile:
A—0 to 5 inches; gravelly sandy loam
Bt—5 to 8 inches; sandy clay loam
BC—8 to 11 inches; gravelly sandy loam
2C—11 to 80 inches; gravelly coarse sand

Similar inclusions: Soils that have more than 35 percent gravel and lack an argillic horizon.

Tassel
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands
Parent material: Residuum derived from calcareous sandstone
Slope: 3 to 9 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Very low (about 1.2 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Shallow Limy
Land capability (nonirrigated): 6s

Typical Profile:
A—0 to 4 inches; fine sandy loam
C—4 to 8 inches; gravelly fine sandy loam
Cr—8 to 60 inches; weathered bedrock

Minor Components

Ashollow
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 9 percent
Drainage class: Well drained
Ecological site: Sandy

Blanche
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 9 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained

Sidney
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 6 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained

1202—Altvan-Satanta loams, 0 to 1 percent slopes

Map Unit Composition

Altvan: 60 percent
Satanta: 30 percent
Minor components: 10 percent

Component Descriptions

Altvan
MLRA: 72—Central High Tableland
Landform: Plains on uplands
Parent material: Loess over sandy and gravelly alluvium
Slope: 0 to 1 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Moderate (about 6.4 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Loamy Upland
Land capability (irrigated): 2s
Land capability (nonirrigated): 3c

Typical Profile:
Ap—0 to 5 inches; loam
Bt1—5 to 10 inches; clay loam
Bt2—10 to 17 inches; clay loam
BCk—17 to 24 inches; loam
C1—24 to 30 inches; loam
2C2—30 to 80 inches; coarse sand

Satanta
MLRA: 72—Central High Tableland
Landform: Plains on uplands
Parent material: Loess
Slope: 0 to 1 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 10.3 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Ponding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Loamy Upland
Land capability (irrigated): 1
Land capability (nonirrigated): 3c

Typical Profile:
Ap—0 to 9 inches; loam
A—9 to 14 inches; loam
Bt—14 to 26 inches; clay loam
BCk—26 to 31 inches; loam
C1—31 to 55 inches; very fine sandy loam
2C2—55 to 80 inches; sand

Similar inclusions: Soils that have a very fine sandy loam surface and a thicker, dark surface.

Minor Components

Albinas
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 1 percent
Drainage class: Well drained
Ecological site: Silty Lowland; Veg. Zone 1

Bayard
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 1 percent
Drainage class: Well drained

1370—Bayard fine sandy loam, 0 to 3 percent slopes

Map Unit Composition

Bayard: 90 percent
Minor components: 10 percent

Component Descriptions

Bayard
MLRA: 72—Central High Tableland
Landform: Stream terraces in valleys (fig. 7)
Parent material: Alluvium
Slope: 0 to 3 percent

Figure 7.—Irrigated alfalfa in an area of Bayard fine sandy loam, 0 to 3 percent slopes.

Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Moderate (about 8.4 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Sandy
Land capability (irrigated): 2e
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 6 inches; fine sandy loam
A—6 to 10 inches; fine sandy loam
AC—10 to 16 inches; fine sandy loam
C—16 to 60 inches; fine sandy loam

Minor Components

Broadwater
Extent: About 5 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Somewhat excessively drained
Ecological site: Gravelly Hills

Tripp
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 3 percent
Drainage class: Well drained

1371—Bayard fine sandy loam, 3 to 6 percent slopes

Map Unit Composition

Bayard: 90 percent
Minor components: 10 percent

Component Descriptions

Bayard
MLRA: 72—Central High Tableland
Landform: Stream terraces in valleys
Parent material: Alluvium
Slope: 3 to 6 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Moderate (about 8.5 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Very low
Ecological site: Sandy
Land capability (irrigated): 3e
Land capability (nonirrigated): 4e

Typical Profile:
Ap—0 to 7 inches; fine sandy loam
A—7 to 13 inches; fine sandy loam
AC—13 to 22 inches; fine sandy loam
C—22 to 60 inches; fine sandy loam

Minor Components

Broadwater
Extent: About 5 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Somewhat excessively drained
Ecological site: Gravelly Hills

Chappell
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 3 to 6 percent
Drainage class: Well drained

1780—Broadwater loamy sand, channeled, occasionally flooded

Map Unit Composition

Broadwater: 90 percent
Minor components: 10 percent

Component Descriptions

Broadwater
MLRA: 72—Central High Tableland

Landform: Flood plains in valleys (fig. 8)
Parent material: Stratified sandy and gravelly alluvium
Slope: 0 to 2 percent
Drainage class: Excessively drained
Slowest saturated hydraulic conductivity: High (about 6.00 inches per hour)
Available water capacity: Very low (about 2.1 inches)
Shrink-swell potential: Low (about 0.5 LEP)
Flooding hazard: Occasional
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Gravelly Hills
Land capability (nonirrigated): 6w

Typical Profile:
A—0 to 3 inches; loamy sand
C1—3 to 6 inches; gravelly coarse sand
2C2—6 to 60 inches; stratified gravelly coarse sand to sand

Minor Components

Glenberg
Extent: About 5 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Sandy Lowland; Veg. Zone 1

Chappell
Extent: About 3 percent of the unit
Landform: Stream terraces in valleys

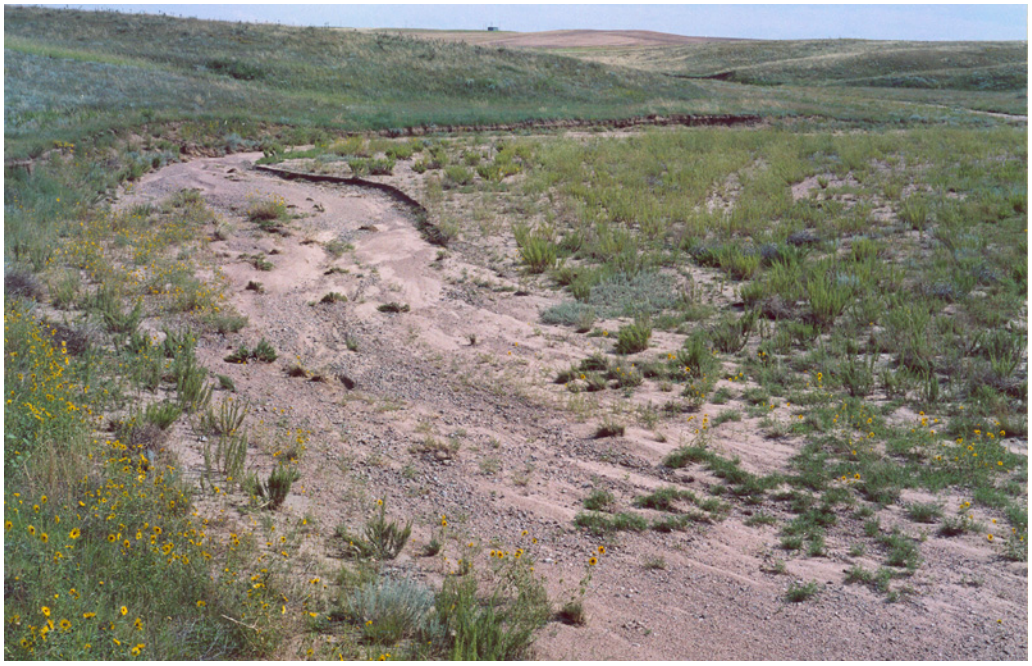

Figure 8.—Rangeland in an area of Broadwater loamy sand, channeled, occasionally flooded, on upland drainageways.

Slope: 0 to 2 percent
Drainage class: Well drained

Dwyer
Extent: About 2 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 2 percent
Drainage class: Excessively drained
Ecological site: Sandy

1797—Brownson-Rosebud-Canyon loams, 0 to 3 percent slopes

Map Unit Composition

Brownson: 40 percent
Rosebud: 30 percent
Canyon: 20 percent
Minor components: 10 percent

Component Descriptions

Brownson
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Loess over weakly cemented, fine grained sandstone
Slope: 0 to 3 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Very low (about 2.4 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Shallow Limy
Land capability (nonirrigated): 6s

Typical Profile:
A—0 to 5 inches; loam
Bt—5 to 13 inches; clay loam
Cr—13 to 60 inches; weathered bedrock

Rosebud
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Loess over weakly cemented, fine grained sandstone
Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Low (about 4.2 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low

Ecological site: Loamy Upland
Land capability (irrigated): 3e
Land capability (nonirrigated): 3e

Typical Profile:
A—0 to 6 inches; loam
Bt—6 to 17 inches; clay loam
BkC—17 to 23 inches; loam
Cr—23 to 60 inches; weathered bedrock

Canyon
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Calcareous loamy residuum derived from calcareous sandstone
Slope: 0 to 3 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: Very low (about 1.2 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Shallow Limy
Land capability (nonirrigated): 6s

Typical Profile:
Ap—0 to 9 inches; loam
Cr—9 to 60 inches; weathered bedrock

Minor Components

Blanche
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained

Tassel
Extent: About 3 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 3 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow Limy

Hemingford
Extent: About 2 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 1 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 1

2055—Chappell-Bayard-Broadwater complex, 0 to 2 percent slopes

Map Unit Composition

Chappell: 40 percent
Bayard: 35 percent
Broadwater: 20 percent
Minor components: 5 percent

Component Descriptions

Chappell
MLRA: 72—Central High Tableland
Landform: Stream terraces in valleys
Parent material: Coarse-loamy alluvium over sandy and gravelly alluvium
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Low (about 4.8 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Very low
Ecological site: Sandy
Land capability (irrigated): 3e
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 8 inches; sandy loam
Bw—8 to 20 inches; sandy loam
BCk—20 to 25 inches; sandy loam
2C—25 to 60 inches; coarse sand

Bayard
MLRA: 72—Central High Tableland
Landform: Stream terraces in valleys
Parent material: Alluvium
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Moderate (about 8.5 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Very low
Ecological site: Sandy
Land capability (irrigated): 2e
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 8 inches; sandy loam
A—8 to 15 inches; sandy loam
AC—15 to 27 inches; sandy loam
C—27 to 80 inches; sandy loam

Broadwater
MLRA: 72—Central High Tableland
Landform: Flood plains in valleys
Parent material: Stratified sandy and gravelly alluvium
Slope: 0 to 2 percent
Drainage class: Somewhat excessively drained
Slowest saturated hydraulic conductivity: High (about 6.00 inches per hour)
Available water capacity: Very low (about 2.1 inches)
Shrink-swell potential: Low (about 0.5 LEP)
Flooding hazard: Occasional
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Gravelly Hills
Land capability (nonirrigated): 6w

Typical Profile:
A—0 to 3 inches; loamy sand
C1—3 to 6 inches; gravelly coarse sand
C2—6 to 60 inches; stratified gravelly coarse sand to sand

Minor Components

Cheyenne
Extent: About 3 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 2 percent
Drainage class: Well drained

Dwyer
Extent: About 2 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 2 percent
Drainage class: Excessively drained
Ecological site: Sandy

2665—Dwyer loamy sand, 0 to 3 percent slopes

Map Unit Composition

Dwyer: 90 percent
Minor components: 10 percent

Component Descriptions

Dwyer
MLRA: 72—Central High Tableland
Landform: Terraces in valleys
Parent material: Eolian sands
Slope: 0 to 3 percent
Drainage class: Excessively drained
Slowest saturated hydraulic conductivity: High (about 6.00 inches per hour)
Available water capacity: Low (about 4.4 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible

Ecological site: Sandy
Land capability (irrigated): 4e
Land capability (nonirrigated): 6e

Typical Profile:
A—0 to 7 inches; loamy sand
AC—7 to 21 inches; loamy fine sand
C—21 to 80 inches; fine sand

Similar inclusions: Areas that have slopes of 3 to 6 percent.

Minor Components

Broadwater
Extent: About 4 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Somewhat excessively drained
Ecological site: Gravelly Hills

Bayard
Extent: About 3 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 2 percent
Drainage class: Well drained

Chappell
Extent: About 3 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 2 percent
Drainage class: Well drained

2687—Eckley and Altvan soils, 9 to 50 percent slopes

Map Unit Composition

Eckley: 70 percent
Altvan: 15 percent
Minor components: 15 percent

Component Descriptions

Eckley
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands
Parent material: Sandy and gravelly alluvium
Slope: 9 to 50 percent
Surface fragments: About 15 to 20 percent coarse subrounded gravel
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Low (about 3.6 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Gravelly Hills
Land capability (nonirrigated): 6s

Typical Profile:
Ap—0 to 3 inches; gravelly sandy loam
Bt—3 to 7 inches; gravelly sandy clay loam
BCk—7 to 16 inches; gravelly sandy loam
C—16 to 80 inches; gravelly coarse sand

Similar inclusions: Dix soils that have more than 35 percent gravel and lack an argillic horizon.

Altvan
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands
Parent material: Loess over sandy and gravelly alluvium
Slope: 9 to 15 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Low (about 4.7 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland
Land capability (nonirrigated): 6e

Typical Profile:
A—0 to 6 inches; sandy loam
Bt1—6 to 11 inches; sandy clay loam
Bt2—11 to 19 inches; sandy clay loam
BCk—19 to 24 inches; loamy coarse sand
2C1—24 to 48 inches; coarse sand
2C2—48 to 80 inches; gravelly coarse sand

Minor Components

Dix
Extent: About 10 percent of the unit
Landform: Hillslopes on uplands
Slope: 9 to 50 percent
Drainage class: Excessively drained
Ecological site: Gravelly Hills

Dankworth
Extent: About 3 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 6 percent
Drainage class: Excessively drained
Ecological site: Sands; Veg. Zone 2

Tassel
Extent: About 2 percent of the unit
Landform: Hillslopes on uplands
Slope: 9 to 30 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow Limy

3050—Glenberg fine sandy loam, rarely flooded

Map Unit Composition

Glenberg: 85 percent
Minor components: 15 percent

Component Descriptions

Glenberg
MLRA: 72—Central High Tableland
Landform: Flood plains in valleys
Parent material: Stratified calcareous alluvium
Slope: 0 to 2 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Low (about 4.2 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: Rare
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Sandy Lowland
Land capability (irrigated): 2e
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 6 inches; fine sandy loam
C—6 to 60 inches; fine sand, loam

Minor Components

Bayard
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 2 percent
Drainage class: Well drained

Broadwater
Extent: About 5 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Somewhat excessively drained
Ecological site: Gravelly Hills

Chappell
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 2 percent
Drainage class: Well drained

4030—Jayem fine sandy loam, 0 to 3 percent slopes

Map Unit Composition

Jayem: 85 percent
Minor components: 15 percent

Component Descriptions

Jayem
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Eolian deposits
Slope: 0 to 3 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Moderate (about 8.8 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Very low
Ecological site: Sandy
Land capability (irrigated): 2e
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 6 inches; fine sandy loam
A—6 to 9 inches; fine sandy loam
Bw—9 to 22 inches; fine sandy loam
C1—22 to 50 inches; fine sandy loam
C2—50 to 60 inches; fine sandy loam

Minor Components

Busher
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 3 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Sandy; Veg. Zone 1

Duroc
Extent: About 5 percent of the unit
Landform: Swales on tablelands
Slope: 0 to 3 percent
Drainage class: Well drained

Keith
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 3 percent
Drainage class: Well drained

4031—Jayem fine sandy loam, 3 to 6 percent slopes

Map Unit Composition

Jayem: 85 percent
Minor components: 15 percent

Component Descriptions

Jayem
MLRA: 72—Central High Tableland

Landform: Hillslopes on uplands
Parent material: Eolian deposits
Slope: 3 to 6 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Moderate (about 8.8 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Very low
Ecological site: Sandy
Land capability (irrigated): 3e
Land capability (nonirrigated): 4e

Typical Profile:
Ap—0 to 6 inches; fine sandy loam
A—6 to 9 inches; fine sandy loam
Bw—9 to 22 inches; fine sandy loam
C1—22 to 50 inches; fine sandy loam
C2—50 to 60 inches; fine sandy loam

Minor Components

Busher
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 6 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Sandy; Veg. Zone 1

Duroc
Extent: About 5 percent of the unit
Landform: swale on uplands
Slope: 1 to 3 percent
Drainage class: Well drained

Keith
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 1 to 3 percent
Drainage class: Well drained

4150—Keith loam, 0 to 1 percent slopes

Map Unit Composition

Keith: 90 percent
Minor components: 10 percent

Component Descriptions

Keith
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Loess

Slope: 0 to 1 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 11.2 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Loamy Upland
Land capability (irrigated): 1
Land capability (nonirrigated): 3c

Typical Profile:
A—0 to 9 inches; loam
Bt—9 to 25 inches; silty clay loam
BCk—25 to 48 inches; silt loam
C—48 to 60 inches; very fine sandy loam

Minor Components

Duroc
Extent: About 5 percent of the unit
Landform: Swales on tablelands
Slope: 0 to 1 percent
Drainage class: Well drained

Kuma
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 1 percent
Drainage class: Well drained

4151—Keith loam, 1 to 3 percent slopes

Map Unit Composition

Keith: 85 percent
Minor components: 15 percent

Component Descriptions

Keith
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Loess
Slope: 1 to 3 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 11.2 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Loamy Upland
Land capability (irrigated): 2e
Land capability (nonirrigated): 3e

Typical Profile:
A—0 to 9 inches; loam
Bt—9 to 25 inches; silty clay loam
BCk—25 to 48 inches; silt loam
C—48 to 60 inches; very fine sandy loam

Minor Components

Duroc
Extent: About 5 percent of the unit
Landform: Swales on tablelands
Slope: 1 to 3 percent
Drainage class: Well drained

Rosebud
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 1 to 3 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained

Ulysses
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 1 to 3 percent
Drainage class: Well drained

4310—Kuma loam, 0 to 1 percent slopes

Map Unit Composition

Kuma: 90 percent
Minor components: 10 percent

Component Descriptions

Kuma
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Loess
Slope: 0 to 1 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 9.1 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Loamy Upland
Land capability (irrigated): 1
Land capability (nonirrigated): 3c

Typical Profile:
Ap—0 to 7 inches; loam
Bt—7 to 14 inches; silty clay loam
Btb1—14 to 24 inches; silt loam
Btb2—24 to 32 inches; silt loam
Bkb—32 to 42 inches; silt loam

C1—42 to 56 inches; silt loam
C2—56 to 60 inches; very fine sandy loam

Minor Components

Keith
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 1 percent
Drainage class: Well drained

Duroc
Extent: About 3 percent of the unit
Landform: Swales on tablelands
Slope: 0 to 1 percent
Drainage class: Well drained

Alliance
Extent: About 2 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 1 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained

4472—Las Animas loam, channeled, occasionally flooded

Map Unit Composition

Las Animas: 95 percent
Minor components: 5 percent

Component Descriptions

Las Animas
MLRA: 72—Central High Tableland
Landform: Flood plains in valleys
Parent material: Calcareous stratified alluvium
Slope: 0 to 2 percent
Drainage class: Poorly drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: Moderate (about 6.8 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: Occasional
Depth to seasonal zone of saturation: About 0 to 18 inches
Surface runoff class: Negligible
Ecological site: Loamy Bottomland
Land capability (nonirrigated): 6w

Typical Profile:
A—0 to 20 inches; loam
AC—20 to 25 inches; loam
C1—25 to 30 inches; sandy loam
C2—30 to 60 inches; stratified gravelly coarse sand to sand

Minor Components

Glenberg
Extent: About 5 percent of the unit

Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Well drained
Ecological site: Sandy Lowland—Veg. Zone 1

4662—Lodgepole loam, occasionally ponded

Map Unit Composition

Lodgepole: 100 percent

Component Descriptions

Lodgepole
MLRA: 72—Central High Tableland
Landform: Playas on tablelands
Parent material: Loess
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained
Slowest saturated hydraulic conductivity: Low (about 0.01 inch per hour)
Available water capacity: High (about 10.0 inches)
Shrink-swell potential: High (about 7.5 LEP)
Flooding hazard: None
Ponding hazard: Occasional
Depth to seasonal zone of saturation: About 0 to 0 inches
Surface runoff class: Negligible
Ecological site: Closed Upland Depression
Land capability (irrigated): 4w
Land capability (nonirrigated): 3w

Typical Profile:
A—0 to 6 inches; loam
Bt1—6 to 18 inches; silty clay
Bt2—18 to 23 inches; silty clay
Bt3—23 to 29 inches; silty clay loam
BC—29 to 43 inches; loam
C—43 to 80 inches; very fine sandy loam

Similar inclusions: Soils that have a loamy fine sand, fine sand, or weathered sandstone below a depth of 40 inches, or soils that have a silt loam or silty clay surface.

6420—Rosebud loam, 0 to 1 percent slopes

Map Unit Composition

Rosebud: 85 percent
Minor components: 15 percent

Component Descriptions

Rosebud
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Loess over weakly cemented, fine grained sandstone
Slope: 0 to 1 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)

Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Low (about 4.7 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Loamy Upland
Land capability (irrigated): 2s
Land capability (nonirrigated): 3c

Typical Profile:
Ap—0 to 6 inches; loam
Bt1—6 to 11 inches; clay loam
Bk2—11 to 15 inches; clay loam
Bk—15 to 19 inches; sandy clay loam
C—19 to 30 inches; sandy loam
Cr—30 to 80 inches; weathered bedrock

Minor Components

Brownson
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 3 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained

Hemingford
Extent: About 3 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 1 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 1

Sidney
Extent: About 3 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 3 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained

Canyon
Extent: About 2 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 3 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow Limy

Satanta
Extent: About 2 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 1 percent
Drainage class: Well drained

6430—Rosebud-Canyon loams, 1 to 3 percent slopes

Map Unit Composition

Rosebud: 60 percent
Canyon: 25 percent
Minor components: 15 percent

Component Descriptions

Rosebud
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Loess over weakly cemented, fine grained sandstone
Slope: 1 to 3 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Low (about 5.2 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Loamy Upland
Land capability (irrigated): 3e
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 6 inches; loam
Bt1—6 to 12 inches; clay loam
Bt2—12 to 22 inches; clay loam
BkC—22 to 25 inches; loam
C—25 to 31 inches; sandy loam
Cr—31 to 60 inches; weathered bedrock

Canyon
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Calcareous loamy residuum derived from limestone and sandstone
Slope: 1 to 3 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: Very low (about 1.9 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Shallow Limy
Land capability (nonirrigated): 6s

Typical Profile:
Ap—0 to 6 inches; loam
C—6 to 10 inches; very fine sandy loam
Cr—10 to 60 inches; weathered bedrock

Minor Components

Blanche
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 1 to 3 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained

Hemingford
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 1 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 1

Satanta
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 1 percent
Drainage class: Well drained

6440—Rosebud-Hemingford loams, 0 to 1 percent slopes

Map Unit Composition

Rosebud: 65 percent
Hemingford: 20 percent
Minor components: 15 percent

Component Descriptions

Rosebud
MLRA: 72—Central High Tableland
Landform: Plains on tablelands (fig. 9)
Parent material: Loess over weakly cemented, fine grained sandstone
Slope: 0 to 1 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Low (about 4.2 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Loamy Upland
Land capability (irrigated): 2s
Land capability (nonirrigated): 3c

Typical Profile:
A—0 to 6 inches; loam
Bt—6 to 17 inches; clay loam
BkC—17 to 23 inches; loam
Cr—23 to 60 inches; weathered bedrock

Figure 9.—Millet in an area of Rosebud-Hemingford loams, 0 to 1 percent slopes.

Hemingford
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Loess over weakly cemented, fine grained sandstone
Slope: 0 to 1 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: High (about 9.1 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Loamy Upland
Land capability (irrigated): 1
Land capability (nonirrigated): 3c

Typical Profile:
Ap—0 to 6 inches; loam
A—6 to 12 inches; loam
Bt—12 to 29 inches; clay loam
BCk—29 to 52 inches; loam
Cr—52 to 60 inches; weathered bedrock

Minor Components

Brownson
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 3 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained

Lodgepole
Extent: About 5 percent of the unit
Landform: Playas on tablelands
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained

Satanta
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 1 percent
Drainage class: Well drained

6442—Rosebud-Blanche complex, 1 to 3 percent slopes

Map Unit Composition

Rosebud: 55 percent
Blanche: 30 percent
Minor components: 15 percent

Component Descriptions

Rosebud
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Loess over weakly cemented, fine grained sandstone
Slope: 1 to 3 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Low (about 4.2 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Loamy Upland
Land capability (irrigated): 3e
Land capability (nonirrigated): 3e

Typical Profile:
A—0 to 6 inches; loam
Bt—6 to 17 inches; clay loam
BkC—17 to 23 inches; loam
Cr—23 to 60 inches; weathered bedrock

Blanche
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Residuum derived from calcareous sandstone
Slope: 1 to 3 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Low (about 4.1 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet

Surface runoff class: Low
Ecological site: Sandy
Land capability (irrigated): 4e
Land capability (nonirrigated): 4e

Typical Profile:
Ap—0 to 5 inches; sandy loam
Bw—5 to 17 inches; sandy loam
BCk—17 to 22 inches; sandy loam
C—22 to 27 inches; sandy loam
Cr—27 to 60 inches; weathered bedrock

Minor Components

Hemingford
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 1 to 3 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 1

Lodgepole
Extent: About 5 percent of the unit
Landform: Playas on tablelands
Slope: 0 to 1 percent
Drainage class: Somewhat poorly drained

Tassel
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 1 to 3 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow Limy

6446—Rosebud-Tassel sandy loams, 0 to 3 percent slopes

Map Unit Composition

Rosebud: 70 percent
Tassel: 20 percent
Minor components: 10 percent

Component Descriptions

Rosebud
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Loess over weakly cemented, fine grained sandstone
Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Low (about 5.2 inches)
Shrink-swell potential: Moderate (about 4.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet

Surface runoff class: Low
Ecological site: Loamy Upland
Land capability (irrigated): 3e
Land capability (nonirrigated): 4e

Typical Profile:
Ap—0 to 5 inches; sandy loam
Bt—5 to 15 inches; clay loam
BkC—15 to 27 inches; loam
C—27 to 37 inches; sandy loam
Cr—37 to 60 inches; weathered bedrock

Tassel
MLRA: 72—Central High Tableland
Landform: Plains on tablelands
Parent material: Residuum derived from calcareous sandstone
Slope: 0 to 3 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Very low (about 1.9 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Very low
Ecological site: Shallow Limy
Land capability (nonirrigated): 6s

Typical Profile:
Ap—0 to 4 inches; sandy loam
C—4 to 16 inches; gravelly sandy loam
Cr—16 to 60 inches; weathered bedrock

Minor Components

Blanche
Extent: About 5 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Sandy

Hemingford
Extent: About 3 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 1 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Silty; Veg. Zone 1

Sidney
Extent: About 2 percent of the unit
Landform: Plains on tablelands
Slope: 0 to 3 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained

7152—Tassel-Ashollow-Rock outcrop complex, 20 to 60 percent slopes

Map Unit Composition

Tassel: 50 percent
Ashollow: 25 percent
Rock outcrop: 15 percent
Minor components: 10 percent

Component Descriptions

Tassel
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands (fig. 10)
Parent material: Residuum derived from calcareous sandstone
Slope: 20 to 60 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Very low (about 1.0 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Shallow Limy
Land capability (nonirrigated): 7s

Typical Profile:
A—0 to 4 inches; gravelly sandy loam

Figure 10.—Native rangeland in an area of Tassel-Ashollow-Rock outcrop complex, 20 to 60 percent slopes.

C—4 to 8 inches; gravelly sandy loam
Cr—8 to 60 inches; weathered bedrock

Ashollow
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands
Hillslopes position: Footslopes
Parent material: Loamy residuum derived from calcareous sandstone
Slope: 20 to 60 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: High (about 10.1 inches)
Shrink-swell potential: Low (about 0.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: High
Ecological site: Sandy
Land capability (nonirrigated): 7e

Typical Profile:
A—0 to 3 inches; very fine sandy loam
AC—3 to 10 inches; very fine sandy loam
C1—10 to 32 inches; very fine sandy loam
C2—32 to 60 inches; very fine sandy loam

Rock outcrop
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands
Slope: 20 to 60 percent
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Very high
Land capability (nonirrigated): 8s

Minor Components

Blanche
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 9 to 30 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained

Broadwater
Extent: About 5 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Somewhat excessively drained
Ecological site: Gravelly Hills

7153—Tassel-Blanche sandy loams, 3 to 9 percent slopes

Map Unit Composition

Tassel: 50 percent
Blanche: 30 percent
Minor components: 20 percent

Component Descriptions

Tassel
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands (fig. 6)
Parent material: Residuum derived from calcareous sandstone
Slope: 3 to 9 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Very low (about 1.0 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Shallow Limy
Land capability (nonirrigated): 6s

Typical Profile:
Ap—0 to 6 inches; sandy loam
Cr—6 to 60 inches; weathered bedrock

Blanche
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands
Parent material: Residuum derived from calcareous sandstone
Slope: 3 to 9 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Low (about 4.1 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Sandy
Land capability (irrigated): 4e
Land capability (nonirrigated): 6e

Typical Profile:
Ap—0 to 5 inches; sandy loam
Bw—5 to 17 inches; sandy loam
BCk—17 to 22 inches; sandy loam
C—22 to 27 inches; sandy loam
Cr—27 to 60 inches; weathered bedrock

Minor Components

Busher
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 9 percent
Depth to restrictive feature: 40 to 60 inches to bedrock (paralithic)
Drainage class: Well drained

Jayem
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands

Slope: 3 to 9 percent
Drainage class: Well drained
Ecological site: Sandy

Rosebud
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 6 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained

Treon
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 3 to 9 percent
Depth to restrictive feature: 10 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Ecological site: Shallow Sandy (15-17sp)

7154—Tassel-Blanche complex, 9 to 30 percent slopes

Map Unit Composition

Tassel: 60 percent
Blanche: 30 percent
Minor components: 10 percent

Component Descriptions

Tassel
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands (fig. 11)
Parent material: Residuum derived from calcareous sandstone
Slope: 9 to 30 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Very low (about 1.7 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Shallow Limy
Land capability (nonirrigated): 6s

Typical Profile:
A—0 to 5 inches; sandy loam
C—5 to 11 inches; sandy loam
Cr—11 to 60 inches; weathered bedrock

Blanche
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands
Parent material: Residuum derived from calcareous sandstone
Slope: 9 to 30 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained

Figure 11.—Cattle grazing on native grass in an area of Tassel-Blanche complex, 9 to 30 percent slopes.

Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Low (about 4.1 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Sandy
Land capability (nonirrigated): 6e

Typical Profile:
A—0 to 8 inches; sandy loam
Bwk—8 to 12 inches; sandy loam
BCk—12 to 19 inches; sandy loam
C—19 to 28 inches; sandy loam
Cr—28 to 60 inches; weathered bedrock

Minor Components

Ashollow
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 9 to 30 percent
Drainage class: Well drained
Ecological site: Sandy

Rock outcrop
Extent: About 3 percent of the unit
Landform: Hillslopes on uplands
Slope: 9 to 30 percent

Bayard
Extent: About 2 percent of the unit
Landform: Alluvial fans on uplands
Slope: 9 to 15 percent
Drainage class: Well drained
Ecological site: Sandy

7180—Tassel and Dix and Altvan soils, 9 to 30 percent slopes

Map Unit Composition

Dix: 35 percent
Tassel: 25 percent
Altvan: 25 percent
Minor components: 15 percent

Component Descriptions

Dix
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands
Parent material: Sandy and gravelly alluvium
Slope: 9 to 30 percent
Surface fragments: About 15 to 20 percent coarse, subrounded gravel
Drainage class: Excessively drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Very low (about 2.8 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Gravelly Hills
Land capability (nonirrigated): 6s

Typical Profile:
A—0 to 7 inches; gravelly sandy loam
AC—7 to 10 inches; gravelly sandy loam
C—10 to 80 inches; gravelly coarse sand

Altvan
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands
Parent material: Loess over sandy and gravelly alluvium
Slope: 9 to 15 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.20 inch per hour)
Available water capacity: Low (about 4.7 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Medium
Ecological site: Loamy Upland
Land capability (nonirrigated): 6e

Typical Profile:
A—0 to 6 inches; sandy loam
Bt1—6 to 11 inches; sandy clay loam
Bt2—11 to 19 inches; sandy clay loam
BCk—19 to 24 inches; loamy coarse sand
2C1—24 to 48 inches; coarse sand
2C2—48 to 80 inches; gravelly coarse sand

Tassel
MLRA: 72—Central High Tableland
Landform: Hillslopes on uplands
Parent material: Residuum derived from calcareous sandstone
Slope: 9 to 30 percent
Depth to restrictive feature: 6 to 20 inches to bedrock (paralithic)
Drainage class: Well drained
Slowest saturated hydraulic conductivity: High (about 2.00 inches per hour)
Available water capacity: Very low (about 1.2 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Shallow Limy
Land capability (nonirrigated): 6s

Typical Profile:
A—0 to 4 inches; fine sandy loam
C—4 to 8 inches; gravelly fine sandy loam
Cr—8 to 60 inches; weathered bedrock

Minor Components

Blanche
Extent: About 5 percent of the unit
Landform: Hillslopes on uplands
Slope: 9 to 30 percent
Depth to restrictive feature: 20 to 40 inches to bedrock (paralithic)
Drainage class: Well drained

Broadwater
Extent: About 4 percent of the unit
Landform: Flood plains in valleys
Slope: 0 to 2 percent
Drainage class: Somewhat excessively drained
Ecological site: Gravelly Hills

Eckley
Extent: About 4 percent of the unit
Landform: Hillslopes on uplands
Slope: 9 to 30 percent
Drainage class: Well drained

Rock outcrop
Extent: About 2 percent of the unit
Landform: Hillslopes on uplands
Slope: 9 to 30 percent

7324—Tripp loam, 0 to 1 percent slopes

Map Unit Composition

Tripp: 90 percent
Minor components: 10 percent

Component Descriptions

Tripp
MLRA: 72—Central High Tableland
Landform: Stream terraces in valleys (fig. 12)
Parent material: Alluvium
Slope: 0 to 1 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: High (about 10.8 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Negligible
Ecological site: Loamy Upland
Land capability (irrigated): 1
Land capability (nonirrigated): 3c

Typical Profile:
Ap—0 to 9 inches; loam
Bw—9 to 24 inches; loam
BCk—24 to 35 inches; loam
C—35 to 60 inches; very fine sandy loam

Figure 12.—Gravity-irrigated corn in an area of Trip loam, 0 to 1 percent slopes.

Minor Components

Bayard
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 1 percent
Drainage class: Well drained
Ecological site: Sandy

Satanta
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 0 to 1 percent
Drainage class: Well drained

7325—Tripp loam, 1 to 3 percent slopes

Map Unit Composition

Tripp: 85 percent
Minor components: 15 percent

Component Descriptions

Tripp
MLRA: 72—Central High Tableland
Landform: Stream terraces in valleys
Parent material: Coarse-silty alluvium
Slope: 1 to 3 percent
Drainage class: Well drained
Slowest saturated hydraulic conductivity: Moderately high (about 0.60 inch per hour)
Available water capacity: High (about 10.8 inches)
Shrink-swell potential: Low (about 1.5 LEP)
Flooding hazard: None
Depth to seasonal zone of saturation: More than 6 feet
Surface runoff class: Low
Ecological site: Loamy Upland
Land capability (irrigated): 2e
Land capability (nonirrigated): 3e

Typical Profile:
Ap—0 to 9 inches; loam
Bw—9 to 24 inches; loam
BCk—24 to 35 inches; loam
C—35 to 60 inches; very fine sandy loam

Minor Components

Bayard
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 1 to 3 percent
Drainage class: Well drained
Ecological site: Sandy

Cheyenne
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys

Slope: 1 to 3 percent
Drainage class: Well drained

Satanta
Extent: About 5 percent of the unit
Landform: Stream terraces in valleys
Slope: 1 to 3 percent
Drainage class: Well drained

9900—Arents, earthen dam

Component Description

This map unit consists of barriers constructed to control the flow or raise the level of water. The dams are typically constructed with earthen material. They may be covered with earthy material or armored with concrete or rock.

9970—Borrow pit

Component Description

This map unit consists of an open excavation from which soil and, commonly, underlying material have been removed. Rock or other material are exposed in the excavation.

9975—Sanitary landfill

Component Description

This map unit consists of accumulated waste products of human habitation that can be above or below the natural ground level. The unit is poorly suited to use as cropland or as a site for engineering practices.

9985—Gravel pits

Component Description

Pits are open excavations from which soil and commonly underlying material have been removed, exposing either rock or other material. Kinds include Pits, mine; Pits, gravel, and Pits, quarry. Commonly, pits are closely associated with Dumps.

9998—Water

Component Description

This map unit includes streams, lakes, ponds, and estuaries. These areas are covered with water in most years, at least during the period that is warm enough for plants to grow. Many areas are covered throughout the year.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; for agricultural waste management; and as 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.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited, somewhat limited,* and *very limited*. The suitability ratings are expressed as *well suited, moderately suited, poorly suited,* and *unsuited* or as *good, fair,* and *poor*, and *very poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate

gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

Crops and Pasture

General management needed for crops and pasture is suggested in this section. The estimated yields of the main crops and pasture plants are listed, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units.” Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

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 criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include 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 forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

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, 2e. The letter *e* shows that the main hazard is the 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 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

The acreage of soils in each capability class or subclass is shown in table 4. The capability classification of map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields table.

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 5. 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 land capability classification of map units in the survey area also is shown in the table.

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 also are 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 ensures 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 5 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 Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food,

feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

A recent trend in land use in some parts of the survey area 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 less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 6. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading “Detailed Soil Map Units.”

Rangeland

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

Table 7 shows, for each soil that supports rangeland vegetation, the ecological site and the potential annual production of vegetation in favorable, normal, and unfavorable years. An explanation of the column headings in the table follows.

An *ecological site* is the product of all the environmental factors responsible for its development. It has characteristic soils that have developed over time throughout the soil development process; a characteristic hydrology, particularly infiltration and runoff, that has developed over time; and a characteristic plant community (kind and amount of vegetation). The hydrology of a site is influenced by development of the soil and plant community. The vegetation, soils, and hydrology are all interrelated. Each is influenced by the others and influences the development of the others. The plant community on an ecological site is typified by an association of species that differs from that of other ecological sites in the kind and/or proportion of species or in total production. Descriptions of ecological sites are provided in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service.

Total dry-weight production is 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. Yields are adjusted to a common percent of air-dry moisture content.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range similarity index and rangeland trend. Range similarity index is determined by comparing the present plant community with the potential natural plant community on a particular rangeland ecological site. The more closely the existing community resembles the potential community, the higher the range similarity index. Rangeland trend is defined as the direction of change in an existing plant community relative to the potential natural plant community. Further information about the range similarity index and rangeland trend is available in chapter 4 of the "National Range and Pasture Handbook" (http://www.ftw.nrcs.usda.gov/glti/NRPH.html).

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, an area with a range similarity index somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, yards, fruit trees, gardens, and cropland from wind and snow; help to keep snow on fields; and provide food and cover for wildlife (fig. 13). Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field (fig. 14). The interval depends on the erodibility of the soil.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in the table are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service or of the Cooperative Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in tables 9a and 9b according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally

Figure 13.—Trees and shrubs have been planted with a fabric mulch, which improves survival by reducing competition and conserving moisture.

cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in tables 9a and 9b can be supplemented by other information in this survey, for example, interpretations for building site development, sanitary facilities, agricultural waste management, construction materials, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope,

stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Figure 14.—A field windbreak in northern Kimball County.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

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 10, 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 flooding. Soil temperature and soil moisture also are 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, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, 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 flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. 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, cedar, 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, bitterbrush, snowberry, and big sagebrush.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

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. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include antelope, deer, 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. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 11a and 11b show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the

soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

Tables 12a and 12b show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and

contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A *trench sanitary landfill* is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an *area sanitary landfill*, solid 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. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading

required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

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 the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Agricultural Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

Tables 13a and 13b show the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of these tables, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 milligrams per liter. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 milligrams per liter. When wastewater is applied, checks should be made to ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste, application of sewage sludge, and disposal of wastewater by irrigation) and for waste management systems that are designed only

for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect agricultural waste management. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Application of manure and food-processing waste not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings. The ratings are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Application of sewage sludge not only disposes of waste material but also can improve crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, availablewater capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood that wind erosion or water erosion will transport the waste material from the application

site. Stones, cobbles, a water table, ponding, and flooding can hinder the application of sludge. Permanently frozen soils are unsuitable for waste treatment.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also can improve crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals. Permanently frozen soils are not suitable for disposal of wastewater by irrigation.

Overland flow of wastewater is a process in which wastewater is applied to the upper reaches of sloped land and allowed to flow across vegetated surfaces, sometimes called terraces, to runoff-collection ditches. The length of the run generally is 150 to 300 feet. The application rate ranges from 2.5 to 16.0 inches per week. It commonly exceeds the rate needed for irrigation of cropland. The wastewater leaves solids and nutrients on the vegetated surfaces as it flows downslope in a thin film. Most of the water reaches the collection ditch, some is lost through evapotranspiration, and a small amount may percolate to the ground water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, and the design and construction of the system. Reaction and the cation-exchange capacity affect absorption. Reaction, salinity, and the sodium adsorption ratio affect plant growth and microbial activity. Slope, permeability, depth to a water table, ponding, flooding, depth to bedrock or a cemented pan, stones, and cobbles affect design and construction. Permanently frozen soils are unsuitable for waste treatment.

Rapid infiltration of wastewater is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil. The wastewater may eventually reach the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil properties that affect the risk of pollution and the design, construction, and performance of the system. Depth to a water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance. Permanently frozen soils are unsuitable for waste treatment.

Slow rate treatment of wastewater is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water may percolate to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented either through control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth microbial activity, erodibility, and the application of waste. The properties

that affect absorption include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, a water table, ponding, and flooding can hinder the application of waste. Permanently frozen soils are unsuitable for waste treatment.

Construction Materials

Tables 14a and 14b give information about the soils as potential sources of gravel, sand, reclamation material, roadfill, and topsoil. Normal compaction, minor processing, and other standard construction practices are assumed.

Gravel and *sand* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 14a, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains gravel or sand, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated *good, fair,* or *poor* as potential sources of gravel and sand. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of gravel or sand. The number 0.00 indicates that the layer is a poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated *good, fair,* or *poor* as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of reclamation material, roadfill, or topsoil. The lower the number, the greater the limitation.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 15 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine particle-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 to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

Table 16 gives the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 15). “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an

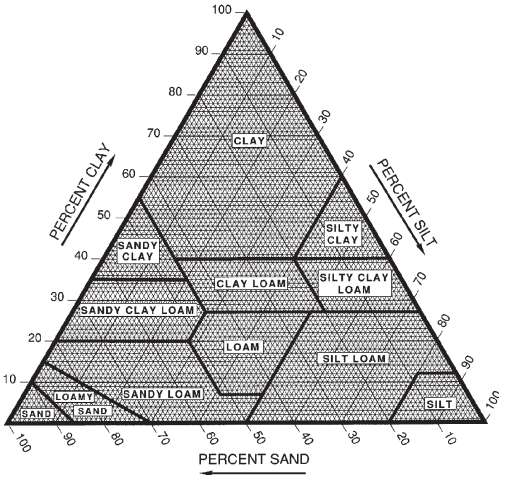

Figure 15.—Percentage of clay, silt, and sand in the basic USDA soil textural classes.

appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2001) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2000).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in 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 particle-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is generally omitted in the table.

Physical Properties

Table 17 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In the table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In the table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In the table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity refers to the ability of a soil to transmit water or air. The term “permeability,” as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of water movement, in micrometers per second (um/sec), when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent;

moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In the table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

Descriptions of these groups are available in the “National Soil Survey Handbook” (USDA, 2003).

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 18 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Soil Features

Table 19 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness of the restrictive layer, which significantly affects the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Table 20 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 20 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 20 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare,

occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1998 and 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 21 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

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 Ustolls (*ust*, meaning subhumid, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplustolls (*Hapl*, meaning minimal horizonation, plus *ustolls*, the suborder of the Mollisols that has a ustic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. An example is Aridic Haplustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed, superactive, mesic Aridic Haplustolls.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each 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” (Soil Survey Division Staff, 1993). Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” (Soil Survey Staff, 1999) and in “Keys to Soil Taxonomy” (Soil Survey Staff, 1998). Unless otherwise indicated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

Albinas Series

The Albinas series consists of very deep, well drained soils that formed in alluvium from mixed sources. These soils are on alluvial fans and terraces. Slopes range from 0 to 6 percent. The average annual precipitation is 12 to 19 inches, and the average annual air temperature is 45 to 50 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Pachic Argiustolls

Typical Pedon

Albinas loam, in an area of rangeland, in Laramie County, Wyoming; 50 feet south and 35 feet east of the northwest corner of sec. 32, T. 14 N., R. 65 W.; lat. 41 degrees 08 minutes 42 seconds N. and long. 104 degrees 41 minutes 37 seconds W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 3 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; many very fine roots; many very fine pores; slightly alkaline (pH 7.8); clear smooth boundary.

Bt1—3 to 12 inches; brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate coarse prismatic structure; hard, firm, slightly sticky and slightly plastic; common very fine roots; common very fine pores; many prominent clay films on vertical faces of peds; slightly alkaline (pH 7.8); clear smooth boundary.

Bt2—12 to 25 inches; brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate coarse prismatic structure; hard, firm, slightly sticky and slightly plastic; common very fine roots; common very fine pores; many prominent clay films on vertical faces of peds; slightly alkaline (pH 7.8); clear smooth boundary.

Bk—25 to 60 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; massive; hard, firm, slightly sticky and slightly plastic; strong effervescence; calcium carbonate disseminated and as few soft masses; moderately alkaline (pH 8.4).

Range in Characteristics

Mean annual soil temperature: 47 degrees to 52 degrees F
Depth to the mollic epipedon: 20 to 40 inches
Depth to carbonates: Continuous horizons of secondary calcium carbonate typically at 20 to 30 inches; may be as deep as 39 inches in some areas.
Parent material: Medium textured alluvial sediments
Mean annual temperature: 45 to 50 degrees F
Average annual precipitation: 12 to 19 inches
Frost-free period: 110 to 140 days

A horizon:
Hue—2.5Y or 10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—2 or 3
Texture—loam or fine sandy loam
Reaction—neutral or slightly alkaline

Bt horizon:
Hue—10YR or 7.5YR
Value—4 to 6 dry, 2 or 3 moist

Chroma—2 or 3
Texture—loam, clay loam, or sandy clay loam
Reaction—neutral or slightly alkaline

Bk horizon:
Hue—2.5Y or 10YR
Value—5 to 7 dry, 3 to 5 moist
Chroma—2 to 4
Texture—loam, silt loam, very fine sandy loam, or fine sandy loam
Reaction—slightly alkaline to strongly alkaline

Alliance Series

The Alliance series consists of deep, well drained soils that formed in a thin layer of loamy loess and the underlying calcareous, weakly cemented limestone or sandstone. These soils are on uplands and have slopes ranging from 0 to 12 percent. Permeability is moderate or moderately slow. The mean annual temperature is about 50 degrees F, and the mean annual precipitation is about 16 inches.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Aridic Argiustolls

Typical Pedon

Alliance silt loam, on a convex, southwest-facing slope of 2 percent, in a cultivated field, in Dawes County, Nebraska; 10 miles south and 6 miles east of Crawford, Nebraska; 1,600 feet north and 100 feet west of the southeast corner of sec. 26, T. 30 N., R. 51 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable; slightly alkaline; abrupt smooth boundary.
A—8 to 11 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure parting to weak fine granular; slightly hard, very friable; slightly alkaline; clear smooth boundary.
Bt1—11 to 15 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable; few thin patchy clay films on faces of peds; slightly alkaline; clear smooth boundary.
Bt2—15 to 20 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable; few thin patchy clay films on faces of peds; slightly alkaline; clear smooth boundary.
BC—20 to 26 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable; 2 percent sandstone gravel, by volume; slightly alkaline; clear smooth boundary.
C—26 to 51 inches; light gray (10YR 7/2) very fine sandy loam, light brownish gray (10YR 6/2) moist; massive; soft, very friable; 5 percent sandstone gravel, by volume; violent effervescence; moderately alkaline; clear wavy boundary.
Cr—51 to 60 inches; light gray (10YR 7/2) weakly cemented very fine grain sandstone; light brownish gray (10YR 6/2) moist; violent effervescence; moderately alkaline.

Range in Characteristics

Thickness of the solum: 16 to 35 inches
Depth to free carbonates: 16 to 35 inches

Thickness of the mollic epipedon: 8 to 20 inches
Depth to the Cr horizon: 40 to 60 inches
Other features: Glass shards throughout the profile in some areas, with the highest concentrations in the C and Cr horizons. Some pedons have a Bk horizon.

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 or 2
Texture—silt loam; less commonly loam, very fine sandy loam, or fine sandy loam
Reaction—neutral or slightly alkaline

Bt horizon:
Hue—10YR
Value—5 or 6 dry, 3 to 5 moist
Chroma—2 or 3
Texture—silty clay loam; less commonly loam, silt loam, or clay loam
Content of clay—25 to 35 percent
Reaction—neutral or slightly alkaline

BC horizon (if it occurs):
Hue—10YR
Value—6 or 7 dry, 4 to 6 moist
Chroma—2 or 3
Texture—silt loam; less commonly very fine sandy loam or loam
Reaction—neutral to moderately alkaline

C horizon:
Hue—10YR
Value—6 to 8 dry, 4 to 6 moist
Chroma—2 or 3
Texture—very fine sandy loam; less commonly silt loam, loam, loamy very fine sand, or fine sandy loam
Reaction—mildly alkaline or moderately alkaline
Content of rock fragments—10 percent sandstone gravel, by volume

Cr horizon:
Hue—10YR or 7.5YR
Value—7 or 8 dry, 6 or 7 moist
Chroma—2 to 4

Altvan Series

The Altvan series consists of well drained soils that formed in loamy sediments on upland hillslopes and valley terraces. These soils are moderately deep to sand or gravelly sand. Permeability is moderate in the solum and very rapid in the underlying material. Slopes range from 0 to 15 percent. The mean annual precipitation is about 16 inches, and the mean annual temperature is 50 degrees F.

Taxonomic classification: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Aridic Augiustolls

Typical Pedon

Altvan loam (fig. 16), on a slope of less than 1 percent in a cultivated field, in Kimball County, Nebraska; about 6 miles north and 6.5 miles west of Bushnell; 2,160 feet east and 100 feet south of the northwest corner of sec. 31, T. 16 N., R. 58 W. When described, the soil was moist to a depth of 23 inches.

Figure 16.—Profile of the Altvan soil.

Ap—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; many fine pebbles; neutral; abrupt smooth boundary.

A—6 to 8 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable; many fine pebbles; neutral; abrupt smooth boundary.

BA—8 to 12 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable; neutral; clear smooth boundary.

Bt—12 to 23 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; hard, firm; thin patchy films on faces of peds; neutral in the upper part, slightly alkaline in the lower part; clear smooth boundary.

Bk—23 to 26 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable; disseminated carbonates in root channels and on faces of peds; violent effervescence; moderately alkaline; clear smooth boundary.

C1—26 to 35 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; massive; soft, very friable; strong effervescence; strongly alkaline; gradual wavy boundary.

2C2—35 to 60 inches; pale brown (10YR 6/3) gravelly sand, brown (10YR 5/3) moist; single grain; 20 percent gravel, by volume; strong effervescence; strongly alkaline.

Range in Characteristics

Mean annual soil temperature: 49 to 59 degrees F

Depth to abrupt textural change: 20 to 40 inches; typically 24 to 36 inches

Depth to secondary calcium carbonate: 16 to 38 inches

Thickness of the solum: 16 to 38 inches

Thickness of the mollic epipedon: 7 to 20 inches; includes the upper part of the argillic horizon in some pedons

Content of clay in the particle-size control section (weighted average): 20 to 35 percent

Content of rock fragments: 0 to 15 percent gravel

Other features: Some pedons have a very gravelly 2Bk horizon that extends to a depth of 60 inches or more; some pedons have a layer of fine sandy loam less than 5 inches thick above the 2C horizon.

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—2 or 3
Texture—loam; less commonly sandy loam, fine sandy loam, or silt loam
Content of clay—15 to 23 percent
Reaction—slightly acid to slightly alkaline

Bt horizon:
Hue—10YR or 7.5YR
Value—4 to 6 dry, 2 to 4 moist
Chroma—2 to 4
Texture—clay loam; less commonly sandy clay loam or loam
Content of clay—20 to 35 percent
Reaction—neutral to moderately alkaline

Bk horizon:
Hue—10YR or 7.5YR
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 or 3
Texture—silt loam; less commonly loam
Content of clay—8 to 15 percent
Calcium carbonate equivalent—1 to 10 percent
Reaction—slightly alkaline to strongly alkaline

C horizon:
Hue—10YR or 7.5YR
Value—6 to 8 dry, 5 or 6 moist
Chroma—2 or 3
Texture—loam; less commonly silt loam
Content of clay—8 to 15 percent
Content of rock fragments—0 to 15 percent gravel, by volume
Reaction—slightly alkaline to strongly alkaline

2C horizon:
Hue—10YR or 7.5YR
Value—5 to 7 dry, 4 to 6 moist
Chroma—3 or 4
Texture—gravelly sand; less commonly gravelly coarse sand, sand, or coarse sand
Calcium carbonate equivalent—0 to 10 percent
Content of rock fragments—5 to 35 percent gravel, by volume
Reaction—slightly alkaline to strongly alkaline

Ashollow Series

The Ashollow series consists of very deep, well drained soils on uplands and in sandhill drainageways. These soils formed in loamy and sandy residuum derived from calcareous sandstone. Permeability is moderately rapid. Slopes range from 3 to 60 percent. The mean annual temperature is about 49 degrees F, and the mean annual precipitation is about 17 inches.

Taxonomic classification: Coarse-loamy, mixed, calcareous, superactive, mesic Aridic Ustorthents

Typical Pedon

Ashollow very fine sandy loam, on a convex, southwest-facing slope of 22 percent, in an area of native grass about 5 miles southeast of Lewellen on State Highway 26, in Garden County, Nebraska; 1,100 feet east and 100 feet south of the northwest corner of sec. 23, T. 15 N., R. 42 W.; Ruthton USGS topographic quadrangle; lat. 41 degrees 15 minutes 53 seconds N. and long. 102 degrees 06 minutes 31 seconds W. When described, the soil was dry throughout.

A—0 to 3 inches; grayish brown (10YR 5/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine granular structure; slightly hard, very friable; slight effervescence; moderately alkaline; clear smooth boundary.

AC—3 to 10 inches; brown (10YR 5/3) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; slightly hard, very friable; 2 percent sandstone gravel, by volume; violent effervescence; moderately alkaline; gradual smooth boundary.

C1—10 to 32 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 4/3) moist; massive; slightly hard, very friable; 2 percent sandstone gravel, by volume; violent effervescence; moderately alkaline; gradual smooth boundary.

C2—32 to 80 inches; light yellowish brown (10YR 6/4) very fine sandy loam, brown (10YR 5/3) moist; massive; slightly hard, very friable; 3 percent sandstone gravel, by volume; violent effervescence; moderately alkaline.

Range in Characteristics

Depth to carbonates: 0 to 10 inches; content of carbonates increases uniformly as depth increases

Content of rock fragments in the particle-size control section: 2 to 15 percent, by volume; typically less than 5 percent

A horizon:

Hue—10YR
Value—4 or 5 dry, 3 or 4 moist
Chroma—2 or 3
Reaction—slightly alkaline or moderately alkaline
Texture—very fine sandy loam, fine sandy loam, or loamy very fine sand
Special features—where value is less than 5.5 dry or 3.5 moist, the horizon is less than 7 inches thick

AC horizon (if it occurs):

Hue—10YR
Value—4 to 6 dry, 4 or 5 moist
Chroma—2 to 4
Reaction—slightly alkaline or moderately alkaline
Texture—very fine sandy loam, loamy very fine sand, or fine sandy loam

C horizon:

Hue—10YR
Value—6 to 8 dry, 4 to 7 moist
Chroma—2 to 4
Reaction—slightly alkaline or moderately alkaline
Texture—very fine sandy loam, fine sandy loam, or loamy very fine sand

Bayard Series

The Bayard series consists of very deep, well drained, soils on foot slopes, and stream terraces. They formed in colluvial-alluvial sediments weathered mostly from

sandstone. Permeability is moderately rapid. Slopes range from 0 to 6 percent. The mean annual precipitation is about 16 inches, and the mean annual temperature is about 53 degrees F.

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Torriorthentic Haplustolls

Typical Pedon

Bayard fine sandy loam, in a cultivated field, in Garden County, Nebraska; about 5.5 miles west of Oshkosh, Nebraska, on US highway 26; 1,600 feet north and 1,800 feet east of the southwest corner of sec. 13, T. 17 N., R. 45 W.; Coumbe Bluff NE USGS topographic quadrangle; lat. 41 degrees 26 minutes 36 seconds N. and long. 102 degrees 27 minutes 28 seconds W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 7 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak, fine granular structure; soft, very friable; neutral; abrupt smooth boundary.
A—7 to 13 inches; dark grayish brown (10YR 4/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak, coarse, subangular blocky structure; soft, very friable; slight effervescence; slightly alkaline; clear smooth boundary.
AC—13 to 22 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak, coarse subangular blocky structure; soft, very friable; neutral; clear smooth boundary.
C1—22 to 42 inches; light brownish gray (10YR 6/2) fine sandy loam, brown (10YR 5/3) moist; massive; soft, very friable; strong effervescence; slightly alkaline; gradual wavy boundary.
C2—42 to 55 inches; grayish brown (10YR 5/2) fine sandy loam; brown (10YR 5/3) moist; massive; soft, very friable; strong effervescence; moderately alkaline; gradual wavy boundary.
C3—55 to 80 inches; grayish brown (10YR 5/2) fine sandy loam; brown (10YR 5/3) moist; massive; soft, very friable; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to carbonates: 8 to 20 inches
Thickness of the mollic epipedon: 8 to 20 inches
Mean annual precipitation: 14 to 18 inches
Annual temperature: 47 to 59 degrees F
Other features: Some pedons have a BK horizon instead of an AC horizon.

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—2 or 3
Reaction—neutral or slightly alkaline
Texture—fine sandy loam; less commonly loam, sandy loam, very fine sandy loam, loamy fine sand, loamy sand, or loamy very fine sand

AC horizon:
Hue—10YR
Value—5 or 6 dry, 3 or 4 moist
Chroma—2 or 3
Reaction—slightly alkaline or moderately alkaline
Texture—fine sandy loam, sandy loam, very fine sandy loam, or loamy very fine sand

C horizon:
Hue—10YR

Value—5 to 7 dry, 4 to 6 moist
Chroma—2 or 3
Reaction—slightly alkaline or moderately alkaline
Texture—fine sandy loam, very fine sandy loam, or loamy very fine sand; loamy fine sand in the lower part of some pedons
Content of sand—more than 15 percent fine sand and coarser; less than 30 percent medium sand and coarser
Content of clay—less than 18 percent
Special feature—gravel-size granite and sandstone pebbles on the surface and throughout the solum

Blanche Series

The Blanche series consists of well drained soils on uplands. These soils are moderately deep over weakly cemented limestone and very fine grained sandstone of the Ogallala Formation. They formed in loamy, calcareous residuum. Permeability is moderately rapid. Slopes range from 0 to 20 percent. The mean annual precipitation is 18 inches, and the mean annual temperature is 53 degrees F.

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Aridic Haplustolls

Typical Pedon

Blanche very fine sandy loam, in a nearly level area in a cultivated field, 8 miles west and 13 miles north of Imperial, in Chase County, Nebraska; 1,450 feet west and 516 feet south of the northeast corner of sec. 6, T. 8 N., R. 39 W. When described, the soil was dry throughout.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine granular structure; slightly hard, very friable; common very fine and few fine roots; slightly alkaline; abrupt smooth boundary.

A—6 to 11 inches; dark grayish brown (10YR 4/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate very fine and fine granular structure; slightly hard, very friable; common very fine and few fine roots; neutral; clear smooth boundary.

Bw1—11 to 19 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard, very friable; few very fine and fine roots; common very fine tubular pores; slightly alkaline; clear smooth boundary.

Bw2—19 to 26 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, very friable; few fine roots; common very fine tubular pores; common worm channels about 2 to 4 mm in diameter; slightly alkaline; clear smooth boundary.

Bk—26 to 34 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, very friable; common fine roots; few very fine tubular pores; many mycelial threads of calcium carbonate; common chips and fragments of limestone; violent effervescence; moderately alkaline; abrupt wavy boundary.

Cr—34 to 80 inches; very pale brown (10YR 8/2), weakly cemented limestone of the Ogallala Formation, light gray (10YR 7/2) moist; violent effervescence; strongly alkaline.

Range in Characteristics

Depth to carbonates: 8 to 32 inches
Depth to Cr horizon: 20 to 40 inches
Thickness of the mollic epipedon: 7 to 20 inches
Thickness of the solum: 17 to 39 inches
Other features: A C horizon in some pedons. Horizons with value of less than 5.5 dry or 3.5 moist extend to a depth of 20 to 32 inches, but the organic carbon content at a depth of more than 20 inches is less than 0.6 percent.

Ap and A horizons:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 to 3
Reaction—neutral or slightly alkaline
Texture—very fine sandy loam, loam, fine sandy loam, loamy fine sand, or loamy sand

Bw1 horizon:
Hue—10YR
Value—4 to 6 dry, 2 to 4 moist
Chroma—2 or 3
Reaction—neutral or slightly alkaline
Texture—fine sandy loam, very fine sandy loam, or loam

Bw2 horizon:
Hue—10YR
Value—4 to 6 dry, 2 to 4 moist
Chroma—2 or 3
Reaction—slightly alkaline or moderately alkaline
Texture—fine sandy loam, very fine sandy loam, or loam

Bk horizon (if it occurs):
Hue—10YR
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 or 3
Reaction—slightly alkaline or moderately alkaline
Texture—fine sandy loam, very fine sandy loam, loam, or loamy fine sand

Cr horizon:
Hue—10YR
Value—7 or 8 dry, 6 or 7 moist
Chroma—2 to 4

Broadwater Series

The Broadwater series consists of very deep, excessively drained soils on valley flood plains. These soils formed in stratified sandy and gravelly alluvium. Slopes range from 0 to 2 percent. The mean annual precipitation is about 17 inches at the type location, and the mean annual air temperature is about 50 degrees F.

Taxonomic classification: Sandy, mixed, mesic Aridic Ustifluvents

Typical Pedon

Broadwater loamy sand, on a slope of 1 percent on a channeled flood plain in an area of rangeland, in Garden County, Nebraska; about 3.5 miles south and 0.5 mile west of Oshkosh; 1,600 feet south and 900 feet west of the northeast corner of sec.

21, T. 16 N., R. 44 W.; Barn Butte USGS topographic quadrangle; lat. 41 degrees 20 minutes 50 seconds N. and long. 102 degrees 21 minutes 45 seconds W.

A—0 to 3 inches; light brownish gray (10YR 6/2) loamy sand, brown (10YR 4/3) moist; weak fine granular structure; soft, very friable; 3 percent gravel, by volume; strong effervescence; slightly alkaline; clear smooth boundary.

C1—3 to 9 inches; pale brown (10YR 6/3) loamy sand, brown (10YR 5/3) moist; single grain; soft, very friable; thin strata of loamy very fine sand; 3 percent gravel, by volume; strong effervescence; slightly alkaline; abrupt smooth boundary.

2C2—9 to 32 inches; pale brown (10YR 6/3) gravelly coarse sand, brown (10YR 5/3) moist; single grain; loose; thin strata of loamy very fine sand; 18 percent gravel, by volume; strong effervescence; slightly alkaline; abrupt smooth boundary.

2C3—32 to 60 inches; very pale brown (10YR 7/3) gravelly coarse sand, pale brown (10YR 6/3) moist; single grain; loose; thin strata of coarse sand; 31 percent gravel, by volume; strong effervescence; slightly alkaline.

Range in Characteristics

Mean annual soil temperature: 49 to 55 degrees F
Depth to secondary calcium carbonate: 0 to 80 inches
Texture of the particle-size control section: Sandy

A horizon:
- Hue—10YR
- Value—5 or 6 dry, 3 to 5 moist
- Chroma—2 to 4
- Texture—loamy sand or loamy fine sand
- Content of clay—3 to 10 percent
- Content of rock fragments—2 to 5 percent sandstone and granitic gravel, by volume
- Reaction—neutral or slightly alkaline

C horizon:
- Hue—10YR
- Value—5 to 7 dry, 4 to 6 moist
- Chroma—2 to 4
- Texture—loamy sand or sand with strata of finer textured material
- Content of clay—3 to 10 percent
- Content of rock fragments—2 to 5 percent gravel, by volume
- Calcium carbonate equivalent—0 to 10 percent
- Reaction—neutral or slightly alkaline

2C horizon:
- Hue—10YR
- Value—5 to 7 dry, 4 to 6 moist
- Chroma—2 to 4
- Texture—coarse sand or gravelly coarse sand
- Content of rock fragments—15 to 35 percent gravel; ranges from 5 to 35 percent, by volume
- Content of clay—0 to 3 percent
- Calcium carbonate equivalent—0 to 10 percent
- Reaction—neutral or slightly alkaline

Brownson Series

The Brownson series consists of well drained soils that are shallow over cemented fine grain sandstone. These soils formed in a thin mantle of loess and calcareous

residuum derived from sandstone of the Ash Hollow Formation of the Ogallala Group on tablelands. Permeability is moderate. Slopes range from 0 to 3 percent. The mean annual precipitation is about 16 inches, and the mean annual temperature is about 51 degrees F.

Taxonomic classification: Clayey, mixed, superactive, mesic, shallow Aridic Argiustolls

Typical Pedon

Brownson loam, on a less than 1 percent slope in a cultivated field, in Kimball County, Nebraska; about 14 miles south on Highway 29 and 1.75 miles east of Kimball; 1,800 feet east and 200 feet south of the northeast corner of sec. 12, T. 12 N., R. 56 W.; long. 41 degrees 01 minute 9 seconds N. and lat. 103 degrees 39 minutes 3 seconds W. (Colors are for dry soil unless otherwise indicated.)

Ap1—0 to 3 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak very fine granular structure; soft, very friable; neutral; abrupt smooth boundary.

Ap2—3 to 5 inches; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky and moderate fine subangular blocky structure; soft, very friable; neutral; abrupt smooth boundary.

Bt1—5 to 8 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; strong fine and very fine subangular blocky structure; moderately hard, firm; neutral; clear smooth boundary.

Bt2—8 to 13 inches; yellowish brown (10YR 5/4) clay loam, brown (10YR 4/3) moist; strong fine prismatic structure parting to strong medium subangular blocky; moderately hard, firm; thin discontinuous films on faces of peds; slightly alkaline; abrupt wavy boundary.

2Bkc—13 to 17 inches; extremely channery sandy loam, white (10YR 8/1) weakly cemented fractured sandstone, moderately alkaline.

2Cr—17 to 25 inches; white (10YR 8/1) cemented sandstone, indurated caliche laminated and discontinuous across the profile.

Range in Characteristics

Mean annual soil temperature: 49 to 55 degrees F
Depth to paralithic contact: 10 to 20 inches
Depth to secondary calcium carbonate: 10 to 20 inches
Thickness of the solum: 10 to 20 inches
Thickness of the mollic epipedon: 7 to 20 inches
Content of clay in the particle-size control section (weighted average): 33 to 40 percent

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—2 or 3
Texture—loam; less commonly very fine sandy loam or fine sandy loam
Reaction—neutral or slightly alkaline

Bt horizon:
Hue—10YR
Value—4 to 6 dry, 3 to 5 moist
Chroma—2 to 4
Texture—clay loam; less commonly sandy clay loam
Content of clay—33 to 40 percent
Reaction—neutral or slightly alkaline

2Bkc horizon:
Hue—10YR
Value—6 to 8 dry, 4 to 7 moist
Chroma—1 to 4
Texture—loam, very fine sandy loam, or fine sandy loam
Calcium carbonate equivalent—0 to 5 percent
Reaction—slightly alkaline or moderately alkaline

2Cr horizon:
Hue—10YR
Value—7 or 8 dry, 6 or 7 moist
Chroma—1 or 2
Texture—cemented fractured sandstone

Busher Series

The Busher series consists of deep, well drained soils that formed in material weathered from soft fine grained sandstone on uplands. Permeability is moderately rapid. Slopes range from 0 to 30 percent. The mean annual air temperature is 48 degrees F, and the mean annual precipitation is 18 inches at the type location.

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Aridic Haplustolls

Typical Pedon

Busher loamy very fine sand with a slope of 9 percent in native grass, in Dawes County, Nebraska; 5 miles south and 2 miles east of Crawford; 2,100 feet north and 100 feet west of the southeast corner of sec. 36, T. 31 N., R. 52 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 10 inches; dark grayish brown (10YR 4/2) loamy very fine sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral; clear smooth boundary.
Bw—10 to 24 inches; brown (10YR 5/3) loamy very fine sand, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; soft, very friable; neutral; gradual wavy boundary.
BC—24 to 29 inches; pale brown (10YR 6/3) loamy very fine sand, brown (10YR 5/3) moist; weak coarse prismatic structure; soft, very friable; 2 percent sandstone gravel, by volume; neutral; clear wavy boundary.
C—29 to 44 inches; light gray (10YR 7/2) loamy very fine sand, light brownish gray (10YR 6/2) moist; massive; soft, very friable; 5 percent sandstone gravel, by volume; strong effervescence; moderately alkaline; gradual wavy boundary.
Cr—44 to 60 inches; very pale brown (10YR 8/2) soft fine grained sandstone, light brownish gray (10YR 6/2) moist; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches
Thickness of the solum: 15 to 40 inches
Depth to a layer of continuous carbonates: 24 to 36 inches; ranges from 15 to 48 inches; carbonates are throughout the Bw horizon in some pedons.
Presence of glass shards: Throughout the profile and in the lower C horizons; range from 20 to 80 percent, by volume, of the very fine sand and coarse silt fractions.
Depth to soft fine grained sandstone: 40 to 60 inches

A horizon:
Hue—10YR

Value—4 or 5 dry, 2 or 3 moist
Chroma—2 or 3
Texture—loamy very fine sand; includes fine sandy loam or very fine sandy loam
Reaction—slightly acid to slightly alkaline
Content of rock fragments—0 to 5 percent sandstone gravel, by volume

Bw horizon:
Hue—10YR or 2.5Y
Value—5 or 6 dry, 4 or 5 moist
Chroma—2 to 4
Texture—loamy very fine sand; includes very fine sandy loam or fine sandy loam
Reaction—neutral to moderately alkaline
Content of rock fragments—0 to 15 percent sandstone gravel, by volume

C horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 to 8 dry, 4 to 7 moist
Chroma—2 or 3
Texture—loamy very fine sand; includes very fine sandy loam or fine sandy loam
Reaction—neutral to moderately alkaline
Content of rock fragments—0 to 15 percent sandstone gravel, by volume

Cr horizon:
Hue—10YR or 2.5Y
Value—5 to 8 dry, 4 to 7 moist
Chroma—2 to 4

Canyon Series

The Canyon series consists of well drained soils that are shallow over weakly cemented limestone or very fine grained sandstone. These soils formed in loamy, calcareous residuum on uplands. Permeability is moderate. Slopes range from 0 to 60 percent. The mean annual precipitation is about 16 inches, and the mean annual air temperature is about 50 degrees F.

Taxonomic classification: Loamy, mixed, calcareous, superactive, mesic, shallow Ustic Torriorthents

Typical Pedon

Canyon loam (fig. 17), on a convex slope of 8 percent, in an area of rangeland in Box Butte County, Nebraska; 9.5 miles south and 6 miles west of Hemingford; 80 feet east and 2,140 feet north of the southwest corner of sec. 32, T. 26 N., R. 50 W.

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; slightly hard, very friable; slightly alkaline; abrupt smooth boundary.
AC—4 to 9 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure; slightly hard, friable; 5 percent sandstone gravel, by volume; strong effervescence; moderately alkaline; clear smooth boundary.
C—9 to 16 inches; very pale brown (10YR 8/3) very fine sandy loam, pale brown (10YR 6/3) moist; massive; slightly hard, friable; 10 percent sandstone gravel, by volume; strong effervescence; moderately alkaline; abrupt wavy boundary.
Cr—16 to 80 inches; very pale brown (10YR 8/3), weakly cemented, fine grained sandstone; violent effervescence.

Figure 17.—Profile of the Canyon soil.

Range in Characteristics

Thickness of the solum: 6 to 12 inches
Depth to bedrock: Typically about 16 inches; ranges from 6 to 20 inches
Depth to free carbonates: 0 to 6 inches
Reaction: Slightly alkaline or moderately alkaline throughout
Content of sandstone gravel: 0 to 15 percent; ranges from 0 to 25 percent

A horizon:
Hue—10YR
Value—4 to 7 dry, 3 to 6 moist
Chroma—2 or 3
Texture—loam, silt loam, sandy loam, fine sandy loam, very fine sandy loam, gravelly loam, or gravelly sandy loam

AC horizon (if it occurs):
Hue—10YR
Value—5 to 8 dry, 4 to 7 moist
Chroma—1 to 4
Texture—loam, silt loam, sandy loam, fine sandy loam, very fine sandy loam, gravelly loam, or gravelly sandy loam

C horizon (if it occurs):
Hue—10YR or 2.5Y
Value—6 to 8 dry, 4 to 7 moist
Chroma—2 to 4
Texture—loam, very fine sandy loam, silt loam, or gravelly loam
Content of clay—12 to 25 percent

Chappell Series

The Chappell series consists of well drained soils that are moderately deep over coarse sand or gravelly sand. These soils formed in loamy colluvium and alluvium deposited over coarse sand or gravelly sand. They are on river valley terraces and upland hillslopes. Permeability is moderately rapid in the solum and rapid or very rapid in the underlying material. Slopes range from 0 to 15 percent. The mean annual temperature is about 51 degrees F, and the mean annual precipitation is about 15 inches.

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Aridic Haplustolls

Typical Pedon

Chappell fine sandy loam, in an area of native grass, in Keith County, Nebraska; about 1 mile south and 7 miles west of Big Springs; 2,700 feet west and 2,100 feet north of the southeast corner of sec. 30, T. 13 N., R. 40 W.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; neutral; abrupt smooth boundary.
A2—7 to 17 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable; neutral; clear smooth boundary.
Bw—17 to 25 inches; light brown (10YR 5/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak fine and medium prismatic and subangular blocky structure; slightly hard, friable; slightly alkaline; clear smooth boundary.
C1—25 to 35 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; massive; slightly hard, friable; strong effervescence; moderately alkaline; gradual smooth boundary.
2C2—35 to 60 inches; very pale brown (10YR 7/4) gravelly coarse sand, light yellowish brown (10YR 6/4) moist; single grain; loose; slightly alkaline; slight effervescence.

Range in Characteristics

Mean annual soil temperature: 49 to 57 degrees F
Depth to abrupt textural change: 20 to 40 inches
Depth to secondary calcium carbonate: 15 to 30 inches; averages about 25 inches (but some pedons are noncalcareous)
Depth to cambic horizon: 10 to 20 inches
Thickness of the mollic epipedon: 10 to 20 inches; includes the A horizon and part of the upper B horizon
Thickness of the solum: 15 to 30 inches
Content of clay in the particle-size control section (weighted average): 5 to 18 percent

A horizon:
Hue—10YR or 7.5YR
Value—3 to 5 dry, 2 or 3 moist
Chroma—2 or 3

Texture—fine sandy loam or sandy loam; less commonly loam or loamy sand
Reaction—slightly acid or neutral

Bw horizon:
Hue—10YR or 7.5YR
Value—3 to 6 dry, 2 to 4 moist
Chroma—2 or 3
Texture—fine sandy loam or sandy loam
Reaction—slightly acid to moderately alkaline

C horizon:
Hue—10YR or 7.5YR
Value—5 to 8 dry, 4 to 6 moist
Chroma—2 to 4
Texture—fine sandy loam or sandy loam
Reaction—neutral to moderately alkaline

2C horizon:
Hue—10YR or 7.5YR
Value—5 to 8 dry, 4 to 6 moist
Chroma—2 to 4
Texture—gravelly coarse sand, gravelly sand, or gravelly loamy sand
Reaction—neutral to moderately alkaline

Cheyenne Series

The Cheyenne series consists of moderately deep soils over sand and gravel. They are well drained, moderately over very rapidly permeable soils on stream terraces. They formed in loamy alluvium derived from mixed sedimentary and igneous material. Slopes range from 0 to 3 percent. The mean annual precipitation is about 16 inches, and the mean annual temperature is about 49 degrees F.

Taxonomic classification: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Aridic Haplustolls

Typical Pedon

Cheyenne loam, in an area of cultivated cropland, in Kimball County, Nebraska; 410 feet west and 250 feet south of the northeast corner of sec. 34, T. 15 N., R. 56 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, friable; few pebbles; neutral; clear smooth boundary.

AB—6 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak and moderate medium subangular blocky structure; slightly hard, friable; few thin patchy films on faces of peds; slightly alkaline; clear, smooth boundary.

Bw—10 to 24 inches; brown (10YR 5/3) loam, dark yellowish brown (10YR 3/4) moist; weak and moderate, coarse prismatic structure parting to moderate medium subangular blocky; hard, friable; thin patchy to nearly continuous films on faces of peds; thin lime crust on the underside of gravel; moderately alkaline; clear smooth boundary.

C1—24 to 32 inches; light brownish gray (10YR 6/2) gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grain; loose; strong effervescence with gravel generally crusted with lime on the undersides; strongly alkaline; gradual smooth boundary.

2C2—32 to 60 inches; very gravelly coarse sand; loose; strong effervescence.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 15 inches; includes the upper part of the B horizon
Depth to carbonates: 20 to 30 inches
Depth to sand and/or gravel: 20 to 40 inches
Other features: A Bk horizon is present when depth to the 2C horizon exceeds about 30 inches.

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 to 3
Texture—loam, silt loam, or fine sandy loam
Reaction—neutral or slightly alkaline

AB horizon:
Hue—10YR
Value—3 or 4 dry, 2 or 3 moist
Chroma—1 to 3

Bw horizon:
Hue—10YR
Value—5 dry, 3 moist
Chroma—3 or 4
Texture—loam or light clay loam; horizons of heavy sandy loam in some pedons
Content of clay—18 to 30 percent
Special feature—brownish films on structural faces but seldom, if ever, thick and continuous
Reaction—slightly alkaline or moderately alkaline

C horizon:
Texture—gravelly loamy sand; thin strata of other sandy textures are common

2C horizon:
Texture—calcareous, loose, gravelly coarse sand or very gravelly coarse sand

Dankworth Series

The Dankworth series consist of very deep, excessively drained soils that formed in sandy alluvium on footslopes and fan remnants. Permeability is rapid. Slopes range from 3 to 6 percent. The mean annual precipitation is about 17 inches, and the mean annual temperature is about 50 degrees F.

Taxonomic classification: Mixed, mesic Aridic Ustipsamments

Typical Pedon

Dankworth loamy sand on a 5 percent north facing slope in an area of rangeland, in Garden County, Nebraska; about 8 miles north and 5.5 miles east of Oshkosh Nebraska; 1,900 feet north and 800 feet west of the southeast corner of sec. 23, T. 18 N., R. 43 W.; Gusher Springs topographic quadrangle; lat. 41 degrees 31 minutes N. and long. 102 degrees 14 minutes 50 seconds W. When described, the soil was moist throughout. (Colors are for dry soil unless otherwise indicated.)

A—0 to 6 inches; grayish brown (10YR 5/2) loamy sand, dark grayish brown (10YR

4/2) moist; weak fine granular structure; soft, very friable; 2 percent gravel, by volume; slightly acid; clear smooth boundary.
AC—6 to 18 inches; grayish brown (10YR 5/2) sand, dark brown (10YR 3/3) moist; single grain; loose; 2 percent gravel, by volume; slightly acid; clear smooth boundary.
C1—18 to 48 inches; pale brown (10YR 6/3) coarse sand, brown (10YR 5/3) moist; single grain; loose; 13 percent gravel, by volume; slightly acid; gradual smooth boundary.
C2—48 to 80 inches; light gray (10YR 7/2) sand, light brownish gray (10YR 6/2) moist; single grain; loose; 2 percent gravel, by volume; slightly acid.

Range in Characteristics

Content of gravel in the particle-size control section (weighted average): 2 to 15 percent, by volume; some layers may range up to 25 percent
Reaction: Slightly acid to neutral throughout; typically lacks free carbonates

A horizon:
Hue—10YR
Value—4 or 5 dry, 3 or 4 moist
Chroma—2 or 3

AC horizon:
Hue—10YR
Value—4 to 6 dry, 3 or 4 moist
Chroma—2 or 3
Texture—sand or loamy sand

C horizon:
Hue—10YR
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 or 3
Texture—sand or coarse sand

Dix Series

The Dix series consists of very deep, excessively drained soils. Very gravelly sandy material is at a depth of 10 to 20 inches. These soils formed in loamy, sandy, and gravelly soil material deposited over gravelly material on stream terraces, alluvial fans, foot slopes, and uplands. Permeability is rapid in the solum and very rapid in the very gravelly sand. Slopes range from 0 to 60 percent. The mean annual air temperature is 50 degrees F, and the mean annual precipitation is 18 inches at the type location.

Taxonomic classification: Sandy-skeletal, mixed, mesic Torriorthentic Haplustolls

Typical Pedon

Dix gravelly sandy loam (fig. 18), on a 20 percent slope in rangeland, in Duel County, Nebraska; about 2 miles north and 2 miles west of Chappell, Nebraska; 1,790 feet north and 2,640 feet west of the southeast corner of sec. 8, T. 13 N., R. 45 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 6 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; neutral; clear smooth boundary.
AC—6 to 10 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish

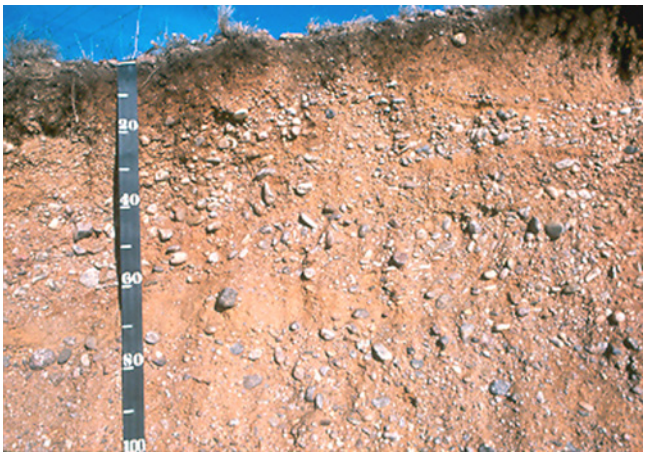

Figure 18.—Profile of the Dix soil.

brown (10YR 3/2) moist; weak coarse prismatic structure; soft, very friable; neutral; gradual smooth boundary.

2C1—10 to 15 inches; light brownish gray (10YR 6/2) gravelly loamy coarse sand, dark grayish brown (10YR 4/2) moist; single grain; loose; moderately alkaline; gradual smooth boundary.

2C2—15 to 60 inches; light gray (10YR 7/2) and very pale brown (10YR 8/2) moist, very gravelly sand; single grain; loose; moderately alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 7 to 20 inches

Depth to very gravelly sandy material: 10 to 20 inches

Other features: The soil has a thin layer of loess in some areas; the soil commonly becomes coarser textured with depth from the surface to the C horizon; soils typically lack free carbonates; pebbles have a coating of lime in some areas.

A horizon:

Hue—10YR

Value—4 or 5 dry, 2 or 3 moist

Chroma—2 or 3

Texture—loam, gravelly loam, fine sandy loam, sandy loam, gravelly sandy loam, very gravelly sandy loam, loamy sand, loamy coarse sand, or gravelly loamy sand

Content of gravel—2 to 35 percent

Reaction—slightly acid to mildly alkaline

AC horizon:

Hue—10YR or 7.5YR

Value—5 or 6 dry, 2 or 4 moist

Chroma—2 to 4, dry or moist

Texture—gravelly loamy coarse sand; ranges to include very gravelly sand to gravelly loam

Reaction—neutral to moderately alkaline

2C1 horizon (if it occurs):

Hue—10YR or 7.5YR

Value—5 to 8 dry, 3 to 6 moist

Chroma—2 to 4

Texture—gravelly loamy coarse sand, very gravelly sand, or extremely gravelly sand

Content of gravel—15 to 70 percent
Reaction—neutral to moderately alkaline

2C2 horizon:
Hue—10YR or 7.5YR
Value—5 to 8 dry, 3 to 6 moist
Chroma—2 to 6
Texture—extremely gravelly sand, very gravelly sand, very gravelly coarse sand, gravelly coarse sand, or gravelly loamy coarse sand, which continues to depths below 40 inches
Content of gravel—35 to 70 percent
Reaction—neutral to moderately alkaline
Special feature—sandstone gravels or other fragments of weathered bedrock in some pedons; weathered bedrock below a depth of 40 inches in some pedons

Duroc Series

The Duroc series consists of very deep, well drained soils that formed in loamy alluvium and eolian deposits. These soils are in swales, on toeslopes, and on stream terraces. Slopes range from 0 to 6 percent. The average annual precipitation is about 16 inches, and the average annual air temperature is about 46 degrees F.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Pachic Haplustolls

Typical Pedon

Duroc loam, in an area of grassland, in Goshen County, Wyoming; 1,900 feet north and 1,950 feet east of the southwest corner of sec. 12, T.22 N., R.61 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; strong very fine granular structure; soft, very friable, slightly sticky and slightly plastic; neutral (pH 7.2); clear smooth boundary.
Bw1—6 to 20 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; slightly alkaline (pH 7.4); clear smooth boundary.
Bw2—20 to 28 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; slightly effervescent; disseminated calcium carbonate; moderately alkaline (pH 8.0); gradual smooth boundary.
Bk—28 to 80 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; strongly effervescent; calcium carbonate occurring as soft masses and thin seams and streaks; moderately alkaline (pH 8.3).

Range in Characteristics

Depth to carbonates: 15 to 36 inches
Mean annual soil temperature: 47 to 58 degrees F
Thickness of the mollic epipedon: 20 to 50 inches
Content of organic carbon: Decreases uniformly with depth
Texture of the particle-size control section: Loam and silt loam
Content of clay in the particle-size control section (weighted average): 18 to 35 percent
Content of silt in the particle-size control section: 30 to 70 percent

Content of sand in the particle-size control section: 10 to 45 percent; less than 15 percent fine or coarser sand
Content of rock fragments in the particle-size control section: 0; range to 10 percent
Other features: Some pedons have an AC horizon with properties similar to those of the A horizon.

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 to 3
Reaction—neutral to moderately alkaline
Texture—loam, silt loam, or very fine sandy loam

Bw horizon:
Hue—10YR
Value—3 to 6 dry, 2 to 4 moist
Chroma—2 or 3
Reaction—neutral or slightly alkaline
Texture—loam, silt loam, or very fine sandy loam

Bk horizon (if it occurs):
Hue—10YR
Value—5 to 7 dry, 3 to 5 moist
Chroma—2 or 3
Reaction—moderately alkaline or strongly alkaline
Texture—loam, silt loam, or very fine sandy loam

C horizon (if it occurs):
Hue—10YR
Value—5 to 7 dry, 3 to 7 moist
Chroma—2 or 3
Reaction—slightly alkaline to strongly alkaline
Texture—loam, silt loam, or very fine sandy loam

Dwyer Series

The Dwyer series consists of very deep, excessively drained soils that formed in eolian sand. These soils are on dune-like forms frequently on or near the edges of alluvial terraces. Slopes range from 0 to 25 percent. The mean annual precipitation is about 14 inches, and the mean annual temperature is about 48 degrees F.

Taxonomic classification: Mixed, mesic Ustic Torripsamments

Typical Pedon

Dwyer fine sand, in an area of grassland, in Goshen County, Wyoming; approximately 200 feet south and 100 feet west of northeast corner of the southeast quarter of the northeast quarter of sec. 26, T. 22 N., R. 61 W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 6 inches; pale brown (10YR 6/3) fine sand, dark grayish brown (10YR 4/2) moist; single grain; loose; calcareous; moderately alkaline (pH 8.0); gradual smooth boundary.
C—6 to 60 inches; very pale brown (10YR 7/3) fine sand, grayish brown (10YR 5/2) moist; single grain; loose; calcareous; moderately alkaline (pH 8.2).

Range in Characteristics

Texture: sand, loamy sand, fine sand, or loamy fine sand
Content of rock fragments: 0 to 15 percent; commonly less than 3 percent
Soil moisture control section: Dry more than half the time cumulative that the soil temperature at a depth of 20 inches is 41 degrees F. Never moist in some or all parts for as long as 60 consecutive days when the soil temperature at a depth of 20 inches is 41 degrees F, which occurs about April 21 to 27. Dry in all parts for at least 60 consecutive days from July 15 to October 25 and for at least 90 cumulative days during this period.
Mean annual soil temperature: 47 to 53 degrees F
Soil temperature at a depth of 20 inches: 41 degrees F or more for 175 to 192 days
Depth to bedrock: More than 60 inches
Other features: These soils may have a weak and inconsistent accumulation of secondary calcium carbonate at any depth but are not considered to have a continuous Bk horizon. Typically, this soil is calcareous throughout but is leached in the upper part of the series control section in some pedons.

A horizon:
Hue—2.5Y or 10YR
Value—5 to 7 dry, 3 to 5 moist
Chroma—2 or 3
Reaction—mildly alkaline to strongly alkaline; slightly acid or neutral in some pedons

AC horizon:
Texture—loamy fine sand or fine sand

C horizon:
Hue—2.5Y to 7.5YR
Value—5 to 7 dry, 3 to 5 moist
Chroma—2 to 4
Reaction—moderately alkaline or strongly alkaline; may contain few small carbonate concretions or seams of calcium carbonate erratically at any depth

Eckley Series

The Eckley series consists of very deep, well drained soils that formed in Tertiary pedisediments. These soils are on upland hillslopes. Slopes range from 1 to 30 percent. The mean annual precipitation is about 17 inches, and the mean annual air temperature is about 49 degrees F.

Taxonomic classification: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Aridic Argiustolls

Taxadjunct features: The Eckley soils in this survey area do not meet the range for the series because the carbonates are too shallow. This difference does not significantly affect the use and management of the soils.

Typical Pedon

Eckley gravelly loam, in an area of grassland in Phillips County, Colorado; 270 feet south and 55 feet east of the north quarter corner of sec. 17, T. 7 N., R. 47 W.

A—0 to 4 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable; 20 percent pebbles; neutral; gradual smooth boundary.
Bt—4 to 12 inches; grayish brown (10YR 5/2) gravelly sandy clay loam, very dark

grayish brown (10YR 3/2) moist; weak or moderate medium prismatic structure parting to moderate medium subangular blocky; hard, very friable; common distinct clay films on peds; 20 percent pebbles; neutral; clear smooth boundary.

BC—12 to 15 inches; pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable; few faint clay films on horizontal and vertical faces of peds and some clay bridges between sand grains; 30 percent pebbles; slightly alkaline; gradual wavy boundary.

2C—15 to 60 inches; very pale brown (10YR 7/4) very gravelly sand, yellowish brown (10YR 5/4) moist; single grain; loose; 40 percent pebbles; slightly alkaline.

Range in Characteristics

Mean annual soil temperature: 49 to 52 degrees F

Depth to contrasting gravelly or very gravelly sand: 12 to 20 inches

Depth to argillic horizon: 4 to 7 inches

Depth to secondary calcium carbonate: Generally noncalcareous to a depth of more than 60 inches but may be calcareous below a depth of 30 inches and have some weak accumulation of secondary calcium carbonate in some pedons

Content of organic carbon in the mollic epipedon: 0.7 to 3 percent; decreases uniformly with increasing depth

Base saturatation in the solum: Typically base saturated; ranges from 90 to 100 percent

Content of clay in the particle-size control section (weighted average): 20 to 35 percent

Content of rock fragments: Typically 15 to 20 percent, by volume; ranges from 5 to 35 percent

A horizon:

Hue—10YR or 7.5YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 to 3
Texture—loam, gravelly loam, or gravelly sandy loam
Content of clay—10 to 25 percent
Reaction—neutral or slightly alkaline

Bt horizon:

Hue—10YR or 7.5YR
Value—4 to 6
Chroma—2 to 4
Texture—clay loam, gravelly sandy clay loam, or sandy clay loam
Content of clay—20 to 35 percent
Content of sand—more than 35 percent fine or coarser sand
Reaction—neutral or slightly alkaline

BC horizon:

Hue—10YR or 7.5YR
Value—4 to 6
Chroma—2 to 4
Texture—gravelly sandy loam
Reaction—neutral or slightly alkaline

2C horizon:

Hue—2.5Y to 7.5YR
Value—5 to 7 dry, 4 or 5 moist
Chroma—3 or 4
Texture—gravelly sand, gravelly loamy sand, or very gravelly sand

Content of rock fragments—5 to 50 percent; dominantly pebble sized
Reaction—neutral or slightly alkaline

Glenberg Series

The Glenberg series consists of very deep, well drained soils that formed in stratified calcareous alluvium derived from mixed sources. These soils are on flood plains and low terraces. Slopes range from 0 to 8 percent. The mean annual precipitation is about 12 inches, and the mean annual air temperature is about 52 degrees F.

Taxonomic classification: Coarse-loamy, mixed, calcareous, superactive, mesic Ustic Torrifluvents

Typical Pedon

Glenberg sandy loam, in an area of grassland in Crowley County, Colorado; 200 feet south and 720 feet east of the north quarter corner of sec. 17, T. 22 S., R. 58 W.

A—0 to 6 inches; light brownish gray (10YR 6/2) sandy loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, very friable; moderately alkaline (pH 8.0); gradual smooth boundary.

C—6 to 60 inches; light brownish gray (10YR 6/2) sandy loam stratified with thin lenses of loam and loamy sand; dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable; weak and inconsistent accumulations of secondary calcium carbonate as small concretions; moderately alkaline (pH 8.2).

Range in Characteristics

Mean annual soil temperature: 47 to 53 degrees F
Mean summer soil temperature: 65 to 74 degrees F
Depth to bedrock or strongly contrasting substratum: More than 40 inches
Estimated content of organic carbon in the surface horizon: 0.5 to 1.5 percent; decreases irregularly with increasing depth
Texture of the control section: Dominantly sandy loam; content of clay ranges from 5 to 18 percent, content of silt from 5 to 40 percent, and content of sand from 50 to 75 percent with more than 35 percent fine or coarser sand.
Content of rock fragments: Ranges from 0 to 15 percent but is commonly less than 5 percent. Some pedons may have up to 30 percent rock fragments in any one horizon, but the weighted average in the particle-size control section is less than 15 percent.
Visible secondary calcium carbonate: Occurs as soft concretions or thin seams inconsistently at any depth
Other features: Typically, these soils are calcareous throughout, but they may be leached for a few inches in some pedons.

A horizon:
Hue—2.5Y or 10YR
Value—4 to 7 dry, 3 to 5 moist
Chroma—2 to 4
Texture—fine sandy loam or sandy loam
Reaction—neutral to moderately alkaline

C horizon:
Hue—2.5Y or 10YR
Value—5 to 7 dry, 4 or 5 moist
Chroma—2 to 4

Texture—variable; stratified loamy sand to clay loam
Reaction—slightly alkaline to strongly alkaline
Calcium carbonate equivalent—ranges from less than 1 percent to 3 percent but is variable from pedon to pedon and from stratum to stratum within a single pedon

Hemingford Series

The Hemingford series consists of deep, well drained soils that formed in a layer of loess deposited on the underlying loamy residuum derived from clayey siltstone and fine grained sandstone. These soils are on uplands. Permeability is moderately slow. Slopes range from 0 to 6 percent. The mean annual precipitation is about 16 inches, and the mean annual air temperature is about 47 degrees F at the type location.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Aridic Argiustolls

Typical Pedon

Hemingford loam, on a slope of less than 1 percent in a cultivated field, in Box Butte County, Nebraska; about 15 miles north and 3.5 miles east of Alliance; 2,350 feet east and 150 feet north of the southwest corner of sec. 15, T. 27 N., R. 47 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable; neutral; abrupt smooth boundary.
A—6 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; weak medium subangular blocky structure parting to weak fine granular; hard, friable; neutral; clear smooth boundary.
Bt—10 to 18 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure parting to strong medium subangular blocky; very hard, firm; neutral; clear smooth boundary.
BC—18 to 25 inches; light brownish gray (2.5Y 6/2) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm; slight effervescence; mildly alkaline; clear smooth boundary.
C—25 to 42 inches; light gray (2.5Y 7/2) sandy clay loam, light brownish gray (2.5Y 6/2) moist; weak medium and coarse subangular blocky structure; hard, firm; few hard fine and medium caliche fragments; violent effervescence; moderately alkaline; gradual smooth boundary.
Cr—42 to 60 inches; white (2.5Y 8/2) soft sandstone, light gray (2.5Y 7/2) moist; strong effervescence.

Range in Characteristics

Thickness of the solum: 12 to 34 inches
Thickness of the mollic epipedon: 7 to 20 inches
Depth to free carbonates: 12 to 24 inches
Depth to the Cr horizon: 40 to 60 inches

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 or 2
Texture—loam; less commonly very fine sandy loam, fine sandy loam, or sandy loam
Reaction—neutral or mildly alkaline

Bt horizon:
Hue—10YR or 2.5Y
Value—4 to 6 dry, 3 to 5 moist
Chroma—2 or 3
Texture—clay loam; less commonly sandy clay loam or loam
Content of clay—25 and 35 percent
Reaction—neutral or mildly alkaline

BC horizon (if it occurs):
Hue—10YR or 2.5Y
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 or 3
Texture—sandy clay loam or loam
Reaction—mildly alkaline or moderately alkaline

C horizon:
Hue—10YR or 2.5Y
Value—6 to 8 dry, 5 to 7 moist
Chroma—2 or 3
Texture—sandy clay loam and loam; includes very fine sandy loam, fine sandy loam, or sandy loam
Reaction—mildly alkaline or moderately alkaline

Cr horizon:
Hue—10YR or 2.5Y
Value—7 or 8 dry, 6 or 7 moist
Chroma—2 or 3
Texture—soft sandstone or siltstone

Jayem Series

The Jayem series consists of very deep, well drained or somewhat excessively drained soils on uplands. These soils formed in sediments weathered from noncalcareous sandstone. Slopes range from 0 to 20 percent. The mean annual precipitation is about 15 inches, and the mean annual air temperature is about 48 degrees F.

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Aridic Haplustolls

Typical Pedon

Jayem fine sandy loam, in an area of rangeland in Goshen County, Wyoming; 1,850 feet south and 45 feet west of the northeast corner of sec. 16, T. 30 N., R. 60 W.; lat. 42 degrees 34 minutes 40 seconds N. and long. 104 degrees 03 minutes 51 seconds W.

A—0 to 10 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; soft, very friable, nonsticky and nonplastic; neutral (pH 7.2); clear smooth boundary.
Bw—10 to 22 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; very few faint clay bridges between sand grains; neutral (pH 7.2); gradual wavy boundary.
C—22 to 60 inches; light brownish gray (10YR 6/2) fine sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable; slightly alkaline (pH 7.4).

Range in Characteristics

Texture of the particle-size control section: Loamy very fine sand, fine sandy loam, or very fine sandy loam
Content of clay in the particle-size control section (weighted average): 5 to 18 percent
Content of silt in the particle-size control section (weighted average): 5 to 35 percent
Content of sand in the particle-size control section (weighted average): 50 to 80 percent (more than 15 percent fine sand or coarser)
Content of rock fragments: 0 to 15 percent
Reaction: Neutral or slightly alkaline
Mean annual soil temperature: 47 to 56 degrees F
Mean summer soil temperature: 60 to 76 degrees F
Thickness of the mollic epipedon: 7 to 20 inches
Other features: A buried horizon in the lower part of the series control section in some pedons

A horizon:
Hue—2.5Y or 10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—2 or 3
Texture—commonly fine sandy loam or sandy loam; loamy sand, loamy fine sand, or loamy very fine sand in some pedons

Bw horizon:
Hue—2.5Y, 10YR, or 7.5YR
Value—4 to 6 dry, 3 to 5 moist
Chroma—2 to 4
Texture—commonly fine sandy loam or sandy loam; loamy very fine sand, very fine sandy loam, loam, silt loam, or sandy clay loam in some pedons

C horizon:
Hue—2.5Y, 10YR, or 7.5YR
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 to 6, dry or moist
Texture—commonly fine sandy loam, sandy loam, very fine sandy loam, or loamy very fine sand; loamy sand, loamy fine sand, fine sand, or sand below a depth of 40 inches in some pedons
Special features—less than 5 percent carbonates below a depth of 40 inches in some pedons

Keith Series

The Keith series consists of very deep, well drained, moderately permeable soils that formed in loess. These soils are on upland hillslopes, tabeland plains, and valley terraces. Slopes range from 0 to 11 percent. The mean annual air temperature is 52 degrees F, and the mean annual precipitation is 19 inches at the type location.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Aridic Argiustolls

Typical Pedon

Keith silt loam (fig. 19), on a slope of 1 percent, in a cultivated field in Hitchcock County, Nebraska; 8 miles south and 5 miles west of Trenton; 1,100 feet south and 110 feet east of the northwest corner of sec. 13, T. 1 N., R. 34 W.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown

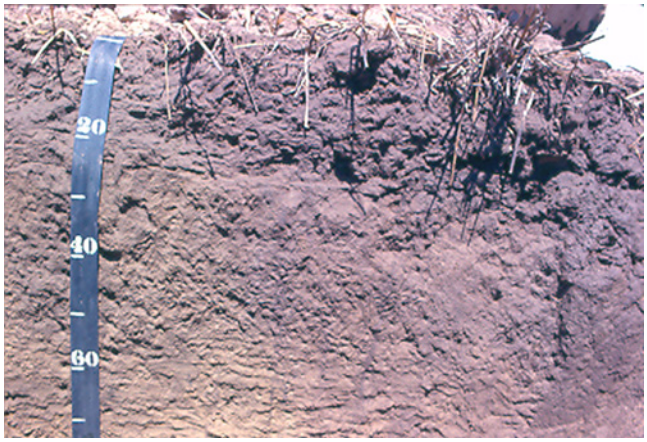

Figure 19.—Profile of the Keith soil.

(10YR 3/2) moist; moderate fine granular structure; soft, friable; slightly acid; abrupt smooth boundary.

A—5 to 9 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable; slightly acid; clear smooth boundary.

Bt1—9 to 14 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse prismatic structure parting to weak medium and coarse subangular blocky; slightly hard, friable; few thin patchy clay films; neutral; clear smooth boundary.

Bt2—14 to 23 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium and coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; few thin patchy clay films; neutral; clear smooth boundary.

BC—23 to 33 inches; light gray (10YR 7/2) silt loam, pale brown (10YR 6/3) moist; weak coarse subangular blocky structure; soft, very friable; violent effervescence; moderately alkaline; gradual smooth boundary.

C—33 to 60 inches; light gray (10YR 7/2) silt loam, pale brown (10YR 6/3) moist; massive; soft, very friable; few accumulations and streaks of carbonate; strong effervescence; moderately alkaline.

Range in Characteristics

Mean annual soil temperature: 48 to 55 degrees F
Depth to the argillic horizon: 6 to 20 inches
Depth to secondary calcium carbonate: 15 to 38 inches
Thickness of the mollic epipedon: 7 to 20 inches; typically the upper part of the B horizon
Thickness of the solum: 15 to 48 inches
Content of clay in the particle-size control section (weighted average): 20 to 35 percent

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 to 3
Texture—silt loam; less commonly loam, very fine sandy loam, or fine sandy loam
Content of clay—14 to 20 percent
Reaction—slightly acid or neutral

Bt1 horizon:
Hue—10YR or 7.5YR
Value—4 or 5 dry, 2 to 4 moist
Chroma—2 or 3
Texture—silt loam, silty clay loam, loam, or clay loam
Content of clay—20 to 35 percent
Reaction—neutral or slightly alkaline

Bt2 horizon:
Hue—10YR or 7.5YR
Value—5 or 6 dry, 4 or 5 moist
Chroma—2 or 3
Texture—silt loam, silty clay loam, loam, or clay loam
Content of clay—20 to 35 percent
Reaction—neutral or slightly alkaline

BC, Bk, and BCk horizons:
Hue—10YR or 2.5Y
Value—5 to 7 dry, 3 to 6 moist
Chroma—2 or 3
Texture—loam, very fine sandy loam, silty clay loam, silt loam, or clay loam
Reaction—slightly alkaline or moderately alkaline; accumulations of secondary carbonates in the Bk and BCk horizons

C horizon:
Hue—10YR or 2.5Y
Value—6 to 8 dry, 5 or 6 moist
Chroma—2 to 4
Texture—silt loam, loam, or very fine sandy loam; a buried soil is below a depth of 40 inches in some pedons
Calcium carbonate equivalent—5 to 15 percent
Reaction—slightly alkaline or moderately alkaline in the upper part and strongly alkaline in the lower part; accumulations of carbonate in some pedons

Kuma Series

The Kuma series consists of very deep, well drained soils that formed in medium or moderately fine textured, calcareous eolian deposits. An age discontinuity is marked by a paleosol. These soils are on tableland plains and upland hillslopes. Slopes range from 0 to 8 percent. The mean annual precipitation is about 16 inches, and the mean annual temperature is about 50 degrees F.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Pachic Argiustolls

Typical Pedon

Kuma silt loam (fig. 20), in a cultivated area in Washington County, Colorado; 2,140 feet west and 70 feet north of the southeast corner of sec. 1, T. 2 N., R. 52 W.

Ap—0 to 5 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to fine granular; soft, very friable, slightly sticky and slightly plastic; neutral (pH 7.0); clear smooth boundary.

BA—5 to 10 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few faint clay films on faces of peds

Figure 20.—Profile of the Kuma soil.

and few faint clay films on the inside of some root channels and pores; neutral (pH 7.0); gradual smooth boundary.

Bt—10 to 20 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common faint clay films on faces of peds and clay films filling root channels and pores; neutral (pH 7.2); abrupt smooth boundary.

Btb—20 to 30 inches; dark gray (10YR 4/1) silt loam, black (10YR 2/1) moist; strong fine prismatic structure parting to fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common distinct clay films on faces of peds and filling root channels and pores; slightly alkaline (pH 7.4); clear smooth boundary.

Btkb1—30 to 45 inches; light yellowish brown (2.5Y 6/3) silt loam, olive brown (2.5Y 4/3) moist; moderate fine prismatic structure parting to fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; few faint clay films on faces of peds and filling root channels and pores; visible secondary calcium carbonate occurring mostly as concretions or as coatings on faces of peds; faces of peds are strong effervescence, but interiors are not effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Btkb2—45 to 50 inches; light yellowish brown (2.5Y 6/3) silt loam, olive brown (2.5Y 4/3) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few faint clay films on faces of peds and in root channels and pores; visible secondary calcium carbonate in structural cracks and on faces of peds; peds are effervescent throughout; violent effervescence; moderately alkaline (pH 8.2); clear smooth boundary.

Bkb—50 to 60 inches; light yellowish brown (2.5Y 6/3) silt loam, olive brown (2.5Y 4/3) moist; massive; hard, very friable, slightly sticky and slightly plastic; secondary calcium carbonate occurring as soft masses, concretions, and thin seams and streaks; violent effervescence; moderately alkaline (pH 8.2).

Range in Characteristics

Mean annual soil temperature: 48 to 53 degrees F
Depth to the base of the argillic horizon: 27 to 60 inches
Depth to secondary calcium carbonate: 10 to 40 inches
Depth to continuous subhorizons of visible secondary calcium carbonate and/or sulfate: 20 to 40 inches
Depth to the mollic epipedon: 20 to 50 inches

Content of clay in the particle-size control section (weighted average): 18 to 35 percent

A horizon:
- Hue—2.5Y to 7.5YR
- Value—3 to 5 dry, 2 or 3 moist
- Chroma—1 to 3
- Texture—silt loam, loam, or very fine sandy loam
- Reaction—slightly acid to slightly alkaline

Bt horizon:
- Hue—2.5Y to 7.5YR
- Value—3 to 5 dry, 2 or 3 moist
- Chroma—1 to 3 dry, 2 or 3 moist
- Texture—loam, clay loam, silt loam, or silty clay loam
- Content of clay—18 to 35 percent
- Content of silt—35 to 70 percent
- Content of sand—5 to 40 percent; less than 15 percent fine or coarser sand
- Reaction—neutral to moderately alkaline

Btb and Btkb horizons:
- Hue—5Y to 7.5YR; subhorizons redder than 7.5YR in some pedons
- Value—4 to 7 dry, 2 to 6 moist
- Chroma—1 to 4
- Texture—silt loam, loam, or silty clay loam
- Content of clay—18 to 35 percent
- Content of silt—35 to 70 percent
- Content of sand—5 to 40 percent; less than 15 percent fine or coarser sand
- Reaction—neutral to moderately alkaline; visible secondary carbonate commonly occurs in some part
- Calcium carbonate equivalent—0 to 14 percent

Bk horizon:
- Hue—5Y to 7.5YR; subhorizons redder than 7.5YR in some pedons
- Value—4 to 7 dry, 2 to 6 moist
- Chroma—1 to 4
- Texture—loam, silt loam, or silty clay loam
- Content of clay—10 to 35 percent
- Content of silt—30 to 70 percent
- Content of sand—5 to 50 percent; less than 35 percent fine or coarser sand
- Reaction—neutral to moderately alkaline

C horizon:
- Hue—5Y to 7.5YR
- Value—4 to 7 dry, 2 to 6 moist
- Chroma—1 to 4
- Texture—loam, silt loam, or silty clay loam
- Calcium carbonate equivalent—1 to 14 percent
- Reaction—moderately alkaline or strongly alkaline

Las Animas Series

The Las Animas series consists of deep, poorly drained and somewhat poorly drained soils that formed in thick, calcareous, stratified alluvial materials derived from mixed sources. These soils are on valley flood plains and low stream terraces.

Slopes range from 0 to 6 percent. The mean annual precipitation is about 15 inches, and the mean annual temperature is about 53 degrees F.

Taxonomic classification: Coarse-loamy, mixed, calcareous, superactive, mesic Typic Fluvaquents

Typical Pedon

Las Animas sandy loam, in an area of grassland, in Bent County, Colorado; 2,640 feet south of the northwest corner of sec. 6, T. 23 S., R. 51 W.

A—0 to 6 inches; gray (N 5/0) sandy loam, dark gray (N 4/0) moist; moderate fine granular structure; soft, very friable; strong effervescence; moderately alkaline (pH 8.2); clear smooth boundary.

ACg—6 to 10 inches; light brownish gray (2.5Y 6/2) sandy loam stratified with loamy sand and loam; grayish brown (2.5Y 5/2) moist; common medium prominent yellowish brown (10YR 5/4 moist) mottles; weak coarse subangular blocky structure parting to weak fine granular; slightly hard, very friable; strong effervescence; moderately alkaline (pH 8.2); gradual smooth boundary.

Ckyg—10 to 60 inches; light brownish gray (2.5Y 6/2) sandy loam stratified with loamy sand and loam; grayish brown (2.5Y 5/2) moist; many coarse prominent light olive brown (2.5Y 5/6 moist) and gray (N 5/0 moist) mottles; massive; soft, very friable; accumulation of visible secondary carbonate and sulfate in the form of crystals and concretions; strong effervescence; moderately alkaline (pH 8.2).

Range in Characteristics

Mean annual soil temperature: 49 to 55 degrees F
Mean summer soil temperature: 73 degrees F
Depth to secondary calcium carbonate: 10 to 18 inches
Depth to endosaturation: 0 to 3.5 feet
Conductivity: 2 to more than 15 mmhos/cm; typically ranges from 4 to 16 mmhos/cm
Content of gypsum in the particle-size control section (weighted average): 0 to 5 percent
Other features: Continuous subhorizons with visible salt accumulation may occur at any depth.

A horizon:
- Hue—5Y to 7.5YR or N
- Value—4 to 6 dry, 3 or 4 moist
- Chroma—0 to 2
- Texture—loam or fine sandy loam
- Reaction—moderately alkaline

C horizon:
- Hue—5Y to 7.5YR
- Value—3 to 7 dry, 5 or 6 moist
- Chroma—1 to 3
- Texture—fine sandy loam or sandy loam with strata of fine sand, silt loam, loam, loamy sand, or loamy fine sand
- Content of clay—8 to 18 percent
- Calcium carbonate equivalent—1 to 10 percent
- Reaction—moderately alkaline

Lodgepole Series

The Lodgepole series consists of very deep, somewhat poorly drained soils in upland depressions and on playas. These soils formed in loess and loamy sediments.

Permeability is very slow. Slopes are 0 to 1 percent. The mean annual air temperature is about 51 degrees F, and the mean annual precipitation is about 17 inches at the type location.

Taxonomic classification: Fine, smectitic, mesic Vertic Argiaqualls

Typical Pedon

Lodgepole silty clay loam, on a concave slope of less than 1 percent, in a cultivated field about 17 miles north and 4 miles east of Benkelman, in Dundy County, Nebraska.

Ap—0 to 5 inches; gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) moist; weak fine granular structure; slightly hard, friable; many very fine roots; slightly acid; abrupt smooth boundary.

Bt1—5 to 9 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; strong fine and medium angular blocky structure; very hard, very firm; patchy clay films on faces of peds; many very fine roots; slightly acid; clear smooth boundary.

Bt2—9 to 24 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; few fine distinct brown (7.5YR 4/4) (moist) iron masses in the soil matrix; strong coarse prismatic structure parting to strong fine subangular blocky; very hard, very firm; patchy clay films on faces of peds; few very fine roots; slightly acid; diffuse wavy boundary.

Bt3—24 to 38 inches; dark grayish brown (10YR 4/2) silty clay, very dark brown (10YR 2/2) moist; common fine distinct brown (7.5YR 4/4) (moist) iron masses in the soil matrix; strong coarse prismatic structure parting to moderate medium and fine subangular blocky; very hard, very firm; patchy clay films on faces of peds; neutral; clear wavy boundary.

Bt4—38 to 45 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; hard, firm; dark organic stains on faces of peds; neutral; gradual wavy boundary.

BC—45 to 54 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable; dark organic stains on faces of peds; neutral; gradual wavy boundary.

C—54 to 80 inches; very pale brown (10YR 7/3) silt loam, brown (10YR 4/3) moist; massive; soft, very friable; slightly alkaline.

Range in Characteristics

Thickness of the mollic epipedon: 20 to 50 inches; extends through Bt horizon

Depth to carbonates: Typically more than 40 inches; ranges from 30 to more than 60 inches

Other features: Pedons in undisturbed areas commonly have a thin E horizon; a Bk horizon in some pedons

A horizon:

Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 or 2
Texture—silt loam or silty clay loam
Reaction—slightly acid to slightly alkaline

Bt horizon:

Hue—10YR or 2.5Y
Value—3 to 5 dry, 2 to 4 moist

Chroma—1 or 2
Texture—silty clay, silty clay loam, clay, or clay loam
Content of clay—35 to 50 percent
Reaction—slightly acid to slightly alkaline

BC horizon (if it occurs):
Textures—intermediate between those of the Bt and C horizons
Colors—intermediate between those of the Bt and C horizons
Reaction—neutral to moderately alkaline
Special features—dark organic stains common on faces of peds

C horizon:
Hue—10YR or 2.5Y
Value—5 to 8 dry, 4 to 7 moist
Chroma—2 to 4
Texture—silt loam, loam, or very fine sandy loam; fine sandy loam, sandy loam, loamy very fine sand, loamy fine sand, or loamy sand below a depth of 40 inches in some pedons
Reaction—neutral to moderately alkaline
Special features—coatings of carbonates on cleavage planes in some pedons

Paoli Series

The Paoli series consists of very deep, well drained soils that formed in calcareous alluvium. Paoli soils are on fans and terraces and have slopes of 0 to 9 percent. The mean annual precipitation is about 14 inches and the mean annual air temperature is about 48 degrees F.

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Pachic Haplustolls

Typical Pedon

Paoli loam, in an area of cropland, in Weld County, Colorado; 750 feet north and 200 feet east of the southwest corner of sec. 19, T. 4 N., R. 68 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 10 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable; neutral; clear smooth boundary.
A1—10 to 20 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure parting to medium granular; slightly hard, friable; neutral; clear smooth boundary.
A2—20 to 25 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure; slightly hard, very friable; slightly effervescent; slightly alkaline; clear smooth boundary.
Bk1—25 to 40 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure; s1ightly hard, very friable; strongly effervescent; visible secondary calcium carbonate as streaks and seams; moderately alkaline; gradual smooth boundary.
Bk2—40 to 60 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, very friable; few seams of sandy loam and loam; visible secondary calcium carbonate in seams and streaks; strongly effervescent; moderately alkaline.

Range in Characteristics

Mean annual soil temperature: 49 to 52 degrees F

Thickness of the mollic epipedon: 20 to 50 inches
Texture of the particle-size control section: Sandy loam or fine sandy loam
Content of clay in the particle-size control section (weighted average): 5 to 18 percent
Content of silt in the particle-size control section (weighted average): 5 to 40 percent
Content of sand in the particle-size control section (weighted average): 50 to 80 percent
Content of rock fragments in the particle-size control section (weighted average): 0 to 15 percent

A horizon:
Hue—2.5Y to 7.5YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—1 to 3
Reaction—neutral or slightly alkaline

Bk horizon:
Hue—2.5Y to 7.5YR
Value—5 or 6 dry, 4 or 5 moist
Chroma—2 to 4
Reaction—moderately alkaline or strongly alkaline; 2 to 10 percent calcium carbonate equivalent in the fine-earth fraction

Rosebud Series

The Rosebud series consists of well drained soils that are moderately deep to weakly cemented, fine grained sandstone. These soils formed in loess and loamy, calcareous residuum derived from weakly cemented, fine grained sandstone. They are on tableland plains and upland hillslopes. Permeability is moderate. Slopes range from 0 to 20 percent. The mean annual precipitation is about 16 inches, and the mean annual temperature is about 51 degrees F.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Aridic Argiustolls

Typical Pedon

Rosebud loam (fig. 21), on a slope of less than 1 percent in a cultivated field, in Kimball County, Nebraska; about 8 miles south and 2 miles east of Kimball; 1,920 feet west and 150 feet north of the southeast corner of sec. 4, T. 13 N., R. 55 W.

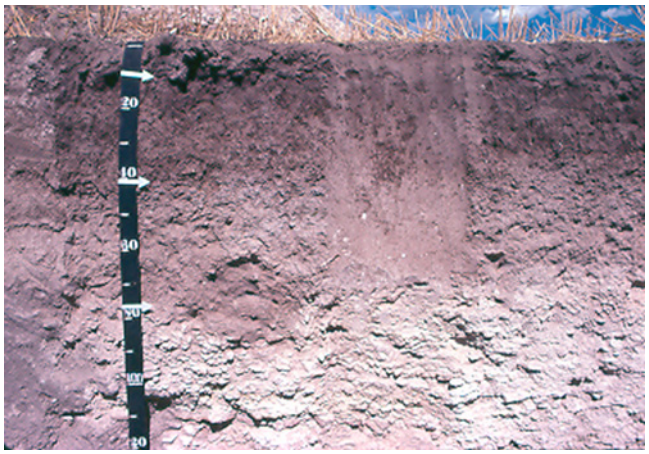

Figure 21.—Profile of the Rosebud soil.

Ap—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; slightly alkaline; abrupt smooth boundary.
Bt—6 to 11 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm; thin discontinuous films on faces of peds; common very dark grayish brown (10YR 3/2) wormcasts; slightly alkaline; clear smooth boundary.
Bk1—11 to 15 inches; very pale brown (10YR 7/3) clay loam, pale brown (10YR 6/3) moist; weak medium subangular blocky structure; slightly hard, friable; few fine pebbles; secondary calcium carbonates occurring as soft masses of lime; violent effervescence; moderately alkaline; clear smooth boundary.
Bk2—15 to 19 inches; very pale brown (10YR 7/3) sandy clay loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; soft, very friable; secondary calcium carbonates occurring as soft masses of lime; violent effervescence; moderately alkaline; clear smooth boundary.
C—19 to 30 inches; very pale brown (10YR 7/3) sandy loam, light yellowish brown (10YR 6/4) moist; massive; soft, very friable; many pebbles and hard caliche fragments; disseminated lime and lime coatings on pebbles; violent effervescence; moderately alkaline; abrupt wavy boundary.
Cr—30 to 80 inches; reddish yellow (7.5YR 6/6), weakly cemented sandstone; few small pebbles; violent effervescence; moderately alkaline.

Range in Characteristics

Mean annual soil temperature: 49 to 55 degrees F
Depth to paralithic contact: 20 to 40 inches
Depth to secondary calcium carbonate: 9 to 30 inches
Thickness of the solum: 12 to 34 inches
Thickness of the mollic epipedon: 7 to 20 inches
Content of clay in the particle-size control section (weighted average): 23 to 35 percent

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—2 or 3
Texture—loam; less commonly silt loam or fine sandy loam
Reaction—neutral to moderately alkaline

Bt horizon:
Hue—10YR
Value—4 to 7 dry, 3 to 6 moist
Chroma—2 or 3
Texture—clay loam or loam
Content of clay—23 to 35 percent
Reaction—neutral to moderately alkaline

Bk or BC horizon:
Hue—10YR
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 or 3
Texture—loam or sandy clay loam
Calcium carbonate equivalent—0 to 5 percent
Reaction—slightly alkaline or moderately alkaline

C horizon:
Hue—10YR

Value—6 or 7 dry, 5 or 6 moist
Chroma—3 or 4
Texture—sandy clay loam or sandy loam; less commonly very fine sandy loam or loam
Calcium carbonate equivalent—1 to 15 percent
Reaction—slightly alkaline or moderately alkaline

Cr horizon:
Value—7 or 8 dry, 6 or 7 moist
Chroma—1 to 6
Reaction—slightly alkaline or moderately alkaline
Texture—weakly cemented sandstone

Satanta Series

The Satanta series consists of very deep, well drained soils on uplands, plains, or high stream terraces. These soils formed in eolian deposits. Permeability is moderate. Slopes range from 0 to 15 percent. The mean annual temperature is 55 degrees F, and the mean annual precipitation is 18 inches.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Aridic Argiustolls

Typical Pedon

Satanta loam, in a cultivated field 14 miles north of Tice, in Haskell County, Kansas; 800 feet south and 100 feet east of the northwest corner of sec. 9, T. 27 S., R. 31 W.

A—0 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, slightly plastic and slightly sticky; many wormcasts in the lower part; neutral; gradual smooth boundary.

BA—9 to 13 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate fine subangular blocky; slightly hard, friable, slightly plastic and slightly sticky; few wormcasts; neutral; clear smooth boundary.

Bt—13 to 23 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, plastic and sticky; thin discontinuous clay films on some faces of peds; few wormcasts; slightly alkaline; gradual smooth boundary.

Bk—23 to 34 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak coarse subangular blocky structure; slightly hard, friable, slightly plastic and slightly sticky; few or common threads and films of segregated lime; strong effervescence; moderately alkaline; gradual smooth boundary.

C—34 to 80 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; massive; slightly hard, friable, slightly plastic; porous; strong effervescence; moderately alkaline.

Range in Characteristics

Calcium carbonate equivalent in the series control section: Less than 15 percent
Content of rock fragments: 0 to 10 percent gravel, by volume
Depth to carbonates: 12 to 36 inches
Thickness of the mollic epipedon: 8 to 20 inches
Phases recognized: Sandy substratum; gravelly substratum; dry; elevation greater than 4,000 feet above sea level
Other features: The BA horizon, if it occurs, has colors and textures intermediate

between those of the A and Bt horizons. The BCk horizon has few carbonates that occur as seams, threads, or concretions in some pedons.

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—2 or 3
Reaction—slightly acid to slightly alkaline
Texture—loam, very fine sandy loam, clay loam, or fine sandy loam

Bt horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 6 dry, 3 to 5 moist
Chroma—2 to 4
Reaction—neutral or slightly alkaline
Texture—loam, sandy clay loam, or clay loam (15 to 35 percent fine sand and coarser sand; less than 50 percent sand)

Bk horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 6 dry, 3 to 5 moist
Chroma—2 to 4
Reaction—slightly alkaline or moderately alkaline
Texture—loam, sandy clay loam, or clay loam (15 to 35 percent fine sand and coarser sand; less than 50 percent sand)

C horizon:
Hue—10YR or 2.5Y
Value—5 to 7 dry, 4 to 6 moist
Chroma—2 to 4
Reaction—slightly alkaline or moderately alkaline
Texture—loam, silt loam, clay loam, sandy clay loam, very fine sandy loam, loamy fine sand, or fine sandy loam

Sidney Series

The Sidney series consists of well drained soils on upland hillslopes. These soils formed in loamy, calcareous residuum derived from weakly cemented fine grained sandstone and are deep over weakly cemented calcareous fine grained sandstone. Permeability is moderate. Slopes range from 3 to 20 percent. The mean annual precipitation is about 17 inches, and the mean annual air temperature is about 51 degrees F at the type location.

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Aridic Calciustolls

Typical Pedon

Sidney loam, Sidney-Canyon complex, on a convex, east-facing side slope of 5 percent, in a cultivated field, in Banner County, Nebraska; about 7 miles south and 5 miles east of Harrisburg; 2,500 feet east and 1,700 feet north of the southwest corner of sec. 10, T. 17 N., R. 55 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 7 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable; common very fine and few fine roots; strong effervescence; 2 percent calcareous sandstone gravel, by volume; slightly alkaline; abrupt smooth boundary.
Bw—7 to 16 inches; brown (10YR 5/3) very fine sandy loam, dark grayish brown

(10YR 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; soft, very friable; common very fine and fine roots; strong effervescence; 2 percent calcareous sandstone gravel, by volume; moderately alkaline; gradual smooth boundary.

Bk—16 to 26 inches; light brownish gray (10YR 6/2) silt loam, grayish brown (10YR 5/2) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable; common fine roots; violent effervescence; 2 percent calcareous sandstone gravel by volume; many mycelial-like threads and seams of calcium carbonate; moderately alkaline; clear wavy boundary.

C—26 to 48 inches; very pale brown (10YR 7/3) very fine sandy loam, pale brown (10YR 6/3) moist; massive, soft, very friable; few fine roots; strong effervescence; 5 percent calcareous sandstone gravel, by volume; moderately alkaline; clear wavy boundary.

Cr—48 to 80 inches; very pale brown (10YR 8/2) weakly cemented fine grained sandstone, light gray (10YR 7/2) moist; violent effervescence, moderately alkaline.

Range in Characteristics

Mean annual soil temperature: 49 to 55 degrees F
Depth to paralithic contact: 40 to 60 inches
Depth to secondary calcium carbonate: 0 to 18 inches; typically 0 to 10 inches
Thickness of the mollic epipedon: 7 to 20 inches
Thickness of the solum: 7 to 30 inches
Content of clay in the particle-size control section (weighted average): 5 to 20 percent
Texture of the particle-size control section: Silt loam, loam, very fine sandy loam, or fine sandy loam
Content of sand in the particle-size control section (weighted average): Less than 65 percent total sand; about 35 percent or less very fine sand
Content of rock fragments in the particle-size control section (weighted average): Calcareous sandstone less than 5 percent, by volume; range from 0 to 15 percent
Other features: Some pedons contain volcanic ash with glass shards that comprise from 20 to 80 percent, by volume, of very fine sand and coarse silt. A few granitic pebbles are throughout the profile in some pedons. Some pedons have an AC horizon with color and texture intermediate between the A and C horizon.

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—2 or 3
Texture—loam, very fine sandy loam, or fine sandy loam
Reaction—slightly alkaline or moderately alkaline; neutral or slightly alkaline in pedons that are leached of carbonates

Bw horizon:
Hue—10YR
Value—4 to 6 dry, 3 to 5 moist
Chroma—2 or 3
Texture—silt loam, loam, very fine sandy loam, or fine sandy loam
Calcium carbonate equivalent—1 to 10 percent
Reaction—slightly alkaline or moderately alkaline

Bk horizon:
Hue—10YR
Value—5 to 8 dry, 4 to 7 moist
Chroma—1 to 3

Texture—silt loam, loam, very fine sandy loam, or fine sandy loam
Calcium carbonate equivalent—5 to 25 percent (lab data)
Reaction—slightly alkaline or moderately alkaline

C horizon:
Hue—10YR
Value—7.5YR or 10YR
Chroma—1 to 3
Texture—loam, very fine sandy loam, fine sandy loam, or sandy loam
Calcium carbonate equivalent—1 to 15 percent
Reaction—slightly alkaline to strongly alkaline

Cr horizon:
Hue—7.5YR or 10YR
Value—6 to 8 dry, 5 to 7 moist
Chroma—1 to 4
Texture—weakly cemented fine grained sandstone

Tassel Series

The Tassel series consists of shallow, well drained soils on uplands. These soils formed in residuum derived from sandstone. Permeability is moderately rapid. Slopes range from 0 to 70 percent. The mean annual precipitation is about 15 inches, and the mean annual air temperature is about 48 degrees F at the type location.

Taxonomic classification: Loamy, mixed, calcareous, superactive, mesic, shallow Ustic Torriorthents

Typical Pedon

Tassel fine sandy loam, on a slope of 15 percent, in an area of rangeland about 4 miles south and 9 miles west of Gering, in Scotts Bluff County, Nebraska; 1,850 feet west and 2,110 feet north of the southeast corner of sec. 29, T. 21 N., R. 56 W.

A—0 to 8 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak medium granular structure; soft, very friable; 3 percent sandstone gravel, by volume; strong effervescence; slightly alkaline; gradual smooth boundary.
C—8 to 15 inches; light gray (10YR 7/2) fine sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, friable; 10 percent sandstone gravel and cobbles, by volume; violent effervescence; moderately alkaline; gradual smooth boundary.
Cr—15 to 80 inches; light gray (10YR 7/2), partially consolidated, soft sandstone; violent effervescence.

Range in Characteristics

Depth to carbonates: 0 to 3 inches
Content of clay in the particle-size control section: 5 to 12 percent; averages 10 percent or less
Content of sand in the particle-size control section: 52 to 75 percent
Depth to the Cr horizon: Typically 10 to 20 inches; ranges from 6 to 20 inches
Reaction: Slightly alkaline or moderately alkaline throughout the profile
Other features: An AC horizon in some pedons; horizon has colors and textures intermediate between those of the A and C horizons

A horizon:
Hue—10YR or 2.5Y
Value—4 to 7 dry, 3 to 6 moist

Chroma—2 to 4
Texture—fine sandy loam, very fine sandy loam, loamy very fine sand, sandy loam, loamy sand, or loamy fine sand
Special features—A horizon too thin to qualify as a mollic epipedon

C horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 to 8 dry, 4 to 7 moist
Chroma—2 or 3
Texture—fine sandy loam, very fine sandy loam (less than 12 percent clay), sandy loam, loamy very fine sand, or loamy fine sand

Treon Series

The Treon series consists of very shallow and shallow, well drained soils that formed in residuum derived from underlying fine grained sandstone. These soils are on upland plains, dissected ridges, structural benches, and escarpments. Permeability is moderately rapid. Slopes range from 0 to 65 percent. The mean annual precipitation is about 15 inches, and the mean annual temperature is about 48 degrees F.

Taxonomic classification: Loamy, mixed, superactive, mesic, shallow Torriorthentic Haplustolls

Typical Pedon

Treon fine sandy loam, on a northeast-facing, convex slope of 10 percent, on grassland at an elevation of 5,520 feet above sea level, in Weld County, Colorado; about 1 mile south and 11 miles west of Hereford; 600 feet south and 1,800 feet west of the northeast corner of sec. 35, T. 12 N., R. 64 W.; USGS Chalk Bluffs East topographic quadrangle; lat. 40 degrees 58 minutes 16 seconds N. and long. 104 degrees 31 minutes 06 seconds W. (Colors are for dry soil unless otherwise indicated.)

A—0 to 7 inches; brown (10YR 5/3) fine sandy loam, dark brown (l0YR 3/3) moist; moderate medium granular structure; soft, very friable; strong effervescence; slightly alkaline (pH 7.4); clear smooth boundary.
Ck—7 to 11 inches; very pale brown (10YR 7/3) fine sandy loam, dark brown (10YR 3/3) moist; massive; slightly hard, very friable; lime disseminated through entire mass; violent effervescence; slightly alkaline (pH 7.7); abrupt smooth boundary.
Cr—11 to 15 inches; calcareous fine grained sandstone.

Range in Characteristics

Thickness of the mollic epipedon: 6 to 12 inches
Mean annual soil temperature: 48 to 52 degrees F
Mean summer temperature: 65 to 70 degrees F
Depth to carbonates: 0 to 4 inches; typically calcareous throughout
Content of clay in the particle-size control section (weighted average): 10 to 20 percent
Depth to paralithic contact: 6 to 20 inches
Content of rock fragments in the particle-size control section (weighted average): 0 to 25 percent; typically less than 10 percent pebble-sized fragments

A horizon:
Hue—7.5YR or 10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—2 or 3

Texture—fine sandy loam; ranges from sandy loam to loam
Reaction—neutral to moderately alkaline

C horizon:
Value—5 to 8 dry, 3 to 6 moist
Texture—very fine sandy loam, fine sandy loam, sandy loam, or gravelly fine sandy loam
Reaction—slightly alkaline or moderately alkaline

Tripp Series

The Tripp series consists of very deep, well drained soils formed in silty or loamy alluvium or loess. These soils are on stream terraces. Permeability is moderate. Slopes range from 0 to 9 percent. The mean annual precipitation is about 15 inches, and the mean annual temperature is about 49 degrees F at the type location.

Taxonomic classification: Coarse-silty, mixed, superactive, mesic Aridic Haplustolls

Typical Pedon

Tripp very fine sandy loam, on a slope of less than 1 percent, in a cultivated field, in Scotts Bluff County, Nebraska; about 4 miles north and 1 mile west of Minatare; 1,200 feet south and 100 feet east of the northwest corner of sec. 19, T. 22 N., R. 53 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 7 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; hard, friable; slightly alkaline; abrupt smooth boundary.
A—7 to 13 inches; grayish brown (10YR 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse angular blocky structure; slightly hard, friable; slightly alkaline; clear smooth boundary.
Bw1—13 to 20 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to moderate fine granular; hard, friable; slightly alkaline; gradual smooth boundary.
Bw2—20 to 30 inches; light brownish gray (10YR 6/2) very fine sandy loam, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to moderate fine subangular blocky; slightly hard, friable; slightly alkaline; gradual wavy boundary.
Bw3—30 to 35 inches; light gray (10YR 7/2) very fine sandy loam, grayish brown (10YR 5/2) moist; weak coarse subangular blocky structure; soft, very friable; slightly alkaline; clear wavy boundary.
Bk—35 to 45 inches; very pale brown (10YR 8/2) very fine sandy loam, light brownish gray (10YR 6/2) moist; weak medium subangular blocky structure; slightly hard, friable; thread-like secondary deposits of carbonates; violent effervescence; moderately alkaline; clear wavy boundary.
C—45 to 80 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; massive; soft, very friable; violent effervescence; moderately alkaline.

Range in Characteristics

Thickness of the solum: 20 to 48 inches
Thickness of the mollic epipedon: 7 to 20 inches
Depth to free carbonates: 18 to 40 inches

A horizon:
Hue—10YR
Value—4 or 5 dry, 2 or 3 moist
Chroma—2 or 3

Texture—very fine sandy loam, silt loam, loam, fine sandy loam, or loamy very fine sand
Reaction—slightly acid to slightly alkaline

B horizon:
Hue—10YR
Value—4 to 7 dry, 3 to 5 moist
Chroma—2 or 3
Texture—silt loam, loam, or very fine sandy loam
Reaction—neutral to moderately alkaline

Bk and C horizons:
Hue—10YR
Value—6 to 8 dry, 5 to 7 moist
Chroma—2 or 3
Texture—loam, silt loam, or very fine sandy loam
Reaction—slightly alkaline or moderately alkaline
Special features—a small amount (less than 3 percent, by volume) of pebbles on the surface or mixed throughout the profile in some pedons; sand or sand mixed with a few pebbles below a depth of 40 inches in some pedons

Ulysses Series

The Ulysses series consists of very deep, well drained upland soils that formed in calcareous loess. Permeability is moderate. Slopes range from 0 to 20 percent. The mean annual temperature is 56 degrees F, and the mean annual precipitation is 16 inches.

Taxonomic classification: Fine-silty, mixed, superactive, mesic Aridic Haplustolls

Typical Pedon

Ulysses silt loam, on a convex slope of 1 percent, in a cultivated field, in Greeley County, Kansas; 16 miles southwest of Tribune; 1,500 feet south and 2,100 feet west of the northeast corner of sec. 8, T. 20 S., R. 42 W. (Colors are for dry soil unless otherwise indicated.)

Ap—0 to 4 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; hard, friable; neutral; abrupt smooth boundary.
A—4 to 10 inches; dark grayish brown (10YR 4/2) silt loam, very dark graysih brown (10YR 3/2) moist; moderate medium granular structure; hard, friable; many wormcasts; mildly alkaline; gradual smooth boundary.
Bw—10 to 18 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; hard, friable; abundant wormcasts; strong effervescence; moderately alkaline; gradual smooth boundary.
C1—18 to 30 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; massive; slightly hard, very friable; violent effervescence; faint films and streaks of segregated lime; moderately alkaline; gradual smooth boundary.
C2—30 to 60 inches; pale brown (10YR 6/3) silt loam, brown (10YR 5/3) moist; massive; soft, very friable; strong effervescence; moderately alkaline.

Range in Characteristics

Thickness of the solum: 10 to 24 inches
Depth to free carbonates: 7 to 15 inches
Thickness of the mollic epipedon: 7 to 20 inches

Other features: Some pedons have an AC horizon. Some pedons have more sandy or more clayey layers below a depth of 40 inches.

A horizon:
- Hue—10YR
- Value—4 or 5 dry, 2 or 3 moist
- Chroma—2 or 3
- Texture—loam, very fine sandy loam, fine sandy loam, silt loam, clay loam, or silty clay loam
- Reaction—neutral or mildly alkaline

Bw horizon:
- Hue—10YR
- Value—4 to 6 dry, 3 or 4 moist
- Chroma—2 or 3
- Texture—silt loam or silty clay loam; includes loam or clay loam; sand fraction dominated by very fine sand
- Reaction—slightly alkaline or moderately alkaline

C horizon:
- Hue—7.5YR to 2.5Y
- Value—5 to 7 dry, 4 to 6 moist
- Chroma—2 to 4
- Texture—silt loam or silty clay loam; includes loam or clay loam; sand fraction dominated by very fine sand
- Reaction—moderately alkaline

Formation of the Soils

This section tells how the factors of soil formation have affected the development of soils in Kimball County.

Factors of Soil Formation

Soil is produced by soil-forming processes acting on deposited or accumulated geologic material. The characteristics of the soil at any given point are determined by the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time the forces of soil formation have acted on the soil material.

Climate and plant and animal life, mainly plants, are the active factors of soil formation. These factors act on the parent material and slowly change it to a natural body that has genetically related horizons. The effects of climate and animal and plant life are conditioned by relief. The parent material also influences the kind of soil profile that is formed and, in extreme cases, the parent material entirely determines the kind of soil that is formed.

Finally, time is needed to change the parent material into a soil profile. A long time is usually required for a soil profile to form distinct horizons. The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four.

Human activities also affect the factors of soil formation. They have an immediate effect on the rate and the direction of the changes caused by the soil-forming processes. Additions of fertilizer and irrigation water change the soil. Cultivation can result in soil loss unless erosion is controlled. Conservation tillage practices and terraces have beneficial effects on the soil.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. It largely determines the mineralogical and chemical composition of the soil. Most of the soils in Kimball County formed in parent material that was transported by wind or water, moved by gravity, or weathered from underlying geological formations.

Loess is wind-deposited silty material that mantles the tablelands and some dissected uplands in Kimball County. It is a yellowish brown, calcareous material ranging from a few inches to few feet in thickness. The major soils that formed in loess are Rosebud, Altvan, Keith, and Kuma.

Alluvium is material deposited by water on flood plains and stream terraces in broad river valleys or in narrow upland drainageways. It ranges widely in texture because of the differences in material from which it was derived and in the manner in which it was deposited. Bayard and Tripp soils formed in alluvium on stream terraces. Dwyer soils formed in wind-worked sandy alluvium on stream terraces. Broadwater, Glenberg, and Las Animas soils formed in alluvium on flood plains.

Colluvium is material that accumulated by the combined forces of gravity and water. In Kimball County, colluvial material occurs on footslopes of dissected uplands. Ashollow soils formed in colluvium.

The Ogallala Sandstone Formation extends throughout most of the county. In some places it is at the surface, and in other places it is many feet below the surface. It is composed of beds of silty to gravelly material that ranges from soft or loose to very hard. The rock that formed from this material ranges from friable caliche that is only partly indurated to relatively hard, resistant, ledge-forming mortar beds. Tassel and Ashollow soils formed in parent material weathered from the Ogallala Formation.

In some areas of the county, soils formed in a mixture of different parent materials, or where young material was deposited over older material. Examples of soils that formed in more than one type of parent material are Altvan, Rosebud, and Brownson soils. Altvan soils formed in loess over sand and gravel. Rosebud and Brownson formed in loess over sandstone.

Climate

Climate has had an important effect on soil formation in Kimball County. It affects soils directly through its effect on the parent material and indirectly through its effect on vegetation and micro-organisms.

The climatic factors that affect the weathering of parent material are rainfall, fluctuating temperatures, and wind. The climate of Kimball County is characterized by cold winters and hot summers. Rainfall is heaviest in late spring and early summer. The annual precipitation averages about 17 inches. Because the amount of rainfall is relatively low, the soils generally are not leached to a significant depth. Runoff of rainwater removes, relocates, and sorts soil material. The wind also removes, sorts, and redeposits soil material. The deposits of eolian sands in the county are examples of the importance of wind as an agent of deposition. Drying promotes the development of granular structure in the surface layer, which is common in many soils. Alternating periods of freezing and thawing hasten the physical disintegration of the parent material and enhance the development of soil structure.

Micro-organisms in the soil are most active within a certain range in temperature. Thus, the rate at which organic matter is decomposed into humus varies, depending on the climatic conditions. Changes in temperature and moisture activate the weathering of parent material, which results in chemical and physical changes in the soil.

Because the humidity in Kimball County is generally low, a fairly high amount of water is lost through evaporation and transpiration. This loss reduces the amount of water available for leaching, plant growth, decomposition of organic material, and chemical weathering.

Plant and Animal Life

Plants, burrowing animals, micro-organisms, earthworms, and other living organisms affect soil formation. The soils in Kimball County formed mainly under a mixture of short, mid, and tall grasses. Each year, the grasses formed new growth above the ground and their fibrous roots penetrated the upper few feet of the soil. In time, a dark layer developed at the surface. This layer gradually became thicker as more organic material decayed into humus. Because of the additional humus, the soil developed granular structure and good tilth. Plant roots bring nutrients to the surface. Calcium, in particular, helps to keep the soil porous. The decomposition of organic material forms organic acids that, in solution, hasten the leaching process. Soil that

formed in sandy parent materials resistant to weathering and that have a low available water holding capacity, such as Tassel soils, tend to develop more slowly than soil that provides a more favorable medium for plants and animals, such as Rosebud soils.

The activity of micro-organisms helps to change undecomposed organic material into humus. Some bacteria take in nitrogen from the air. When the bacteria die, the nitrogen becomes available to plants. Other bacteria oxidize sulphur, which then becomes available to plants. The plants, in turn, complete the cycle by producing more organic material. Other living organisms, such as algae, fungi, protozoa, and actinomycetes, affect soil formation physically and chemically. Larger animals, such as gophers, moles, earthworms, millipedes, spiders, and other insects help mix the soil and add organic matter when they die.

Relief

Relief affects soil formation mainly through its influence on runoff, erosion, aeration, and drainage. The rate of runoff is more rapid on steep and very steep soils than on the less sloping soils. Consequently, plant growth generally is less vigorous on the steeper soils, less water penetrates the surface, soil horizons are thinner and less distinct, and lime (calcium carbonate) is not so deeply leached. Also, the hazard of erosion is more severe on the steeper soils if all other factors are equal.

Relief can contribute to differences in the color, thickness, and horizonation of soils that formed in the same kind of parent material. For example, differences among Keith and Lodgepole soils, which formed in Peoria Loess, can be attributed mainly to differences in relief. The gradient, shape, length, and direction of the slopes influence the amount of moisture in the soil. Lodgepole soils, which formed on upland depressions, are the more strongly developed than Keith soils on hillslopes and plains due to the additional moisture Lodgepole receives in its landscape position.

The soils on flood plains, such as Broadwater, Glenberg, and Las Animas, are characterized by low relief. They commonly receive new sediment during periods of flooding. Each flood provides new parent material and starts a new cycle of soil formation.

Time

Time enables relief, climate, and plant and animal life to change the parent material into a soil. If the parent material has been in place for only a short time, the soils are weakly developed. The degree of profile development depends on the intensity of the soil-forming factors. Differences in the length of time that geological material has been in place are commonly reflected in the distinctness of horizons in the soil profile.

The time needed for soil formation depends mainly on the kinds of parent material and the climate. The resistance to weathering of the parent material partly determines the length of time that is needed. Generally, soils in warm, humid areas form faster than soils in cool, dry areas.

Soil maturity is related not only to time but also to the other four soil-forming factors. Soils that do not have a B horizon are commonly considered immature, and soils that have a well developed B horizon are considered mature. The maturity of a soil, however, depends on the interaction of all five soil-forming factors. Thus, a very steep Tassel soil that does not have a B horizon might be as mature as it can be on its particular slope and under its particular climate.

Geologic Framework and Groundwater Occurrence

R.F. Diffendal, Jr., Conservation and Survey Division, University of Nebraska, helped prepare this section.

Geologic Framework

All of Kimball County is part of the Cheyenne Tablelands, a largely constructional part of the High Plains underlain primarily by sediments transported from the Rocky Mountains and deposited on the developing tablelands. Quaternary fluvial erosion cut away parts of the tablelands producing the valleys of Lodgepole Creek and its tributaries.

The oldest rocks exposed in Kimball County belong to the upper part of the Brule Formation, youngest formation of the White River Group of rocks. The Brule Formation is Oligocene in age and was deposited from about 35 to 29 million years ago. The Brule Formation underlies the entire county and varies in thickness from a few feet to more than 600 feet. The formation is mostly covered by younger deposits, but is exposed in a few areas in natural exposures along the south valley side of Lodgepole Creek and in a few roadcuts and excavations primarily on valley sides on the south side of Lodgepole Creek west of Bushnell. Other small exposures crop out along the east part of the valley of Rocky Hollow in the northeastern part of the county.

Much of the Brule Formation is a brown to pinkish brown siltstone. The silt grains in the rock are composed dominantly of volcanic glass and crystals erupted from volcanoes that were active at the time of Brule deposition. These volcanoes appear to have been located principally in the Southern Rocky Mountains and the Great Basin. The silt in the form of volcanic ash was carried to Kimball County by winds and deposited as an extensive blanket averaging several hundred feet in thickness. While most of the siltstone is impure volcanic ash having some usually minor admixtures of minerals from non-volcanic sources, some strata in the Brule Formation are composed of very pure ash. These volcanic ash beds occur beneath much of western Nebraska and adjacent parts of South Dakota, Wyoming, and Colorado, and are key markers used by some drillers to determine position in the Brule Formation. Some minor stream deposits of sandstone and conglomerate fill small valleys eroded into the Brule silts during their deposition.

Some changes occurred in the Brule Formation after deposition of the silt. Authigenic clays crystallized in the pore spaces between grains, forming a weak cement. Fractures developed in some of the siltstones after this cementing process. The fractures are very steeply dipping and occur in one or more sets, each with a general directional trend (e.g., NW-SE, NE-SW, etc.) The density of fractures varies through the formation and may be related to weathering of near-surface layers of silt when deposition stopped for a time. Calcium carbonate concretions also formed in some parts of the Brule Formation, probably as a result of changes in chemistry of included waters or of soil-forming processes.

Volcaniclastic sandstones, conglomerates, and some siltstones of the lower part of the Arikaree Group of late Oligocene age (about 28 million years old) crop out in a very small locally exposed area along Rocky Hollow in the northeastern part of the county. These sediments fill ancient gullies and valleys eroded into the underlying Brule Formation. A few test holes in the northern part of the county have also penetrated sediments of the Arikaree Group also filling small ancient gully and valley systems. Overall the group is exposed in such a small area of the county that it has had essentially no influence on soil development in Kimball County.

The Ash Hollow Formation of the Ogallala Group directly overlies the Brule Formation beneath much of Kimball County today, and in the past covered the Brule

Formation across the whole county. The Ash Hollow Formation is of Miocene age and was deposited from about 13 to 5 million years ago. This formation was deposited on the stream-eroded surface of the Brule Formation, largely as alluvial sediments carried principally to the Kimball County area by ancient rivers draining the Rocky Mountains in southern Wyoming and north-central Colorado. The sediments and rocks of the Ash Hollow Formation include sands and gravels, conglomerates, sands, sandstones, silts, siltstones, and minor diatomites. These kinds of deposits grade laterally and vertically into one another, just as similar deposits of braided rivers do today. At any one instant in the formation of the Ash Hollow, there were streams and rivers transporting and depositing sediments in channels and flood plains directly alongside higher spots where soils were forming on previously deposited sediments. Through time these streams and rivers filled their channels with sediments eroded from granites and other kids of rocks from the Rocky Mountains and then shifted to new positions, cutting new channels, and filling them in turn. The thickness of the Ash Hollow Formation in Kimball County, resulting largely from the mode of deposition just outlined, varies from a feather edge along western Lodgepole Valley to 600 or more feet in northern parts of the county (fig. 22).

In contrast to the tremendous volcanic ash falls that formed the Brule Formation, the Ash Hollow Formation has only minor volcanic ash deposits rarely more than 10 feet thick and generally extends over areas of less than one square mile. These ash deposits occur in former low spots on the depositional surface that were either gullies, swales, ponds, or stream channels. Ash Hollow volcanic ash deposits usually have admixtures on nonvolcanically-derived sediments and often appear to have been washed off surrounding higher land surfaces into the low spots mentioned above.

Parts of the Ash Hollow Formation are typified by hard calcium carbonate or silica cemented layers of sandstone or siltstone that form grey to white ledges up to several feet thick separated from one another by softer sediments or rocks. These so-called

Figure 22.—Exposure of sandstone of the Ash Hollow Formation of the Ogallala Group.

calcretes and silcretes are thought to be remnants of paleosols formed in sediments beneath topographically higher land areas adjacent to streams during deposition of the formation. Fossil root structures and other plant fossils found in these ledges support the idea of the paleosol hypothesis of origin for many of these strata.

A blanket of wind-deposited eolian silt or loess, deposited primarily on the Ash Hollow Formation, underlies the tableland surface across most of the county. Most of the loess is the early Holocene Bignell Loess and the late Pleistocene Peoria Loess, ranging in age from about 20,000 to about 8,500 years. There are probably remnants of older loess deposits buried beneath the Peoria Loess. Loess thicknesses range from a feather edge to as much as 20 feet.

Several types of mappable deposits younger than the Peoria Loess are present across parts of Kimball County. Generally thin colluvium underlies most slopes in the county. Dunes of eolian sand are common along some parts of the valley floor of Lodgepole Creek. Generally discontinuous fluvial fill terrace deposits occur along the valley sides and beneath valley floors in the county. Most (and perhaps all) of these deposits appear to be Holocene in age. The alluvium of Lodgepole Creek is up to about 60 feet thick.

Groundwater

The Brule Formation, which underlies all of Kimball County, is not a good aquifer. It may yield a moderate amount of water to wells where the siltstone is coarser grained, where local sandstones and conglomerates occur, or where fractures are present. Wells tapping fractures may yield large initial quantities of water, but yields may rapidly decline. Some wells along lower valley sides and valley floors may tap this source (fig. 23).

The Ash Hollow Formation is an important source of water, particularly in areas underlain by thicker deposits of coarse grained sediments beneath the water table.

Of the units younger than the Ash Hollow Formation, the Peoria Loess is not a water source, but can transmit water. Terrace deposits and younger alluvium beneath

Figure 23.—Gravity-irrigated edible beans on Tripp loam, 0 to 1 percent slopes.

Lodgepole Valley may be important sources of water if they contain sufficient saturated coarse-grained deposits. Eolian sand may yield small supplies of water if conditions are right.

Depth to water is from less than 3 feet to about 50 feet in the valley of Lodgepole Creek. Depth to water beneath the Cheyenne Tablelands ranges from about 100 feet to more than 300 feet.

Water appears to occur in sufficient quantities to meet current needs in the county. Most irrigation wells in the county also tap alluvial sources. Some irrigation wells drilled on the tablelands also yield significant water from the Ash Hollow Formation (fig. 24). The principal aquifer, which consists of the Ash Hollow Formation and the Quaternary eolian and fluvial deposits, is thickest in the northern half of the county.

Figure 24.—Corn irrigated with a center-pivot sprinkler system.

Water quality varies. Elevated nitrate concentrations are present in water from Lodgepole Valley. Water from beneath the tablelands is generally of good quality.

References

American Association of State Highway and Transportation Officials (AASHTO). 2000. Standard specifications for transportation materials and methods of sampling and testing. 20th edition, 2 volumes.

American Society for Testing and Materials (ASTM). 2001. Standard classification of soils for engineering purposes. ASTM Standard D 2487-00.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1998. Keys to soil taxonomy. 8th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

United States Department of Agriculture. 1962. Soil survey of Kimball County Nebraska. Soil Conservation Service in cooperation with the University of Nebraska, Conservation and Survey Divison.

United States Department of Agriculture. 2003. National soil survey handbook, title 430-VI. [Online] Available: http://soils.usda.gov/technical/handbook.

Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte. An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds directly beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Channery soil material. Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

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 depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

COLE (coefficient of linear extensibility). See Linear extensibility.

Colluvium. Soil material or 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 establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

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.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

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 wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

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.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fine textured soil. Sandy clay, silty clay, or 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 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.
Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.
Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).
Forb. Any herbaceous plant not a grass or a sedge.
Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.
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.
Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.
Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.
Gravelly soil material. Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.
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. Water filling all the unblocked pores of the 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.
Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.
Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.
Hard to reclaim (in tables). Reclamation is difficult after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.
Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.
High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.
Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well

defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

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.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some 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.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

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 potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

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.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

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

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

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.

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.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates

less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Paleoterrace. An erosional remnant of a terrace that retains the surface form and alluvial deposits of its origin but was not emplaced by, and commonly does not grade to, a present-day stream or drainage network.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

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.

Pitting (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.

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.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed 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 degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

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.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.
Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.
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-sized particles.
Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.
Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.
Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.
Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.
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.
Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.
Shale. Sedimentary rock 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 surface runoff.
Shoulder. The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.
Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.
Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.
Silica. A combination of silicon and oxygen. The mineral form is called quartz.
Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.
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.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Sinkhole. A depression in the landscape where limestone has been dissolved.

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.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

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. In this survey, classes for simple slopes are as follows:

Level	0 to 1 percent
Nearly level	0 to 2 percent
Very gently sloping	1 to 3 percent
Gently sloping	3 to 6 percent
Strongly sloping	6 to 9 percent
Moderately steep	9 to 17 percent
Steep	17 to 30 percent
Very steep	30 to 60 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

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 if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are

slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

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 that is 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.

Toeslope. The position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

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.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Upland. 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 meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

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.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

Table 1.--Temperature and Precipitation

(Recorded in the period 1971-2000 at Kimball, Nebraska)

Month	Temperature						Precipitation				
				2 yrs in 10 will have				2 yrs in 10 will have		Avg. # of days w/1 or more	Avg. total snow-fall
	Avg. daily max.	Avg. daily min.	Avg.	Max. temp. >than	Min. temp. <than	Avg. # of grow deg days*	Avg.	Less than	More than		
	°F	°F	°F	°F	°F	Units	In	In	In	In	In
January	39.0	12.9	25.9	65	-17	10	0.41	0.18	0.63	1	6.9
February	43.9	16.9	30.4	69	-14	27	0.31	0.07	0.54	1	4.3
March	50.2	23.0	36.6	77	-2	80	1.15	0.36	1.80	3	10.3
April	59.0	30.9	45.0	85	9	207	1.53	0.64	2.38	4	5.3
May	68.8	41.2	55.0	90	25	467	2.92	1.43	4.24	6	0.7
June	80.3	50.6	65.4	99	36	763	2.57	1.38	3.57	5	0.0
July	87.1	56.4	71.7	101	45	983	2.86	1.26	4.28	5	0.0
August	85.4	54.3	69.9	100	43	926	1.91	0.82	3.00	4	0.0
September	76.2	44.0	60.1	96	25	607	1.43	0.51	2.25	3	0.4
October	63.9	32.3	48.1	88	12	287	0.97	0.22	1.68	2	1.9
November	48.5	21.4	34.9	76	-4	69	0.62	0.23	0.99	1	6.9
December	40.9	14.1	27.5	69	-17	20	0.49	0.12	0.84	1	7.5
Yearly:											
Average	61.9	33.2	47.5	---	---	---	---	---	---	---	---
Extreme	105	-35	---	102	-23	---	---	---	---	---	---
Total	---	---	---	---	---	4,446	17.16	13.75	19.79	36	44.2

*A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-1990 at Kimball, Nebraska)

Probability	Temperature		
	24°F or lower	28°F or lower	32°F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 30	May 10	May 23
2 year in 10 later than--	Apr. 25	May 5	May 19
5 year in 10 later than--	Apr. 15	Apr. 27	May 10
First freezing temperature in fall:			
1 yr in 10 earlier than--	Sept. 27	Sept. 19	Sept. 12
2 yr in 10 earlier than--	Oct. 2	Sept. 24	Sept. 17
5 yr in 10 earlier than--	Oct. 13	Oct. 4	Sept. 26

Table 3.--Growing Season

(Recorded in the period 1971-2000 at Kimball, Nebraska)

Probability	Daily minimum temperature during growing season		
	Higher than 24°F	Higher than 28°F	Higher than 32°F
9 years in 10	158	137	122
8 years in 10	165	144	128
5 years in 10	179	157	139
2 years in 10	192	171	150
1 year in 10	200	178	155

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
1080	Albinas-Cheyenne loams, 0 to 1 percent slopes	20,324	3.3
1132	Alliance loam, 3 to 6 percent slopes	869	0.1
1180	Altvan loam, 0 to 1 percent slopes	4,080	0.7
1185	Altvan fine sandy loam, 1 to 3 percent slopes	33,485	5.5
1196	Altvan-Eckley complex, 3 to 9 percent slopes	60,080	9.9
1199	Altvan-Satanta fine sandy loams, 1 to 3 percent slopes	26,695	4.4
1200	Altvan-Eckley-Tassel complex, 3 to 9 percent slopes	14,762	2.4
1202	Altvan-Satanta loams, 0 to 1 percent slopes	16,833	2.8
1370	Bayard fine sandy loam, 0 to 3 percent slopes	21,579	3.5
1371	Bayard fine sandy loam, 3 to 6 percent slopes	4,582	0.8
1780	Broadwater loamy sand, channeled, occasionally flooded	7,203	1.2
1797	Brownson-Rosebud-Canyon loams, 0 to 3 percent slopes	31,794	5.2
2055	Chappell-Bayard-Broadwater complex, 0 to 2 percent slopes	10,979	1.8
2665	Dwyer loamy sand, 0 to 3 percent slopes	752	0.1
2687	Eckley and Altvan soils, 9 to 50 percent slopes	17,489	2.9
3050	Glenberg fine sandy loam, rarely flooded	1,638	0.3
4030	Jayem fine sandy loam, 0 to 3 percent slopes	1,706	0.3
4031	Jayem fine sandy loam, 3 to 6 percent slopes	925	0.2
4150	Keith loam, 0 to 1 percent slopes	541	*
4151	Keith loam, 1 to 3 percent slopes	2,360	0.4
4310	Kuma loam, 0 to 1 percent slopes	1,843	0.3
4472	Las Animas loam, channeled, occasionally flooded	1,808	0.3
4662	Lodgepole loam, occasionally ponded	1,594	0.3
6420	Rosebud loam, 0 to 1 percent slopes	17,295	2.8
6430	Rosebud-Canyon loams, 1 to 3 percent slopes	54,888	9.0
6440	Rosebud-Hemingford loams, 0 to 1 percent slopes	23,301	3.8
6442	Rosebud-Blanche complex , 1 to 3 percent slopes	10,968	1.8
6446	Rosebud-Tassel sandy loams, 0 to 3 percent slopes	8,280	1.4
7152	Tassel-Ashollow-Rock outcrop complex, 20 to 60 percent slopes	9,227	1.5
7153	Tassel-Blanche sandy loams 3 to 9 percent slopes	122,202	20.0
7154	Tassel-Blanche complex, 9 to 30 percent slopes	64,133	10.5
7180	Tassel and Dix and Altvan soils, 9 to 30 percent slopes	10,235	1.7
7324	Tripp loam, 0 to 1 percent slopes	3,609	0.6
7325	Tripp loam, 1 to 3 percent slopes	1,206	0.2
9900	Arents, earthen dam	24	*
9970	Borrow pit	57	*
9975	Sanitary landfill	63	*
9985	Gravel pits	45	*
9998	Water	248	*
	Total	609,702	100.0

* Less than 0.1 percent.

Table 5.--Land Capability and Yields per Acre of Crops and Pasture

(Yields in the "N" columns are for nonirrigated areas; those in the "I" columns are for irrigated areas. 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.)

Map symbol and soil name	Land capability		Alfalfa hay		Millet		Winter wheat-fallow	
	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu
1080:								
Albinas	3c	2c	---	4.8	23	---	40	---
Cheyenne	3c	2s	---	3.8	15	---	30	---
1132:								
Alliance	3e	3e	---	4.6	19	---	36	---
1180:								
Altvan	3c	2s	---	4.5	20	---	35	---
1185:								
Altvan	3e	3e	---	4.2	18	---	34	---
1196:								
Altvan	4e	4e	---	3.6	10	---	24	---
Eckley	6s	---	---	---	---	---	---	---
1199:								
Altvan	3e	3s	---	4.2	19	---	34	---
Satanta	3e	2e	---	4.8	22	---	40	---
1200:								
Altvan	4e	4e	---	3.6	10	---	24	---
Eckley	6s	---	---	---	---	---	---	---
Tassel	6s	---	---	---	---	---	---	---
1202:								
Altvan	3c	2s	---	4.5	20	---	35	---
Satanta	3c	1	---	5.0	22	---	42	---
1370:								
Bayard	3e	2e	---	4.2	18	---	32	---
1371:								
Bayard	4e	3e	---	3.8	17	---	28	---
1780:								
Broadwater	6w	---	---	---	---	---	---	---
1797:								
Brownson	6s	---	---	---	---	---	---	---
Rosebud	3e	3e	---	3.8	16	---	34	---
Canyon	6s	---	---	---	---	---	---	---
2055:								
Chappell	3e	3e	---	3.6	16	---	25	---
Bayard	3e	2e	---	3.8	18	---	32	---
Broadwater	6w	---	---	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Millet		Winter wheat-fallow	
	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu
2665:								
Dwyer	6e	4e	---	3.0	10	---	20	---
2687:								
Eckley	6s	---	---	---	---	---	---	---
Altvan	6e	---	---	---	---	---	---	---
3050:								
Glenberg	3e	2e	---	3.8	15	---	26	---
4030:								
Jayem	3e	2e	---	3.7	16	---	30	---
4031:								
Jayem	4e	3e	---	3.5	14	---	28	---
4150:								
Keith	3c	1	---	5.0	23	---	42	---
4151:								
Keith	3e	2e	---	4.8	22	---	40	---
4310:								
Kuma	3c	1	---	5.2	24	---	42	---
4472:								
Las Animas	6w	---	---	---	---	---	---	---
4662:								
Lodgepole	3w	4w	---	3.8	17	---	28	---
6420:								
Rosebud	3c	2s	---	4.5	20	---	35	---
6430:								
Rosebud	3e	3e	---	4.2	18	---	30	---
Canyon	6s	---	---	---	---	---	---	---
6440:								
Rosebud	3c	2s	---	4.8	20	---	34	---
Hemingford	3c	1	---	5.2	22	---	42	---
6442:								
Rosebud	3e	3e	---	4.6	18	---	30	---
Blanche	4e	4e	---	3.6	14	---	26	---
6446:								
Rosebud	4e	3e	---	3.8	16	---	28	---
Tassel	6s	---	---	---	---	---	---	---
7152:								
Tassel	7s	---	---	---	---	---	---	---
Ashollow	7e	---	---	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---	---	---

Table 5.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Millet		Winter wheat-fallow	
	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu
7153:								
Tassel	6s	---	---	---	---	---	---	---
Blanche	6e	4e	---	3.6	10	---	24	---
7154:								
Tassel	6s	---	---	---	---	---	---	---
Blanche	6e	---	---	---	---	---	---	---
7180:								
Dix	6s	---	---	---	---	---	---	---
Altvan	6e	---	---	---	---	---	---	---
Tassel	6s	---	---	---	---	---	---	---
7324:								
Tripp	3c	1	---	5.3	24	---	42	---
7325:								
Tripp	3e	2e	---	5.2	23	---	40	---
9900:								
Arents, earthen dam	8	---	---	---	---	---	---	---
9970.								
Borrow pits								
9975.								
Sanitary landfill								
9985:								
Pits	8s	---	---	---	---	---	---	---
9998.								
Water								

Table 6.--Prime Farmland

(If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name.)

Map symbol	Soil name
1080	Albinas-Cheyenne loams, 0 to 1 percent slopes (where irrigated)
1132	Alliance loam, 3 to 6 percent slopes (where irrigated)
1180	Altvan loam, 0 to 1 percent slopes (where irrigated)
1185	Altvan fine sandy loam, 1 to 3 percent slopes (where irrigated)
1199	Altvan-Satanta fine sandy loams, 1 to 3 percent slopes (where irrigated)
1202	Altvan-Satanta loams, 0 to 1 percent slopes (where irrigated)
1370	Bayard fine sandy loam, 0 to 3 percent slopes (where irrigated)
1371	Bayard fine sandy loam, 3 to 6 percent slopes (where irrigated)
3050	Glenberg fine sandy loam, rarely flooded (where irrigated)
4030	Jayem fine sandy loam, 0 to 3 percent slopes (where irrigated)
4031	Jayem fine sandy loam, 3 to 6 percent slopes (where irrigated)
4150	Keith loam, 0 to 1 percent slopes (where irrigated)
4151	Keith loam, 1 to 3 percent slopes (where irrigated)
4310	Kuma loam, 0 to 1 percent slopes (where irrigated)
6420	Rosebud loam, 0 to 1 percent slopes (where irrigated)
6440	Rosebud-Hemingford loams, 0 to 1 percent slopes (where irrigated)
6442	Rosebud-Blanche complex, 1 to 3 percent slopes (where irrigated)
7324	Tripp loam, 0 to 1 percent slopes (where irrigated)
7325	Tripp loam, 1 to 3 percent slopes (where irrigated)

Table 7.--Rangeland Productivity

(Only the soils that support rangeland vegetation suitable for grazing are rated.)

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
1080:				
Albinas	Loamy Upland	3,100	2,400	1,700
Cheyenne	Loamy Upland	3,100	2,400	1,700
1132:				
Alliance	Loamy Upland	3,100	2,400	1,700
1180:				
Altvan	Loamy Upland	3,100	2,400	1,700
1185:				
Altvan	Loamy Upland	3,100	2,400	1,700
1196:				
Altvan	Loamy Upland	3,100	2,400	1,700
Eckley	Gravelly Hills	1,150	900	600
1199:				
Altvan	Loamy Upland	3,100	2,400	1,700
Satanta	Loamy Upland	3,100	2,400	1,700
1200:				
Altvan	Loamy Upland	3,100	2,400	1,700
Eckley	Gravelly Hills	1,150	900	600
Tassel	Shallow Limy	1,300	1,050	750
1202:				
Altvan	Loamy Upland	3,100	2,400	1,700
Satanta	Loamy Upland	3,100	2,400	1,700
1370:				
Bayard	Sandy	2,650	2,100	1,500
1371:				
Bayard	Sandy	2,650	2,100	1,500
1780:				
Broadwater	Gravelly Hills	1,150	900	600
1797:				
Brownson	Shallow Limy	1,300	1,050	750
Rosebud	Loamy Upland	3,100	2,400	1,700
Canyon	Shallow Limy	1,300	1,050	750
2055:				
Chappell	Sandy	2,650	2,100	1,500
Bayard	Sandy	2,650	2,100	1,500
Broadwater	Gravelly Hills	1,150	900	600

Table 7.--Rangeland Productivity--Continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
2665:				
Dwyer	Sandy	2,650	2,100	1,500
2687:				
Eckley	Gravelly Hills	1,150	900	600
Altvan	Loamy Upland	3,100	2,400	1,700
3050:				
Glenberg	Sandy Lowland	2,700	2,200	1,600
4030:				
Jayem	Sandy	2,650	2,100	1,500
4031:				
Jayem	Sandy	2,650	2,100	1,500
4150:				
Keith	Loamy Upland	3,100	2,400	1,700
4151:				
Keith	Loamy Upland	3,100	2,400	1,700
4310:				
Kuma	Loamy Upland	3,100	2,400	1,700
4472:				
Las Animas	Loamy Bottomland	3,650	3,000	2,450
4662:				
Lodgepole	Closed Upland Depression	1,200	1,000	700
6420:				
Rosebud	Loamy Upland	3,100	2,400	1,700
6430:				
Rosebud	Loamy Upland	3,100	2,400	1,700
Canyon	Shallow Limy	1,300	1,050	750
6440:				
Rosebud	Loamy Upland	3,100	2,400	1,700
Hemingford	Loamy Upland	3,100	2,400	1,700
6442:				
Rosebud	Loamy Upland	3,100	2,400	1,700
Blanche	Sandy	2,650	2,100	1,500
6446:				
Rosebud	Loamy Upland	3,100	2,400	1,700
Tassel	Shallow Limy	1,300	1,050	750
7152:				
Tassel	Shallow Limy	1,300	1,050	750
Ashollow	Sandy	2,650	2,100	1,500
Rock outcrop	No Site - Veg. Zone 1	0	0	0

Table 7.--Rangeland Productivity--Continued

Map symbol and soil name	Ecological site	Total dry-weight production		
		Favorable year	Normal year	Unfavorable year
		Lb/acre	Lb/acre	Lb/acre
7153:				
Tassel	Shallow Limy	1,300	1,050	750
Blanche	Sandy	2,650	2,100	1,500
7154:				
Tassel	Shallow Limy	1,300	1,050	750
Blanche	Sandy	2,650	2,100	1,500
7180:				
Dix	Gravelly Hills	1,150	900	600
Altvan	Loamy Upland	3,100	2,400	1,700
Tassel	Shallow Limy	1,300	1,050	750
7324:				
Tripp	Loamy Upland	3,100	2,400	1,700
7325:				
Tripp	Loamy Upland	3,100	2,400	1,700
9900.				
Arents, earthen dam				
9970.				
Borrow pits				
9975.				
Sanitary landfill				
9985.				
Pits				
9998.				
Water				

Table 8.--Windbreaks and Environmental Plantings

(Absence of an entry indicates that trees generally do not grow to the given height.)

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1080:					
Albinas	Common chokecherry; common lilac; siberian peashrub; skunkbush sumac; tatarian honeysuckle	Eastern redcedar; green ash; honeylocust; ponderosa pine; Rocky Mountain juniper; Russian olive	Siberian elm	---	---
Cheyenne	Common lilac; Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---
1132:					
Alliance	American plum; common lilac; siberian peashrub	Rocky Mountain juniper	Austrian pine; common hackberry; eastern redcedar; jack pine; ponderosa pine; Russian olive; Scotch pine	Siberian elm	---
1180:					
Altvan	Common lilac; Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---
1185:					
Altvan	Common lilac; Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---
1196:					
Altvan	Common lilac; Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---
Eckley	Common lilac; eastern redcedar; Rocky Mountain juniper; Russian olive; Siberian peashrub	Common hackberry; green ash; ponderosa pine; Siberian elm	---	---	---
1199:					
Altvan	Common lilac; Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1199:					
Satanta	American plum; common chokecherry; tatarian honeysuckle	Autumn olive; Rocky Mountain juniper	Black locust; common hackberry; eastern redcedar; green ash; honeylocust; ponderosa pine	Siberian elm	---
1200:					
Altvan	Common lilac; Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---
Eckley	Common lilac; eastern redcedar; Rocky Mountain juniper; Russian olive; Siberian peashrub	Common hackberry; green ash; ponderosa pine; Siberian elm	---	---	---
Tassel.					
1202:					
Altvan	American plum; common chokecherry; common lilac; Siberian peashrub	Manchurian crabapple; Rocky Mountain juniper	Common hackberry; green ash; honeylocust; ponderosa pine; Russian olive	Siberian elm	---
Satanta	American plum; common chokecherry; tatarian honeysuckle	Eastern redcedar; Rocky Mountain juniper	Black locust; common hackberry; green ash; honeylocust; ponderosa pine; Siberian elm	---	---
1370:					
Bayard	American plum; common lilac; Siberian peashrub; skunkbush sumac	Eastern redcedar; Rocky Mountain juniper	Common hackberry; green ash; honeylocust; ponderosa pine; Russian mulberry	Siberian elm	---
1371:					
Bayard	American plum; common lilac; Siberian peashrub; skunkbush sumac	Eastern redcedar; Rocky Mountain juniper	Common hackberry; green ash; honeylocust; ponderosa pine; Russian mulberry	Siberian elm	---
1780:					
Broadwater.					
1797:					
Brownson	Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1797:					
Rosebud----------	Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---
Canyon.					
2055:					
Chappell----------	Common lilac; Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---
Bayard----------	American plum; common lilac; Siberian peashrub; skunkbush sumac	Eastern redcedar; Rocky Mountain juniper	Common hackberry; green ash; honeylocust; ponderosa pine; Russian mulberry	Siberian elm	---
Broadwater.					
2665:					
Dwyer----------	---	Eastern redcedar; ponderosa pine; Rocky Mountain juniper; Scotch pine	---	---	---
2687:					
Eckley----------	Common lilac; eastern redcedar; Rocky Mountain juniper; Russian olive; Siberian peashrub	Common hackberry; green ash; ponderosa pine; Siberian elm	---	---	---
Altvan----------	Common lilac; Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---
3050:					
Glenberg----------	American plum; Siberian peashrub	---	Bur oak; common hackberry; eastern redcedar; green ash; ponderosa pine; Rocky Mountain juniper; Russian olive	Black locust	Eastern cottonwood
4030:					
Jayem----------	Amur honeysuckle; common chokecherry; common lilac; Siberian peashrub; skunkbush sumac	Eastern redcedar; Rocky Mountain juniper; Russian olive	Green ash; honeylocust; ponderosa pine; Siberian elm	---	---

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
4031: Jayem	Amur honeysuckle; common chokecherry; common lilac; Siberian peashrub; skunkbush sumac	Eastern redcedar; Rocky Mountain juniper; Russian olive	Green ash; honeylocust; ponderosa pine; Siberian elm	---	---
4150: Keith	American plum; common chokecherry; common lilac; Siberian peashrub	Manchurian crabapple; Rocky Mountain juniper	Common hackberry; green ash; honeylocust; ponderosa pine; Russian olive	Siberian elm	---
4151: Keith	American plum; common chokecherry; common lilac; Siberian peashrub	Manchurian crabapple; Rocky Mountain juniper	Common hackberry; green ash; honeylocust; ponderosa pine; Russian olive	Siberian elm	---
4310: Kuma	Amur honeysuckle; common lilac	Common chokecherry	Bur oak; eastern redcedar; green ash; honeylocust; ponderosa pine; Russian olive	Siberian elm	---
4472: Las Animas.					
4662: Lodgepole	American plum; common chokecherry; common lilac	---	Common hackberry; eastern redcedar; green ash; honeylocust; ponderosa pine; Russian mulberry	Golden willow; silver maple	---
6420: Rosebud	Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---
6430: Rosebud Canyon.	Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---
6440: Rosebud	Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
6440:					
Hemingford	American plum; common lilac; Siberian peashrub; skunkbush sumac	Rocky Mountain juniper	Common hackberry; eastern redcedar; green ash; honeylocust; ponderosa pine; Russian olive	Siberian elm	---
6442:					
Rosebud	Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---
Blanche	Amur honeysuckle; common lilac; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper	Honeylocust; ponderosa pine; Russian olive; Siberian elm	---	---
6446:					
Rosebud	Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---
Tassel.					
7152:					
Tassel.					
Ashollow	Common lilac; Siberian peashrub; skunkbush sumac	Black locust; common hackberry; eastern redcedar; green ash; ponderosa pine; Rocky Mountain juniper; Russian olive	Honeylocust; Siberian elm	---	---
Rock outcrop.					
7153:					
Tassel.					
Blanche	Amur honeysuckle; common lilac; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper	Honeylocust; ponderosa pine; Russian olive; Siberian elm	---	---
7154:					
Tassel.					
Blanche	Amur honeysuckle; common lilac; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper	Honeylocust; ponderosa pine; Russian olive; Siberian elm	---	---
7180:					
Dix.					

Table 8.--Windbreaks and Environmental Plantings--Continued

Map symbol and soil name	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
7180:					
Altvan	Common lilac; Siberian peashrub; skunkbush sumac	Common hackberry; eastern redcedar; green ash; Rocky Mountain juniper; Russian olive	Honeylocust; ponderosa pine; Siberian elm	---	---
Tassel.					
7324:					
Tripp	American plum; common lilac; Siberian peashrub; skunkbush sumac	Rocky Mountain juniper	Common hackberry; eastern redcedar; green ash; honeylocust; ponderosa pine; Russian olive	Siberian elm	---
7325:					
Tripp	American plum; common lilac; Siberian peashrub; skunkbush sumac	Rocky Mountain juniper	Common hackberry; eastern redcedar; green ash; honeylocust; ponderosa pine; Russian olive	Siberian elm	---
9900.					
Arents, earthen dam					
9970.					
Borrow pits					
9975.					
Sanitary landfill					
9985.					
Pits					
9998.					
Water					

Table 9a.--Recreation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1080:							
Albinas	50	Very limited		Not limited		Not limited	
		Flooding	1.00				
Cheyenne	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
1132:							
Alliance	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Slope	0.72
						Dusty	0.50
1180:							
Altvan	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
1185:							
Altvan	85	Not limited		Not limited		Not limited	
1196:							
Altvan	55	Not limited		Not limited		Somewhat limited	
						Slope	0.88
Eckley	35	Not limited		Not limited		Very limited	
						Slope	1.00
1199:							
Altvan	55	Not limited		Not limited		Not limited	
Satanta	30	Not limited		Not limited		Not limited	
1200:							
Altvan	40	Not limited		Not limited		Somewhat limited	
						Slope	0.88
Eckley	30	Somewhat limited		Somewhat limited		Very limited	
		Gravel content	0.50	Gravel content	0.50	Gravel content	1.00
						Slope	1.00
Tassel	15	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	1.00
1202:							
Altvan	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
Satanta	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
1370:							
Bayard	90	Not limited		Not limited		Not limited	
1371:							
Bayard	90	Not limited		Not limited		Somewhat limited	
						Slope	0.72

Table 9a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1780:							
Broadwater	90	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.91	Too sandy	0.91
		Too sandy	0.91			Flooding	0.60
1797:							
Brownson	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Dusty	0.50	Dusty	0.50	Dusty	0.50
Rosebud	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
Canyon	20	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Dusty	0.50	Dusty	0.50	Dusty	0.50
						Gravel content	0.18
2055:							
Chappell	40	Not limited		Not limited		Not limited	
Bayard	35	Not limited		Not limited		Not limited	
Broadwater	20	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.91	Too sandy	0.91
		Too sandy	0.91			Flooding	0.60
2665:							
Dwyer	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.59	Too sandy	0.59	Too sandy	0.59
2687:							
Eckley	70	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Altvan	15	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
3050:							
Glenberg	85	Very limited		Not limited		Not limited	
		Flooding	1.00				
4030:							
Jayem	85	Not limited		Not limited		Not limited	
4031:							
Jayem	85	Not limited		Not limited		Somewhat limited	
						Slope	0.72
4150:							
Keith	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
4151:							
Keith	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
4310:							
Kuma	90	Not limited		Not limited		Not limited	

Table 9a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4472:							
Las Animas	95	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00			Flooding	0.60
4662:							
Lodgepole	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
6420:							
Rosebud	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
6430:							
Rosebud	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
Canyon	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Dusty	0.50	Dusty	0.50	Dusty	0.50
						Gravel content	0.18
6440:							
Rosebud	65	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
Hemingford	20	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
6442:							
Rosebud	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
Blanche	30	Not limited		Not limited		Not limited	
6446:							
Rosebud	70	Not limited		Not limited		Not limited	
Tassel	20	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
7152:							
Tassel	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Gravel content	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Gravel content	0.50	Gravel content	0.50	Depth to bedrock	1.00
Ashollow	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Dusty	0.50	Dusty	0.50	Dusty	0.50
Rock outcrop	15	Not rated		Not rated		Not rated	

Table 9a.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7153:							
Tassel	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	1.00
Blanche	30	Not limited		Not limited		Somewhat limited	
						Slope	0.88
						Depth to bedrock	0.42
7154:							
Tassel	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
Blanche	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Depth to bedrock	0.42
7180:							
Dix	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Altvan	25	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
Tassel	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
7324:							
Tripp	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
7325:							
Tripp	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
9900:							
Arents, earthen dam	100	Not rated		Not rated		Not rated	
9970:							
Borrow pits	100	Not rated		Not rated		Not rated	
9975:							
Sanitary landfill	100	Not rated		Not rated		Not rated	
9985:							
Pits	100	Not rated		Not rated		Not rated	
9998:							
Water	100	Not rated		Not rated		Not rated	

Table 9b.--Recreation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1080:							
Albinas	50	Not limited		Not limited		Not limited	
Cheyenne	35	Somewhat limited Dusty	0.50	Somewhat limited Dusty	0.50	Not limited	
1132:							
Alliance	85	Somewhat limited Dusty	0.50	Somewhat limited Dusty	0.50	Not limited	
1180:							
Altvan	90	Somewhat limited Dusty	0.50	Somewhat limited Dusty	0.50	Not limited	
1185:							
Altvan	85	Not limited		Not limited		Not limited	
1196:							
Altvan	55	Not limited		Not limited		Not limited	
Eckley	35	Not limited		Not limited		Somewhat limited Droughty	0.83
1199:							
Altvan	55	Not limited		Not limited		Not limited	
Satanta	30	Not limited		Not limited		Not limited	
1200:							
Altvan	40	Not limited		Not limited		Not limited	
Eckley	30	Not limited		Not limited		Somewhat limited Droughty Gravel content	0.95 0.50
Tassel	15	Not limited		Not limited		Very limited Depth to bedrock Droughty	1.00 1.00
1202:							
Altvan	60	Somewhat limited Dusty	0.50	Somewhat limited Dusty	0.50	Not limited	
Satanta	30	Somewhat limited Dusty	0.50	Somewhat limited Dusty	0.50	Not limited	
1370:							
Bayard	90	Not limited		Not limited		Not limited	
1371:							
Bayard	90	Not limited		Not limited		Not limited	
1780:							
Broadwater	90	Somewhat limited Too sandy	0.91	Somewhat limited Too sandy	0.91	Very limited Droughty Flooding	1.00 0.60

Table 9b.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1797:							
Brownson	40	Somewhat limited Dusty	0.50	Somewhat limited Dusty	0.50	Very limited Depth to bedrock Droughty	1.00 0.90
Rosebud	30	Somewhat limited Dusty	0.50	Somewhat limited Dusty	0.50	Somewhat limited Depth to bedrock	0.42
Canyon	20	Somewhat limited Dusty	0.50	Somewhat limited Dusty	0.50	Very limited Depth to bedrock Droughty	1.00 1.00
2055:							
Chappell	40	Not limited		Not limited		Not limited	
Bayard	35	Not limited		Not limited		Not limited	
Broadwater	20	Somewhat limited Too sandy	0.91	Somewhat limited Too sandy	0.91	Very limited Droughty Flooding	1.00 0.60
2665:							
Dwyer	90	Somewhat limited Too sandy	0.59	Somewhat limited Too sandy	0.59	Somewhat limited Droughty	0.25
2687:							
Eckley	70	Somewhat limited Slope	0.50	Not limited		Very limited Slope Droughty	1.00 0.49
Altvan	15	Not limited		Not limited		Somewhat limited Slope	0.37
3050:							
Glenberg	85	Not limited		Not limited		Somewhat limited Droughty	0.46
4030:							
Jayem	85	Not limited		Not limited		Not limited	
4031:							
Jayem	85	Not limited		Not limited		Not limited	
4150:							
Keith	90	Somewhat limited Dusty	0.50	Somewhat limited Dusty	0.50	Not limited	
4151:							
Keith	85	Somewhat limited Dusty	0.50	Somewhat limited Dusty	0.50	Not limited	
4310:							
Kuma	90	Not limited		Not limited		Not limited	
4472:							
Las Animas	95	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone	1.00	Very limited Depth to saturated zone Flooding	1.00 0.60

Table 9b.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4662:							
Lodgepole	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Ponding	1.00	Depth to saturated zone	1.00
6420:							
Rosebud	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Depth to bedrock	0.42
6430:							
Rosebud	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Depth to bedrock	0.42
Canyon	25	Somewhat limited		Somewhat limited		Very limited	
		Dusty	0.50	Dusty	0.50	Depth to bedrock	1.00
						Droughty	1.00
6440:							
Rosebud	65	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Depth to bedrock	0.42
Hemingford	20	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
6442:							
Rosebud	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Depth to bedrock	0.42
Blanche	30	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.42
6446:							
Rosebud	70	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.42
Tassel	20	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	1.00
7152:							
Tassel	50	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.78	Depth to bedrock	1.00
						Slope	1.00
						Droughty	1.00
						Gravel content	0.50
Ashollow	25	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Dusty	0.50	Slope	1.00
		Dusty	0.50	Slope	0.22		
Rock outcrop	15	Not rated		Not rated		Not rated	
7153:							
Tassel	50	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	1.00
Blanche	30	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.42

Table 9b.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7154:							
Tassel	60	Somewhat limited		Not limited		Very limited	
		Slope	0.50			Depth to bedrock	1.00
						Droughty	1.00
						Slope	1.00
Blanche	30	Not limited		Not limited		Very limited	
						Slope	1.00
						Depth to bedrock	0.42
7180:							
Dix	35	Somewhat limited		Not limited		Very limited	
		Slope	0.50			Slope	1.00
						Droughty	0.96
Altvan	25	Not limited		Not limited		Somewhat limited	
						Slope	0.37
Tassel	25	Somewhat limited		Not limited		Very limited	
		Slope	0.50			Depth to bedrock	1.00
						Droughty	1.00
						Slope	1.00
7324:							
Tripp	90	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
7325:							
Tripp	85	Somewhat limited		Somewhat limited		Not limited	
		Dusty	0.50	Dusty	0.50		
9900:							
Arents, earthen dam	100	Not rated		Not rated		Not rated	
9970:							
Borrow pits	100	Not rated		Not rated		Not rated	
9975:							
Sanitary landfill	100	Not rated		Not rated		Not rated	
9985:							
Pits	100	Not rated		Not rated		Not rated	
9998:							
Water	100	Not rated		Not rated		Not rated	

Table 10.--Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
1080:												
Albinas.												
Cheyenne	Fair	Good	Good	---	Fair	Fair	Very poor	Very poor	Good	---	Very poor	Good
1132:												
Alliance	Good	Good	Good	Good	Good	Good	Very poor	Poor	Good	Good	Poor	Good
1180:												
Altvan	Fair	Good	Good	Good	Fair	Good	Very poor	Very poor	Good	Good	Very poor	Good
1185:												
Altvan	Fair	Good	Good	Good	Fair	Good	Very poor	Very poor	Good	Good	Very poor	Good
1196:												
Altvan	Fair	Good	Good	Good	Fair	Good	Very poor	Very poor	Good	Good	Very poor	Good
Eckley	Poor	Poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
1199:												
Altvan	Fair	Good	Good	Good	Fair	Good	Very poor	Very poor	Good	Good	Very poor	Good
Satanta	Good	Good	Fair	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
1200:												
Altvan	Fair	Good	Good	Good	Fair	Good	Very poor	Very poor	Good	Good	Very poor	Good
Eckley	Poor	Poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
Tassel	Poor	Poor	Poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Fair	Very poor	Poor
1202:												
Altvan	Good	Good	Good	Fair	Fair	Good	Very poor	Very poor	Good	Fair	Very poor	Good
Satanta	Good	Good	Fair	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
1370:												
Bayard	Fair	Good	Good	Good	Good	Fair	Poor	Very poor	Good	Fair	Very poor	Fair
1371:												
Bayard	Fair	Good	Good	Good	Good	Fair	Poor	Very poor	Good	Fair	Very poor	Fair
1780:												
Broadwater	Poor	Fair	Fair	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Fair

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
1797:												
Brownson	Good	Good	Fair	---	Good	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Rosebud	Good	Good	Fair	---	Good	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Canyon	Poor	Poor	Fair	Poor	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor	Poor
2055:												
Chappell	Fair	Good	Good	---	Good	Good	Very poor	Very poor	Fair	---	Very poor	Good
Bayard	Fair	Good	Good	Good	Good	Fair	Poor	Very poor	Good	Fair	Very poor	Fair
Broadwater	Poor	Fair	Fair	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Fair
2665:												
Dwyer	Poor	Fair	Fair	Poor	Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor	Fair
2687:												
Eckley	Poor	Poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
Altvan	Fair	Good	Good	Good	Fair	Good	Very poor	Very poor	Good	Good	Very poor	Good
3050:												
Glenberg	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good
4030:												
Jayem	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor	Fair	Good	Very poor	Fair
4031:												
Jayem	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor	Fair	Good	Very poor	Fair
4150:												
Keith	Good	Good	Good	Fair	Fair	Good	Very poor	Very poor	Good	Fair	Very poor	Good
4151:												
Keith	Good	Good	Good	Fair	Fair	Good	Very poor	Very poor	Good	Fair	Very poor	Good
4310:												
Kuma	Good	Good	Fair	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Poor
4472:												
Las Animas	Very poor	Poor	Fair	Poor	Poor	Fair	Good	Good	Poor	Poor	Good	Fair
4662:												
Lodgepole	Poor	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good	Poor

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Shrubs	Wetland plants	Shallow water areas	Open-land wild-life	Wood-land wild-life	Wetland wild-life	Range-land wild-life
6420:												
Rosebud	Fair	Good	Fair	---	Good	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
6430:												
Rosebud	Good	Good	Fair	---	Good	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Canyon	Poor	Poor	Fair	Poor	Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor	Poor
6440:												
Rosebud	Fair	Good	Fair	---	Good	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Hemingford	Good	Good	Good	Good	Good	Good	Poor	Very poor	Good	Good	Very poor	Good
6442:												
Rosebud	Fair	Good	Fair	---	Good	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Blanche	Very poor	Poor	Good	Good	Good	Fair	Very poor	Very poor	Poor	Good	Very poor	Fair
6446:												
Rosebud	Fair	Good	Fair	---	Good	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Tassel	Poor	Poor	Poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Fair	Very poor	Poor
7152:												
Tassel	Poor	Poor	Poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Fair	Very poor	Poor
Ashollow	Poor	Poor	Fair	Poor	Fair	Fair	Very poor	Very poor	Fair	Good	Very poor	Fair
Rock outcrop	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
7153:												
Tassel	Poor	Poor	Poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Fair	Very poor	Poor
Blanche	Very poor	Poor	Good	Good	Good	Fair	Very poor	Very poor	Poor	Good	Very poor	Fair
7154:												
Tassel	Poor	Poor	Poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Fair	Very poor	Poor
Blanche	Very poor	Poor	Good	Good	Good	Fair	Very poor	Very poor	Poor	Good	Very poor	Fair
7180:												
Dix	Poor	Poor	Poor	Poor	Poor	Poor	Very poor	Very poor	Very poor	Poor	Very poor	Poor
Altvan	Fair	Good	Good	Good	Fair	Good	Very poor	Very poor	Good	Good	Very poor	Good

Table 10.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Shrubs	Wetland plants	Shallow water areas	Open-land wild-life	Wood-land wild-life	Wetland wild-life	Range-land wild-life
7180:												
Tassel	Poor	Poor	Poor	Fair	Fair	Poor	Very poor	Very poor	Poor	Fair	Very poor	Poor
7324:												
Tripp	Good	Good	Fair	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
7325:												
Tripp	Fair	Good	Fair	Good	Good	Fair	Poor	Very poor	Fair	Good	Very poor	Fair
9900.												
Arents, earthen dam												
9970.												
Borrow pits												
9975.												
Sanitary landfill												
9985:												
Pits	Very poor	Very poor	Poor	Poor	Poor	Poor	Very poor	Fair	Very poor	Very poor	Poor	Poor
9998.												
Water												

Table 11a.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1080:							
Albinas	50	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50			Shrink-swell	0.50
Cheyenne	35	Not limited		Not limited		Not limited	
1132:							
Alliance	85	Not limited		Not limited		Somewhat limited	
						Slope	0.03
1180:							
Altvan	90	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
1185:							
Altvan	85	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
1196:							
Altvan	55	Not limited		Not limited		Somewhat limited	
						Slope	0.12
Eckley	35	Not limited		Not limited		Very limited	
						Slope	1.00
1199:							
Altvan	55	Not limited		Not limited		Not limited	
Satanta	30	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
1200:							
Altvan	40	Not limited		Not limited		Somewhat limited	
						Slope	0.12
Eckley	30	Not limited		Not limited		Very limited	
						Slope	1.00
Tassel	15	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
						Slope	1.00
1202:							
Altvan	60	Not limited		Not limited		Not limited	
Satanta	30	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
1370:							
Bayard	90	Not limited		Not limited		Not limited	
1371:							
Bayard	90	Not limited		Not limited		Somewhat limited	
						Slope	0.03

Table 11a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1780:							
Broadwater	90	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
1797:							
Brownson	40	Somewhat limited Depth to soft bedrock Shrink-swell	1.00 0.50	Very limited Depth to soft bedrock Shrink-swell	1.00 0.50	Somewhat limited Depth to soft bedrock Shrink-swell	1.00 0.50
Rosebud	30	Not limited		Somewhat limited Depth to soft bedrock	0.42	Not limited	
Canyon	20	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock	1.00	Somewhat limited Depth to soft bedrock	1.00
2055:							
Chappell	40	Not limited		Not limited		Not limited	
Bayard	35	Not limited		Not limited		Not limited	
Broadwater	20	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
2665:							
Dwyer	90	Not limited		Not limited		Not limited	
2687:							
Eckley	70	Very limited Slope	1.00	Very limited Slope	1.00	Very limited Slope	1.00
Altvan	15	Somewhat limited Slope	0.37	Somewhat limited Slope	0.37	Very limited Slope	1.00
3050:							
Glenberg	85	Very limited Flooding	1.00	Very limited Flooding	1.00	Very limited Flooding	1.00
4030:							
Jayem	85	Not limited		Not limited		Not limited	
4031:							
Jayem	85	Not limited		Not limited		Somewhat limited Slope	0.03
4150:							
Keith	90	Somewhat limited Shrink-swell	0.50	Not limited		Somewhat limited Shrink-swell	0.50
4151:							
Keith	85	Somewhat limited Shrink-swell	0.50	Not limited		Somewhat limited Shrink-swell	0.50
4310:							
Kuma	90	Not limited		Not limited		Not limited	

Table 11a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4472:							
Las Animas	95	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
4662:							
Lodgepole	100	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
6420:							
Rosebud	85	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.42		
6430:							
Rosebud	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to soft bedrock	0.42		
Canyon	25	Somewhat limited		Very limited		Somewhat limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
6440:							
Rosebud	65	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.42		
Hemingford	20	Somewhat limited		Not limited		Somewhat limited	
		Shrink-swell	0.50			Shrink-swell	0.50
6442:							
Rosebud	55	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.42		
Blanche	30	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.42		
6446:							
Rosebud	70	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.42		
Tassel	20	Somewhat limited		Very limited		Somewhat limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
7152:							
Tassel	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
Ashollow	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Table 11a.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7152:							
Rock outcrop	15	Not rated		Not rated		Not rated	
7153:							
Tassel	50	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
						Slope	1.00
Blanche	30	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.42	Slope	0.12
7154:							
Tassel	60	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to soft bedrock	1.00
Blanche	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	0.42		
7180:							
Dix	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Altvan	25	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
Tassel	25	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Slope	1.00	Slope	1.00	Depth to soft bedrock	1.00
7324:							
Tripp	90	Not limited		Not limited		Not limited	
7325:							
Tripp	85	Not limited		Not limited		Not limited	
9900:							
Arents, earthen dam	100	Not rated		Not rated		Not rated	
9970:							
Borrow pits	100	Not rated		Not rated		Not rated	
9975:							
Sanitary landfill	100	Not rated		Not rated		Not rated	
9985:							
Pits	100	Not rated		Not rated		Not rated	
9998:							
Water	100	Not rated		Not rated		Not rated	

Table 11b.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1080:							
Albinas	50	Very limited		Very limited		Not limited	
		Low strength	1.00	Cutbanks cave	1.00		
		Shrink-swell	0.50				
		Frost action	0.50				
		Flooding	0.40				
Cheyenne	35	Somewhat limited		Very limited		Not limited	
		Low strength	0.22	Cutbanks cave	1.00		
1132:							
Alliance	85	Somewhat limited		Very limited		Not limited	
		Frost action	0.50	Cutbanks cave	1.00		
1180:							
Altvan	90	Very limited		Very limited		Not limited	
		Low strength	1.00	Cutbanks cave	1.00		
		Shrink-swell	0.50				
		Frost action	0.50				
1185:							
Altvan	85	Very limited		Very limited		Not limited	
		Low strength	1.00	Cutbanks cave	1.00		
		Shrink-swell	0.50				
		Frost action	0.50				
1196:							
Altvan	55	Somewhat limited		Very limited		Not limited	
		Frost action	0.50	Cutbanks cave	1.00		
Eckley	35	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.83
1199:							
Altvan	55	Somewhat limited		Very limited		Not limited	
		Frost action	0.50	Cutbanks cave	1.00		
Satanta	30	Very limited		Very limited		Not limited	
		Low strength	1.00	Cutbanks cave	1.00		
		Shrink-swell	0.50				
		Frost action	0.50				
1200:							
Altvan	40	Somewhat limited		Very limited		Not limited	
		Frost action	0.50	Cutbanks cave	1.00		
Eckley	30	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.95
						Gravel content	0.50
Tassel	15	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
				Cutbanks cave	0.10	Droughty	1.00

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1202:							
Altvan	60	Somewhat limited Frost action	 0.50	Very limited Cutbanks cave	 1.00	Not limited	
Satanta	30	Very limited Low strength Shrink-swell Frost action	 1.00 0.50 0.50	Very limited Cutbanks cave	 1.00	Not limited	
1370:							
Bayard	90	Somewhat limited Frost action	 0.50	Somewhat limited Cutbanks cave	 0.10	Not limited	
1371:							
Bayard	90	Somewhat limited Frost action	 0.50	Somewhat limited Cutbanks cave	 0.10	Not limited	
1780:							
Broadwater	90	Very limited Flooding	 1.00	Very limited Cutbanks cave Flooding	 1.00 0.60	Very limited Droughty Flooding	 1.00 0.60
1797:							
Brownson	40	Very limited Depth to soft bedrock Low strength Shrink-swell Frost action	 1.00 1.00 0.50 0.50	Very limited Depth to soft bedrock Cutbanks cave	 1.00 0.10	Very limited Depth to bedrock Droughty	 1.00 0.90
Rosebud	30	Somewhat limited Frost action	 0.50	Somewhat limited Depth to soft bedrock Cutbanks cave	 0.42 0.10	Somewhat limited Depth to bedrock	 0.42
Canyon	20	Somewhat limited Depth to soft bedrock	 1.00	Very limited Depth to soft bedrock Cutbanks cave	 1.00 0.10	Very limited Depth to bedrock Droughty	 1.00 1.00
2055:							
Chappell	40	Not limited		Very limited Cutbanks cave	 1.00	Not limited	
Bayard	35	Somewhat limited Frost action	 0.50	Somewhat limited Cutbanks cave	 0.10	Not limited	
Broadwater	20	Very limited Flooding	 1.00	Very limited Cutbanks cave Flooding	 1.00 0.60	Very limited Droughty Flooding	 1.00 0.60
2665:							
Dwyer	90	Not limited		Very limited Cutbanks cave	 1.00	Somewhat limited Droughty	 0.25
2687:							
Eckley	70	Very limited Slope	 1.00	Very limited Cutbanks cave Slope	 1.00 1.00	Very limited Slope Droughty	 1.00 0.49

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2687:							
Altvan	15	Somewhat limited		Very limited		Somewhat limited	
		Frost action	0.50	Cutbanks cave	1.00	Slope	0.37
		Slope	0.37	Slope	0.37		
3050:							
Glenberg	85	Somewhat limited		Very limited		Somewhat limited	
		Frost action	0.50	Cutbanks cave	1.00	Droughty	0.46
		Flooding	0.40				
4030:							
Jayem	85	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
4031:							
Jayem	85	Not limited		Somewhat limited		Not limited	
				Cutbanks cave	0.10		
4150:							
Keith	90	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
4151:							
Keith	85	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
4310:							
Kuma	90	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
4472:							
Las Animas	95	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Cutbanks cave	1.00	Flooding	0.60
		Flooding	1.00	Flooding	0.60		
4662:							
Lodgepole	100	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Too clayey	0.12		
				Cutbanks cave	0.10		
6420:							
Rosebud	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Depth to soft bedrock	0.42	Depth to bedrock	0.42
				Cutbanks cave	0.10		
6430:							
Rosebud	60	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Depth to soft bedrock	0.42	Depth to bedrock	0.42
		Shrink-swell	0.50				
		Frost action	0.50	Cutbanks cave	0.10		

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6430:							
Canyon	25	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Cutbanks cave	1.00 0.10	Very limited Depth to bedrock Droughty	1.00 1.00
6440:							
Rosebud	65	Somewhat limited Frost action	0.50	Somewhat limited Depth to soft bedrock Cutbanks cave	0.42 0.10	Somewhat limited Depth to bedrock	0.42
Hemingford	20	Very limited Low strength Shrink-swell Frost action	1.00 0.50 0.50	Somewhat limited Cutbanks cave	0.10	Not limited	
6442:							
Rosebud	55	Somewhat limited Frost action	0.50	Somewhat limited Depth to soft bedrock Cutbanks cave	0.42 0.10	Somewhat limited Depth to bedrock	0.42
Blanche	30	Not limited		Somewhat limited Depth to soft bedrock Cutbanks cave	0.42 0.10	Somewhat limited Depth to bedrock	0.42
6446:							
Rosebud	70	Somewhat limited Frost action	0.50	Somewhat limited Depth to soft bedrock Cutbanks cave	0.42 0.10	Somewhat limited Depth to bedrock	0.42
Tassel	20	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Cutbanks cave	1.00 0.10	Very limited Depth to bedrock Droughty	1.00 1.00
7152:							
Tassel	50	Very limited Slope Depth to soft bedrock	1.00 1.00	Very limited Depth to soft bedrock Slope Cutbanks cave	1.00 1.00 0.10	Very limited Depth to bedrock Slope Droughty Gravel content	1.00 1.00 1.00 0.50
Ashollow	25	Very limited Slope	1.00	Very limited Slope Cutbanks cave	1.00 0.10	Very limited Slope	1.00
Rock outcrop	15	Not rated		Not rated		Not rated	
7153:							
Tassel	50	Somewhat limited Depth to soft bedrock	1.00	Very limited Depth to soft bedrock Cutbanks cave	1.00 0.10	Very limited Depth to bedrock Droughty	1.00 1.00

Table 11b.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7153:							
Blanche	30	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.42	Depth to bedrock	0.42
				Cutbanks cave	0.10		
7154:							
Tassel	60	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Droughty	1.00
				Cutbanks cave	0.10	Slope	1.00
Blanche	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	0.42	Depth to bedrock	0.42
				Cutbanks cave	0.10		
7180:							
Dix	35	Very limited		Very limited		Very limited	
		Slope	1.00	Cutbanks cave	1.00	Slope	1.00
				Slope	1.00	Droughty	0.96
Altvan	25	Somewhat limited		Very limited		Somewhat limited	
		Frost action	0.50	Cutbanks cave	1.00	Slope	0.37
		Slope	0.37	Slope	0.37		
Tassel	25	Very limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Droughty	1.00
				Cutbanks cave	0.10	Slope	1.00
7324:							
Tripp	90	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
		Low strength	0.22				
7325:							
Tripp	85	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
		Low strength	0.22				
9900:							
Arents, earthen dam-	100	Not rated		Not rated		Not rated	
9970:							
Borrow pits	100	Not rated		Not rated		Not rated	
9975:							
Sanitary landfill	100	Not rated		Not rated		Not rated	
9985:							
Pits	100	Not rated		Not rated		Not rated	
9998:							
Water	100	Not rated		Not rated		Not rated	

Table 12a.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1080:					
Albinas	50	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Seepage	1.00	Flooding	0.40
		Restricted permeability	1.00		
		Flooding	0.40		
Cheyenne	35	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Restricted permeability	0.50		
1132:					
Alliance	85	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Depth to bedrock	0.78	Slope	0.50
		Restricted permeability	0.50	Depth to soft bedrock	0.42
1180:					
Altvan	90	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Restricted permeability	0.50		
1185:					
Altvan	85	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Restricted permeability	0.50		
1196:					
Altvan	55	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Restricted permeability	0.46	Slope	0.68
Eckley	35	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	1.00
1199:					
Altvan	55	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Restricted permeability	0.50		

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1199:					
Satanta	30	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Restricted permeability	1.00		
1200:					
Altvan	40	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.68
		Restricted permeability	0.46		
Eckley	30	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	1.00
Tassel	15	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	1.00
				Slope	1.00
1202:					
Altvan	60	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Restricted permeability	0.50		
Satanta	30	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Restricted permeability	1.00		
1370:					
Bayard	90	Very limited		Very limited	
		Seepage	1.00	Seepage	1.00
1371:					
Bayard	90	Very limited		Very limited	
		Seepage	1.00	Seepage	1.00
				Slope	0.50
1780:					
Broadwater	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	1.00	Seepage	1.00
1797:					
Brownson	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	1.00

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1797:					
Rosebud	30	Very limited Depth to bedrock	 1.00	Very limited Depth to soft bedrock Seepage	 1.00 1.00
Canyon	20	Very limited Depth to bedrock	 1.00	Very limited Depth to soft bedrock Seepage	 1.00 1.00
2055:					
Chappell	40	Very limited Filtering capacity	 1.00	Very limited Seepage	 1.00
Bayard	35	Very limited Seepage	 1.00	Very limited Seepage	 1.00
Broadwater	20	Very limited Flooding Filtering capacity	 1.00 1.00	Very limited Flooding Seepage	 1.00 1.00
2665:					
Dwyer	90	Very limited Filtering capacity	 1.00	Very limited Seepage	 1.00
2687:					
Eckley	70	Very limited Filtering capacity Slope	 1.00 1.00	Very limited Slope Seepage	 1.00 1.00
Altvan	15	Very limited Filtering capacity Slope	 1.00 0.37	Very limited Slope Seepage	 1.00 1.00
3050:					
Glenberg	85	Very limited Filtering capacity Flooding	 1.00 0.40	Very limited Seepage Flooding	 1.00 0.40
4030:					
Jayem	85	Not limited		Very limited Seepage	 1.00
4031:					
Jayem	85	Not limited		Very limited Seepage Slope	 1.00 0.50
4150:					
Keith	90	Very limited Restricted permeability	 1.00	Somewhat limited Seepage	 0.53

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
4151:					
Keith	85	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.53
4310:					
Kuma	90	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
4472:					
Las Animas	95	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Filtering capacity	1.00		
		Seepage	1.00		
		Restricted permeability	0.50		
4662:					
Lodgepole	100	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	1.00	Seepage	0.53
6420:					
Rosebud	85	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	1.00
6430:					
Rosebud	60	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Restricted permeability	0.50	Seepage	1.00
Canyon	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	1.00
6440:					
Rosebud	65	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	1.00
Hemingford	20	Very limited		Very limited	
		Restricted permeability	1.00	Seepage	1.00
		Depth to bedrock	0.78	Depth to soft bedrock	0.42

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
6442:					
Rosebud	55	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock Seepage	1.00 1.00
Blanche	30	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock Seepage	1.00 1.00
6446:					
Rosebud	70	Very limited Depth to bedrock Restricted permeability	1.00 0.50	Very limited Depth to soft bedrock Seepage	1.00 1.00
Tassel	20	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock Seepage	1.00 1.00
7152:					
Tassel	50	Very limited Depth to bedrock Slope	1.00 1.00	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 1.00
Ashollow	25	Very limited Slope Restricted permeability	1.00 0.50	Very limited Slope Seepage	1.00 0.50
Rock outcrop	15	Not rated		Not rated	
7153:					
Tassel	50	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 1.00 1.00
Blanche	30	Very limited Depth to bedrock	1.00	Very limited Depth to soft bedrock Seepage Slope	1.00 1.00 0.68
7154:					
Tassel	60	Very limited Depth to bedrock Slope	1.00 1.00	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 1.00
Blanche	30	Very limited Depth to bedrock Slope	1.00 1.00	Very limited Depth to soft bedrock Slope Seepage	1.00 1.00 1.00

Table 12a.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
7180:					
Dix	35	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
				Seepage	1.00
		Seepage	1.00		
		Slope	1.00		
Altvan	25	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
				Seepage	1.00
		Slope	0.37		
Tassel	25	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00		
				Slope	1.00
				Seepage	1.00
7324:					
Tripp	90	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
7325:					
Tripp	85	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
9900:					
Arents, earthen dam	100	Not rated		Not rated	
9970:					
Borrow pits	100	Not rated		Not rated	
9975:					
Sanitary landfill	100	Not rated		Not rated	
9985:					
Pits	100	Not rated		Not rated	
9998:					
Water	100	Not rated		Not rated	

Table 12b.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1080:							
Albinas	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Flooding	0.40	Too sandy	1.00
		Too sandy	1.00			Seepage	1.00
		Flooding	0.40				
Cheyenne	35	Very limited		Not limited		Very limited	
		Too sandy	1.00			Too sandy	1.00
						Seepage	1.00
						Gravel content	0.20
1132:							
Alliance	85	Very limited		Not limited		Somewhat limited	
		Depth to bedrock	1.00			Depth to bedrock	0.42
1180:							
Altvan	90	Very limited		Not limited		Very limited	
		Too sandy	1.00			Too sandy	1.00
						Seepage	1.00
1185:							
Altvan	85	Very limited		Not limited		Very limited	
		Too sandy	1.00			Too sandy	1.00
						Seepage	1.00
1196:							
Altvan	55	Very limited		Not limited		Very limited	
		Too sandy	1.00			Too sandy	1.00
						Seepage	1.00
Eckley	35	Very limited		Not limited		Very limited	
		Too sandy	1.00			Too sandy	1.00
						Seepage	1.00
						Gravel content	0.01
1199:							
Altvan	55	Very limited		Not limited		Very limited	
		Too sandy	1.00			Too sandy	1.00
						Seepage	1.00
Satanta	30	Not limited		Not limited		Very limited	
						Seepage	1.00
1200:							
Altvan	40	Very limited		Not limited		Very limited	
		Too sandy	1.00			Too sandy	1.00
						Seepage	1.00
Eckley	30	Very limited		Not limited		Very limited	
		Too sandy	1.00			Too sandy	1.00
						Seepage	1.00
						Gravel content	0.02
Tassel	15	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	1.00

Table 12b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1202:							
Altvan	60	Very limited		Not limited		Very limited	
		Too sandy	1.00			Too sandy	1.00
						Seepage	1.00
Satanta	30	Not limited		Not limited		Very limited	
						Seepage	1.00
1370:							
Bayard	90	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.50
1371:							
Bayard	90	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.50
1780:							
Broadwater	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too sandy	1.00
		Too sandy	1.00			Seepage	1.00
						Gravel content	0.01
1797:							
Brownson	40	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
Rosebud	30	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	1.00
Canyon	20	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	1.00
2055:							
Chappell	40	Very limited		Not limited		Very limited	
		Too sandy	1.00			Too sandy	1.00
						Seepage	1.00
Bayard	35	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.50
Broadwater	20	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too sandy	1.00
		Too sandy	1.00			Seepage	1.00
						Gravel content	0.01
2665:							
Dwyer	90	Very limited		Not limited		Very limited	
		Too sandy	1.00			Too sandy	1.00
						Seepage	1.00
2687:							
Eckley	70	Very limited		Very limited		Very limited	
		Too sandy	1.00	Slope	1.00	Too sandy	1.00
		Slope	1.00			Seepage	1.00
						Slope	1.00
						Gravel content	0.01

Table 12b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2687:							
Altvan	15	Very limited		Somewhat limited		Very limited	
		Too sandy	1.00	Slope	0.37	Too sandy	1.00
		Slope	0.37			Seepage	1.00
						Slope	0.37
3050:							
Glenberg	85	Very limited		Somewhat limited		Very limited	
		Too sandy	1.00	Flooding	0.40	Too sandy	1.00
		Flooding	0.40			Seepage	1.00
4030:							
Jayem	85	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
4031:							
Jayem	85	Not limited		Not limited		Somewhat limited	
						Seepage	0.50
4150:							
Keith	90	Not limited		Not limited		Not limited	
4151:							
Keith	85	Not limited		Not limited		Not limited	
4310:							
Kuma	90	Not limited		Not limited		Not limited	
4472:							
Las Animas	95	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too sandy	1.00
		Seepage	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	1.00				
4662:							
Lodgepole	100	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
6420:							
Rosebud	85	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	0.51
6430:							
Rosebud	60	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
Canyon	25	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	1.00
6440:							
Rosebud	65	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	1.00

Table 12b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6440:							
Hemingford----------	20	Very limited		Not limited		Somewhat limited	
		Depth to bedrock	1.00			Depth to bedrock	0.42
6442:							
Rosebud-------------	55	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	1.00
Blanche-------------	30	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	0.51
6446:							
Rosebud-------------	70	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
Tassel--------------	20	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	0.50
7152:							
Tassel--------------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00			Slope	1.00
						Seepage	1.00
Ashollow------------	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Rock outcrop--------	15	Not rated		Not rated		Not rated	
7153:							
Tassel--------------	50	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	1.00
Blanche-------------	30	Very limited		Not limited		Very limited	
		Depth to bedrock	1.00			Depth to bedrock	1.00
						Seepage	0.51
7154:							
Tassel--------------	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00	Depth to bedrock	1.00
		Slope	1.00			Slope	1.00
						Seepage	1.00
Blanche-------------	30	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00	Depth to bedrock	1.00
		Slope	1.00			Slope	1.00
						Seepage	0.51
7180:							
Dix-----------------	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00	Seepage	1.00
		Slope	1.00			Slope	1.00
						Gravel content	0.01

Table 12b.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7180:							
Altvan	25	Very limited		Somewhat limited		Very limited	
		Too sandy	1.00	Slope	0.37	Too sandy	1.00
		Slope	0.37			Seepage	1.00
						Slope	0.37
Tassel	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00	Depth to bedrock	1.00
		Slope	1.00			Slope	1.00
						Seepage	1.00
7324:							
Tripp	90	Not limited		Not limited		Not limited	
7325:							
Tripp	85	Not limited		Not limited		Not limited	
9900:							
Arents, earthen dam	100	Not rated		Not rated		Not rated	
9970:							
Borrow pits	100	Not rated		Not rated		Not rated	
9975:							
Sanitary landfill	100	Not rated		Not rated		Not rated	
9985:							
Pits	100	Not rated		Not rated		Not rated	
9998:							
Water	100	Not rated		Not rated		Not rated	

Table 13a.--Agricultural Waste Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1080:							
Albinas	50	Very limited Filtering capacity Restricted permeability	 1.00 0.41	Very limited Filtering capacity Flooding Restricted permeability	 1.00 0.40 0.31	Very limited Filtering capacity Restricted permeability	 1.00 0.31
Cheyenne	35	Very limited Filtering capacity Droughty	 1.00 0.01	Very limited Filtering capacity Droughty	 1.00 0.01	Very limited Filtering capacity Droughty	 1.00 0.01
1132:							
Alliance	85	Very limited Filtering capacity Restricted permeability	 1.00 0.30	Very limited Filtering capacity Low adsorption Restricted permeability	 1.00 1.00 0.22	Very limited Filtering capacity Restricted permeability Too steep for surface application	 1.00 0.22 0.18
1180:							
Altvan	90	Very limited Filtering capacity Restricted permeability	 1.00 0.41	Very limited Filtering capacity Restricted permeability	 1.00 0.31	Very limited Filtering capacity Restricted permeability	 1.00 0.31
1185:							
Altvan	85	Very limited Filtering capacity Restricted permeability	 1.00 0.30	Very limited Filtering capacity Restricted permeability	 1.00 0.22	Very limited Filtering capacity Restricted permeability	 1.00 0.22
1196:							
Altvan	55	Very limited Filtering capacity Restricted permeability	 1.00 0.30	Very limited Filtering capacity Restricted permeability	 1.00 0.22	Very limited Filtering capacity Too steep for surface application Restricted permeability	 1.00 0.32 0.22

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1196:							
Eckley	35	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Dense layer	1.00	Droughty	0.85	Too steep for surface application	1.00
		Droughty	0.85	Restricted permeability	0.31	Droughty	0.85
		Restricted permeability	0.41			Restricted permeability	0.31
						Too steep for sprinkler application	0.10
1199:							
Altvan	55	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Restricted permeability	0.30	Restricted permeability	0.22	Restricted permeability	0.22
Satanta	30	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Restricted permeability	0.41	Restricted permeability	0.31	Restricted permeability	0.31
1200:							
Altvan	40	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Restricted permeability	0.30	Restricted permeability	0.22	Too steep for surface application	0.32
						Restricted permeability	0.22
Eckley	30	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Dense layer	1.00	Droughty	0.93	Too steep for surface application	1.00
		Droughty	0.93	Restricted permeability	0.31	Droughty	0.93
		Restricted permeability	0.41			Restricted permeability	0.31
						Too steep for sprinkler application	0.10
Tassel	15	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Low adsorption	1.00	Too steep for surface application	1.00
		Filtering capacity	0.01	Filtering capacity	0.01	Too steep for sprinkler application	0.10
						Filtering capacity	0.01

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1202:							
Altvan	60	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Restricted permeability	0.30	Restricted permeability	0.22	Restricted permeability	0.22
Satanta	30	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Restricted permeability	0.41	Restricted permeability	0.31	Restricted permeability	0.31
1370:							
Bayard	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Filtering capacity	0.01	Filtering capacity	0.01	Filtering capacity	0.01
1371:							
Bayard	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Filtering capacity	0.01	Filtering capacity	0.01	Too steep for surface application	0.18
						Filtering capacity	0.01
1780:							
Broadwater	90	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Droughty	1.00	Droughty	1.00
				Filtering capacity	1.00	Filtering capacity	1.00
		Low adsorption	1.00				
		Droughty	1.00	Flooding	1.00	Low adsorption	1.00
		Flooding	0.60	Low adsorption	0.87	Flooding	0.60
		Leaching	0.45				
1797:							
Brownson	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Restricted permeability	0.30	Low adsorption	1.00	Restricted permeability	0.22
				Restricted permeability	0.22		
Rosebud	30	Somewhat limited		Very limited		Somewhat limited	
		Droughty	0.63	Low adsorption	1.00	Droughty	0.63
		Depth to bedrock	0.42	Droughty	0.63	Depth to bedrock	0.42
		Restricted permeability	0.30	Depth to bedrock	0.42	Restricted permeability	0.22
				Restricted permeability	0.22		
Canyon	20	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Low adsorption	1.00		
2055:							
Chappell	40	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Leaching	0.45	Droughty	0.28	Droughty	0.28
		Droughty	0.28				

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2055:							
Bayard	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Filtering capacity	0.01	Filtering capacity	0.01	Filtering capacity	0.01
Broadwater	20	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Droughty	1.00	Droughty	1.00
		Low adsorption	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Droughty	1.00	Flooding	1.00	Low adsorption	1.00
		Flooding	0.60	Low adsorption	0.87	Flooding	0.60
		Leaching	0.45				
2665:							
Dwyer	90	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Leaching	0.45	Droughty	0.01	Droughty	0.01
		Droughty	0.01				
2687:							
Eckley	70	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Dense layer	1.00	Droughty	0.64		
		Droughty	0.64	Restricted permeability	0.31	Too steep for sprinkler application	1.00
		Restricted permeability	0.41			Droughty	0.64
						Restricted permeability	0.31
Altvan	15	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Restricted permeability	0.41	Slope	0.37	Too steep for surface application	1.00
		Slope	0.37	Restricted permeability	0.31		
		Droughty	0.07	Droughty	0.07	Too steep for sprinkler application	0.60
						Restricted permeability	0.31
						Droughty	0.07
3050:							
Glenberg	85	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Droughty	0.62	Droughty	0.62	Droughty	0.62
				Flooding	0.40		
4030:							
Jayem	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Filtering capacity	0.01	Filtering capacity	0.01	Filtering capacity	0.01

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4031:							
Jayem	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Filtering capacity	0.01	Filtering capacity	0.01	Too steep for surface application	0.18
						Filtering capacity	0.01
4150:							
Keith	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Restricted permeability	0.31	Restricted permeability	0.31
4151:							
Keith	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Restricted permeability	0.31	Restricted permeability	0.31
4310:							
Kuma	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Restricted permeability	0.31	Restricted permeability	0.31
4472:							
Las Animas	95	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	0.60	Flooding	1.00	Flooding	0.60
		Runoff	0.40				
4662:							
Lodgepole	100	Very limited		Very limited		Very limited	
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Runoff	0.40				
6420:							
Rosebud	85	Somewhat limited		Very limited		Somewhat limited	
		Depth to bedrock	0.42	Low adsorption	1.00	Depth to bedrock	0.42
		Restricted permeability	0.41	Depth to bedrock	0.42	Droughty	0.33
		Droughty	0.33	Droughty	0.33	Restricted permeability	0.31
		Filtering capacity	0.01	Restricted permeability	0.31	Filtering capacity	0.01
				Filtering capacity	0.01		
6430:							
Rosebud	60	Somewhat limited		Very limited		Somewhat limited	
		Depth to bedrock	0.42	Low adsorption	1.00	Depth to bedrock	0.42
		Restricted permeability	0.30	Depth to bedrock	0.42	Restricted permeability	0.22
		Droughty	0.10	Restricted permeability	0.22	Droughty	0.10
		Filtering capacity	0.01	Droughty	0.10	Filtering capacity	0.01
				Filtering capacity	0.01		

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6430:							
Canyon	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Low adsorption	1.00		
6440:							
Rosebud	65	Somewhat limited		Very limited		Somewhat limited	
		Droughty	0.63	Low adsorption	1.00	Droughty	0.63
		Depth to bedrock	0.42	Droughty	0.63	Depth to bedrock	0.42
		Restricted permeability	0.30	Depth to bedrock	0.42	Restricted permeability	0.22
				Restricted permeability	0.22		
Hemingford	20	Somewhat limited		Very limited		Somewhat limited	
		Restricted permeability	0.30	Low adsorption	1.00	Restricted permeability	0.22
				Restricted permeability	0.22		
6442:							
Rosebud	55	Somewhat limited		Very limited		Somewhat limited	
		Droughty	0.63	Low adsorption	1.00	Droughty	0.63
		Depth to bedrock	0.42	Droughty	0.63	Depth to bedrock	0.42
		Restricted permeability	0.30	Depth to bedrock	0.42	Restricted permeability	0.22
				Restricted permeability	0.22		
Blanche	30	Somewhat limited		Very limited		Somewhat limited	
		Droughty	0.70	Low adsorption	1.00	Droughty	0.70
		Depth to bedrock	0.42	Droughty	0.70	Depth to bedrock	0.42
		Filtering capacity	0.01	Depth to bedrock	0.42	Filtering capacity	0.01
				Filtering capacity	0.01		
6446:							
Rosebud	70	Somewhat limited		Very limited		Somewhat limited	
		Depth to bedrock	0.42	Low adsorption	1.00	Depth to bedrock	0.42
		Restricted permeability	0.30	Depth to bedrock	0.42	Restricted permeability	0.22
		Droughty	0.13	Restricted permeability	0.22	Droughty	0.13
		Filtering capacity	0.01	Droughty	0.13	Filtering capacity	0.01
				Filtering capacity	0.01		
Tassel	20	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Low adsorption	1.00	Filtering capacity	0.01
		Filtering capacity	0.01	Filtering capacity	0.01		

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7152:							
Tassel	50	Very limited		Very limited		Very limited	
		Slope	1.00	Droughty	1.00	Droughty	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Droughty	1.00	Low adsorption	1.00	Too steep for surface application	1.00
		Runoff	0.40	Slope	1.00		
		Filtering capacity	0.01	Filtering capacity	0.01	Too steep for sprinkler application	1.00
						Filtering capacity	0.01
Ashollow	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
Rock outcrop	15	Not rated		Not rated		Not rated	
7153:							
Tassel	50	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Runoff	0.40	Low adsorption	1.00	Too steep for surface application	1.00
		Filtering capacity	0.01	Filtering capacity	0.01	Too steep for sprinkler application	0.10
						Filtering capacity	0.01
Blanche	30	Somewhat limited		Very limited		Somewhat limited	
		Droughty	0.70	Low adsorption	1.00	Droughty	0.70
		Depth to bedrock	0.42	Droughty	0.70	Depth to bedrock	0.42
		Filtering capacity	0.01	Depth to bedrock	0.42	Too steep for surface application	0.32
				Filtering capacity	0.01		
						Filtering capacity	0.01
7154:							
Tassel	60	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Low adsorption	1.00	Too steep for surface application	1.00
		Runoff	0.40	Slope	1.00		
		Filtering capacity	0.01	Filtering capacity	0.01	Too steep for sprinkler application	1.00
						Filtering capacity	0.01

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7154:							
Blanche	30	Very limited		Very limited		Very limited	
		Slope	1.00	Low adsorption	1.00	Too steep for surface application	1.00
		Droughty	0.71	Slope	1.00		
		Depth to bedrock	0.42	Droughty	0.71		
		Filtering capacity	0.01	Depth to bedrock	0.42	Too steep for sprinkler application	1.00
				Filtering capacity	0.01		
						Droughty	0.71
						Depth to bedrock	0.42
						Filtering capacity	0.01
7180:							
Dix	35	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Slope	1.00	Slope	1.00	Too steep for surface application	1.00
		Dense layer	1.00	Droughty	0.94		
		Droughty	0.94			Too steep for sprinkler application	1.00
		Leaching	0.45				
						Droughty	0.94
Altvan	25	Very limited		Very limited		Very limited	
		Filtering capacity	1.00	Filtering capacity	1.00	Filtering capacity	1.00
		Restricted permeability	0.41	Slope	0.37	Too steep for surface application	1.00
		Slope	0.37	Restricted permeability	0.31		
		Droughty	0.07	Droughty	0.07	Too steep for sprinkler application	0.60
						Restricted permeability	0.31
						Droughty	0.07
Tassel	25	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Droughty	1.00	Droughty	1.00
		Droughty	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Low adsorption	1.00	Too steep for surface application	1.00
		Runoff	0.40	Slope	1.00		
		Filtering capacity	0.01	Filtering capacity	0.01	Too steep for sprinkler application	1.00
						Filtering capacity	0.01
7324:							
Tripp	90	Not limited		Not limited		Not limited	
7325:							
Tripp	85	Not limited		Not limited		Not limited	
9900:							
Arents, earthen dam	100	Not rated		Not rated		Not rated	
9970:							
Borrow pits	100	Not rated		Not rated		Not rated	

Table 13a.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Application of manure and food-processing waste		Application of sewage sludge		Disposal of wastewater by irrigation	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9975:							
Sanitary landfill---	100	Not rated		Not rated		Not rated	
9985:							
Pits----------	100	Not rated		Not rated		Not rated	
9998:							
Water----------	100	Not rated		Not rated		Not rated	

Table 13b.--Agricultural Waste Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1080:							
Albinas	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted	1.00	Filtering	1.00
		Too level	0.50	permeability		capacity	
		Flooding	0.40			Restricted	0.21
						permeability	
Cheyenne	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted	1.00	Filtering	1.00
		Too level	0.50	permeability		capacity	
1132:							
Alliance	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted	1.00	Filtering	1.00
		Depth to bedrock	0.42	permeability		capacity	
				Depth to bedrock	1.00	Depth to bedrock	0.42
				Slope	0.03	Too steep for	0.18
						surface	
						application	
						Restricted	0.15
						permeability	
1180:							
Altvan	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted	1.00	Filtering	1.00
		Too level	0.50	permeability		capacity	
						Restricted	0.21
						permeability	
1185:							
Altvan	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted	1.00	Filtering	1.00
				permeability		capacity	
						Restricted	0.15
						permeability	
1196:							
Altvan	55	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted	1.00	Filtering	1.00
				permeability		capacity	
				Slope	0.12	Too steep for	0.32
						surface	
						application	
						Restricted	0.15
						permeability	

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1196:							
Eckley	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Filtering capacity	1.00
		Too steep for surface application	0.22	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	0.22
						Restricted permeability	0.21
1199:							
Altvan	55	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Filtering capacity	1.00
						Restricted permeability	0.15
Satanta	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Filtering capacity	1.00
						Restricted permeability	0.21
1200:							
Altvan	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Filtering capacity	1.00
				Slope	0.12	Too steep for surface application	0.32
						Restricted permeability	0.15
Eckley	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Filtering capacity	1.00
		Too steep for surface application	0.22	Slope	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	0.22
						Restricted permeability	0.21
Tassel	15	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.22	Restricted permeability	0.32	Too steep for sprinkler application	0.22
						Filtering capacity	0.01

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1202:							
Altvan	60	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Filtering capacity	1.00
		Too level	0.50			Restricted permeability	0.15
Satanta	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Filtering capacity	1.00
		Too level	0.50			Restricted permeability	0.21
1370:							
Bayard	90	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	0.32	Filtering capacity	0.01
1371:							
Bayard	90	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	0.32	Too steep for surface application	0.18
				Slope	0.03	Filtering capacity	0.01
1780:							
Broadwater	90	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.60	Filtering capacity	1.00
		Seepage	1.00			Low adsorption	1.00
		Low adsorption	1.00			Flooding	0.60
1797:							
Brownson	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Restricted permeability	0.15
Rosebud	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Restricted permeability	0.15
Canyon	20	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	1.00		
2055:							
Chappell	40	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Restricted permeability	0.32	Filtering capacity	1.00
Bayard	35	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	0.32	Filtering capacity	0.01

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2055:							
Broadwater----------	20	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.60	Filtering capacity	1.00
		Seepage	1.00				
		Low adsorption	1.00			Low adsorption	1.00
						Flooding	0.60
2665:							
Dwyer---------------	90	Very limited		Not limited		Very limited	
		Seepage	1.00			Filtering capacity	1.00
2687:							
Eckley--------------	70	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Filtering capacity	1.00
		Too steep for surface application	1.00	Restricted permeability	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
						Restricted permeability	0.21
Altvan--------------	15	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Filtering capacity	1.00
		Too steep for surface application	0.94	Restricted permeability	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	0.94
						Restricted permeability	0.21
3050:							
Glenberg------------	85	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Restricted permeability	0.32	Filtering capacity	1.00
		Flooding	0.40				
4030:							
Jayem---------------	85	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	0.32	Filtering capacity	0.01
4031:							
Jayem---------------	85	Very limited		Somewhat limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	0.32	Too steep for surface application	0.18
				Slope	0.03	Filtering capacity	0.01
4150:							
Keith---------------	90	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Restricted permeability	1.00	Restricted permeability	0.21
		Too level	0.50				

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4151:							
Keith	85	Very limited Seepage	 1.00	Very limited Restricted permeability	 1.00	Somewhat limited Restricted permeability	 0.21
4310:							
Kuma	90	Very limited Seepage Too level	 1.00 0.50	Very limited Restricted permeability	 1.00	Somewhat limited Restricted permeability	 0.21
4472:							
Las Animas	95	Very limited Flooding Seepage Depth to saturated zone Too level	 1.00 1.00 1.00 0.50	Very limited Depth to saturated zone Restricted permeability Flooding	 1.00 1.00 0.60	Very limited Filtering capacity Depth to saturated zone Flooding	 1.00 1.00 0.60
4662:							
Lodgepole	100	Very limited Seepage Ponding Depth to saturated zone Too level	 1.00 1.00 1.00 1.00	Very limited Ponding Restricted permeability Depth to saturated zone	 1.00 1.00 1.00	Very limited Ponding Depth to saturated zone Restricted permeability	 1.00 1.00 1.00
6420:							
Rosebud	85	Very limited Seepage Depth to bedrock Too level	 1.00 1.00 0.50	Very limited Restricted permeability Depth to bedrock	 1.00 1.00	Very limited Depth to bedrock Restricted permeability Filtering capacity	 1.00 0.21 0.01
6430:							
Rosebud	60	Very limited Seepage Depth to bedrock	 1.00 1.00	Very limited Restricted permeability Depth to bedrock	 1.00 1.00	Very limited Depth to bedrock Restricted permeability Filtering capacity	 1.00 0.15 0.01
Canyon	25	Very limited Seepage Depth to bedrock	 1.00 1.00	Very limited Depth to bedrock Restricted permeability	 1.00 1.00	Very limited Depth to bedrock	 1.00
6440:							
Rosebud	65	Very limited Seepage Depth to bedrock Too level	 1.00 1.00 0.50	Very limited Restricted permeability Depth to bedrock	 1.00 1.00	Very limited Depth to bedrock Restricted permeability	 1.00 0.15
Hemingford	20	Very limited Seepage Too level Depth to bedrock	 1.00 0.50 0.42	Very limited Restricted permeability Depth to bedrock	 1.00 1.00	Somewhat limited Depth to bedrock Restricted permeability	 0.42 0.15

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6442:							
Rosebud	55	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Restricted permeability	0.15
Blanche	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	0.31	Filtering capacity	0.01
6446:							
Rosebud	70	Very limited		Very limited		Very limited	
		Seepage	1.00	Restricted permeability	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Restricted permeability	0.15
						Filtering capacity	0.01
Tassel	20	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	0.32	Filtering capacity	0.01
7152:							
Tassel	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	0.32	Too steep for sprinkler application	1.00
						Filtering capacity	0.01
Ashollow	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	1.00	Too steep for sprinkler application	1.00
Rock outcrop	15	Not rated		Not rated		Not rated	
7153:							
Tassel	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00	Too steep for surface application	1.00
		Too steep for surface application	0.22	Restricted permeability	0.32	Too steep for sprinkler application	0.22
						Filtering capacity	0.01

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7153:							
Blanche	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Restricted permeability	0.31	Too steep for surface application	0.32
				Slope	0.12	Filtering capacity	0.01
7154:							
Tassel	60	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	0.32	Too steep for sprinkler application	1.00
						Filtering capacity	0.01
Blanche	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	0.31	Too steep for sprinkler application	1.00
						Filtering capacity	0.01
7180:							
Dix	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Filtering capacity	1.00
		Too steep for surface application	1.00	Restricted permeability	0.32	Too steep for surface application	1.00
						Too steep for sprinkler application	1.00
Altvan	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Filtering capacity	1.00
		Too steep for surface application	0.94	Restricted permeability	1.00	Too steep for surface application	1.00
						Too steep for sprinkler application	0.94
						Restricted permeability	0.21

Table 13b.--Agricultural Waste Management--Continued

Map symbol and soil name	Pct. of map unit	Overland flow of wastewater		Rapid infiltration of wastewater		Slow rate treatment of wastewater	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7180:							
Tassel	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too steep for surface application	1.00
		Too steep for surface application	1.00	Restricted permeability	0.32		
						Too steep for sprinkler application	1.00
						Filtering capacity	0.01
7324:							
Tripp	90	Very limited		Very limited		Not limited	
		Seepage	1.00	Restricted permeability	1.00		
		Too level	0.50				
7325:							
Tripp	85	Very limited		Very limited		Not limited	
		Seepage	1.00	Restricted permeability	1.00		
9900:							
Arents, earthen dam	100	Not rated		Not rated		Not rated	
9970:							
Borrow pits	100	Not rated		Not rated		Not rated	
9975:							
Sanitary landfill	100	Not rated		Not rated		Not rated	
9985:							
Pits	100	Not rated		Not rated		Not rated	
9998:							
Water	100	Not rated		Not rated		Not rated	

Table 14a.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
1080:					
Albinas	50	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.61
Cheyenne	35	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.00
		Bottom layer	0.00	Bottom layer	0.61
1132:					
Alliance	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1180:					
Altvan	90	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.79
1185:					
Altvan	85	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.61
1196:					
Altvan	55	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.61
Eckley	35	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.04
		Thickest layer	0.00	Bottom layer	0.61
1199:					
Altvan	55	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.61
Satanta	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.79
1200:					
Altvan	40	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.61
Eckley	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.04
		Thickest layer	0.00	Bottom layer	0.54

Table 14a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
1200:					
Tassel----------	15	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1202:					
Altvan----------	60	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.61
Satanta----------	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.79
1370:					
Bayard----------	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1371:					
Bayard----------	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
1780:					
Broadwater----------	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.61
		Thickest layer	0.00	Thickest layer	0.61
1797:					
Brownson----------	40	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Rosebud----------	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Canyon----------	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
2055:					
Chappell----------	40	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.04
		Thickest layer	0.00	Bottom layer	0.66
Bayard----------	35	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.04
		Thickest layer	0.00	Thickest layer	0.04
Broadwater----------	20	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.61
		Thickest layer	0.00	Thickest layer	0.61
2665:					
Dwyer----------	90	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.05
		Thickest layer	0.00	Bottom layer	0.27

Table 14a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
2687:					
Eckley	70	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.04
		Thickest layer	0.00	Bottom layer	0.61
Altvan	15	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.61
		Thickest layer	0.00	Thickest layer	0.61
3050:					
Glenberg	85	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.27
4030:					
Jayem	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4031:					
Jayem	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4150:					
Keith	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4151:					
Keith	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4310:					
Kuma	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
4472:					
Las Animas	95	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.61
4662:					
Lodgepole	100	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
6420:					
Rosebud	85	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.03
6430:					
Rosebud	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Canyon	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 14a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
6440:					
Rosebud	65	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Hemingford	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
6442:					
Rosebud	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Blanche	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.01
6446:					
Rosebud	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Tassel	20	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.02
7152:					
Tassel	50	Not rated		Not rated	
Ashollow	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Rock outcrop	15	Not rated		Not rated	
7153:					
Tassel	50	Not rated		Not rated	
Blanche	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.01
7154:					
Tassel	60	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.02
Blanche	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.01
7180:					
Dix	35	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.04
		Thickest layer	0.00	Bottom layer	0.54

Table 14a.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of gravel		Potential source of sand	
		Rating class	Value	Rating class	Value
7180:					
Altvan	25	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.61
		Thickest layer	0.00	Thickest layer	0.61
Tassel	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7324:					
Tripp	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
7325:					
Tripp	85	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
9900:					
Arents, earthen dam	100	Not rated		Not rated	
9970:					
Borrow pits	100	Not rated		Not rated	
9975:					
Sanitary landfill	100	Not rated		Not rated	
9985:					
Pits	100	Not rated		Not rated	
9998:					
Water	100	Not rated		Not rated	

Table 14b.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1080:							
Albinas	50	Fair		Good		Fair	
		Low content of organic matter	0.88			Hard to reclaim (dense layer)	0.84
						Hard to reclaim (rock fragments)	0.97
Cheyenne	35	Fair		Good		Poor	
		Low content of organic matter	0.12			Hard to reclaim (rock fragments)	0.00
		Droughty	0.99				
		Water erosion	0.99				
1132:							
Alliance	85	Fair		Fair		Good	
		Low content of organic matter	0.88	Depth to bedrock	0.58		
		Water erosion	0.99				
1180:							
Altvan	90	Fair		Good		Good	
		Low content of organic matter	0.12				
1185:							
Altvan	85	Fair		Good		Fair	
		Low content of organic matter	0.12			Hard to reclaim (dense layer)	0.03
		Water erosion	0.99			Hard to reclaim (rock fragments)	0.98
1196:							
Altvan	55	Fair		Good		Fair	
		Low content of organic matter	0.88			Hard to reclaim (dense layer)	0.16
		Water erosion	0.99			Hard to reclaim (rock fragments)	0.97
Eckley	35	Poor		Good		Poor	
		Too sandy	0.00			Hard to reclaim (dense layer)	0.00
		Droughty	0.15			Too sandy	0.00
		Low content of organic matter	0.88			Rock fragments	0.02
						Hard to reclaim (rock fragments)	0.97
1199:							
Altvan	55	Poor		Good		Poor	
		Too sandy	0.00			Hard to reclaim (dense layer)	0.00
		Low content of organic matter	0.12			Too sandy	0.00
		Water erosion	0.99			Rock fragments	0.50

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1199:							
Satanta	30	Fair		Good		Good	
		Low content of organic matter	0.12				
		Water erosion	0.90				
1200:							
Altvan	40	Fair		Good		Fair	
		Low content of organic matter	0.88			Hard to reclaim (dense layer)	0.16
		Water erosion	0.99			Hard to reclaim (rock fragments)	0.97
Eckley	30	Poor		Good		Poor	
		Too sandy	0.00			Hard to reclaim (dense layer)	0.00
		Droughty	0.07			Too sandy	0.00
		Low content of organic matter	0.88			Rock fragments	0.02
						Hard to reclaim (rock fragments)	0.97
Tassel	15	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00				
		Low content of organic matter	0.88				
1202:							
Altvan	60	Poor		Good		Poor	
		Too sandy	0.00			Hard to reclaim (dense layer)	0.00
		Low content of organic matter	0.12			Too sandy	0.00
		Water erosion	0.99			Rock fragments	0.50
Satanta	30	Fair		Good		Good	
		Low content of organic matter	0.12				
		Water erosion	0.90				
1370:							
Bayard	90	Fair		Good		Good	
		Low content of organic matter	0.88				
1371:							
Bayard	90	Fair		Good		Good	
		Low content of organic matter	0.88				
1780:							
Broadwater	90	Poor		Good		Poor	
		Too sandy	0.00			Hard to reclaim (dense layer)	0.00
		Wind erosion	0.00			Too sandy	0.00
		Droughty	0.00			Rock fragments	0.03
		Low content of organic matter	0.12			Hard to reclaim (rock fragments)	0.98

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1797:							
Brownson	40	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Low strength	0.00		
		Low content of organic matter	0.88	Shrink-swell	0.87		
		Water erosion	0.90				
Rosebud	30	Fair		Poor		Fair	
		Droughty	0.37	Depth to bedrock	0.00	Depth to bedrock	0.58
		Depth to bedrock	0.58				
		Low content of organic matter	0.88				
		Water erosion	0.99				
Canyon	20	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.88
		Low content of organic matter	0.88				
2055:							
Chappell	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.12			Rock fragments	0.00
		Droughty	0.72			Hard to reclaim (dense layer)	0.00
						Hard to reclaim (rock fragments)	0.92
Bayard	35	Fair		Good		Good	
		Low content of organic matter	0.88				
Broadwater	20	Poor		Good		Poor	
		Too sandy	0.00			Hard to reclaim (dense layer)	0.00
		Wind erosion	0.00			Too sandy	0.00
		Droughty	0.00			Rock fragments	0.03
		Low content of organic matter	0.12			Hard to reclaim (rock fragments)	0.98
2665:							
Dwyer	90	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Low content of organic matter	0.12				
		Droughty	0.99				
2687:							
Eckley	70	Poor		Fair		Poor	
		Too sandy	0.00	Slope	0.50	Hard to reclaim (dense layer)	0.00
		Droughty	0.36			Too sandy	0.00
		Low content of organic matter	0.88			Slope	0.00
						Rock fragments	0.02
						Hard to reclaim (rock fragments)	0.97

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
2687:							
Altvan	15	Poor		Good		Poor	
		Too sandy	0.00			Hard to reclaim (dense layer)	0.00
		Low content of organic matter	0.12			Too sandy	0.00
		Droughty	0.93			Rock fragments	0.03
						Slope	0.63
						Hard to reclaim (rock fragments)	0.97
3050:							
Glenberg	85	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.12				
		Droughty	0.38				
4030:							
Jayem	85	Fair		Good		Good	
		Low content of organic matter	0.18				
4031:							
Jayem	85	Fair		Good		Good	
		Low content of organic matter	0.18				
4150:							
Keith	90	Fair		Fair		Fair	
		Low content of organic matter	0.12	Low strength	0.78	Too clayey	0.66
		Water erosion	0.90				
		Too clayey	0.92				
4151:							
Keith	85	Fair		Fair		Fair	
		Low content of organic matter	0.12	Low strength	0.78	Too clayey	0.66
		Water erosion	0.90				
		Too clayey	0.92				
4310:							
Kuma	90	Fair		Good		Good	
		Low content of organic matter	0.88				
		Water erosion	0.90				
4472:							
Las Animas	95	Fair		Poor		Poor	
		Low content of organic matter	0.12	Depth to saturated zone	0.00	Depth to saturated zone	0.00
						Hard to reclaim (dense layer)	0.16
						Hard to reclaim (rock fragments)	0.98

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4662:							
Lodgepole	100	Poor		Poor		Poor	
		Too clayey	0.00	Depth to saturated zone	0.00	Too clayey	0.00
		Low content of organic matter	0.88	Shrink-swell	0.98	Depth to saturated zone	0.00
		Too acid	0.99				
6420:							
Rosebud	85	Fair		Poor		Fair	
		Depth to bedrock	0.58	Depth to bedrock	0.00	Depth to bedrock	0.58
		Droughty	0.67				
		Low content of organic matter	0.88				
		Water erosion	0.90				
6430:							
Rosebud	60	Fair		Poor		Fair	
		Depth to bedrock	0.58	Depth to bedrock	0.00	Depth to bedrock	0.58
		Low content of organic matter	0.88	Low strength	0.00		
				Shrink-swell	0.99		
		Droughty	0.90				
		Water erosion	0.99				
Canyon	25	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.88
		Low content of organic matter	0.88				
6440:							
Rosebud	65	Fair		Poor		Fair	
		Droughty	0.37	Depth to bedrock	0.00	Depth to bedrock	0.58
		Depth to bedrock	0.58				
		Low content of organic matter	0.88				
		Water erosion	0.99				
Hemingford	20	Fair		Fair		Good	
		Low content of organic matter	0.88	Depth to bedrock	0.58		
		Water erosion	0.99				
6442:							
Rosebud	55	Fair		Poor		Fair	
		Droughty	0.37	Depth to bedrock	0.00	Depth to bedrock	0.58
		Depth to bedrock	0.58				
		Low content of organic matter	0.88				
		Water erosion	0.99				
Blanche	30	Fair		Poor		Fair	
		Droughty	0.30	Depth to bedrock	0.00	Depth to bedrock	0.58
		Low content of organic matter	0.50				
		Depth to bedrock	0.58				

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6446:							
Rosebud	70	Fair		Poor		Fair	
		Depth to bedrock	0.58	Depth to bedrock	0.00	Depth to bedrock	0.58
		Droughty	0.87				
		Low content of organic matter	0.88				
		Water erosion	0.99				
Tassel	20	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00			Rock fragments	0.00
		Low content of organic matter	0.12				
7152:							
Tassel	50	Not rated		Poor		Not rated	
		Wind erosion	0.00	Depth to bedrock	0.00		
		Droughty	0.00	Slope	0.00		
		Low content of organic matter	0.00				
Ashollow	25	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Low content of organic matter	0.88				
		Water erosion	0.90				
Rock outcrop	15	Not rated		Not rated		Not rated	
7153:							
Tassel	50	Not rated		Poor		Not rated	
		Droughty	0.00	Depth to bedrock	0.00		
		Low content of organic matter	0.00				
		Depth to bedrock	0.00				
Blanche	30	Fair		Poor		Fair	
		Droughty	0.30	Depth to bedrock	0.00	Depth to bedrock	0.58
		Low content of organic matter	0.50				
		Depth to bedrock	0.58				
7154:							
Tassel	60	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Slope	0.50	Slope	0.00
		Low content of organic matter	0.12			Rock fragments	0.00
Blanche	30	Fair		Poor		Poor	
		Low content of organic matter	0.12	Depth to bedrock	0.00	Slope	0.00
		Droughty	0.29			Depth to bedrock	0.58
		Depth to bedrock	0.58				

Table 14b.--Construction Materials--Continued

Map symbol and soil name	Pct. of map unit	Potential source of reclamation material		Potential source of roadfill		Potential source of topsoil	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
7180:							
Dix	35	Poor		Fair		Poor	
		Too sandy	0.00	Slope	0.50	Hard to reclaim (dense layer)	0.00
		Droughty	0.06			Too sandy	0.00
		Low content of organic matter	0.88			Slope	0.00
						Rock fragments	0.02
						Hard to reclaim (rock fragments)	0.97
Altvan	25	Poor		Good		Poor	
		Too sandy	0.00			Hard to reclaim (dense layer)	0.00
		Low content of organic matter	0.12			Too sandy	0.00
		Droughty	0.93			Rock fragments	0.03
						Slope	0.63
						Hard to reclaim (rock fragments)	0.97
Tassel	25	Poor		Poor		Poor	
		Droughty	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
		Depth to bedrock	0.00	Slope	0.50	Slope	0.00
		Low content of organic matter	0.88				
7324:							
Tripp	90	Fair		Good		Good	
		Low content of organic matter	0.12				
		Water erosion	0.90				
7325:							
Tripp	85	Fair		Good		Good	
		Low content of organic matter	0.12				
		Water erosion	0.90				
9900:							
Arents, earthen dam	100	Not rated		Not rated		Not rated	
9970:							
Borrow pits	100	Not rated		Not rated		Not rated	
9975:							
Sanitary landfill	100	Not rated		Not rated		Not rated	
9985:							
Pits	100	Not rated		Not rated		Not rated	
9998:							
Water	100	Not rated		Not rated		Not rated	

Table 15.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1080:							
Albinas	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.61	No ground water	1.00
Cheyenne	35	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.61	No ground water	1.00
1132:							
Alliance	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	No ground water	1.00
		Depth to bedrock	0.01	Thin layer	0.11		
1180:							
Altvan	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.79	No ground water	1.00
1185:							
Altvan	85	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.61	No ground water	1.00
1196:							
Altvan	55	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.61	No ground water	1.00
Eckley	35	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.61	No ground water	1.00
1199:							
Altvan	55	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.61	No ground water	1.00
Satanta	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.79	No ground water	1.00
1200:							
Altvan	40	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.61	No ground water	1.00
Eckley	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.54	No ground water	1.00
Tassel	15	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	No ground water	1.00
		Depth to bedrock	0.74				
1202:							
Altvan	60	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.61	No ground water	1.00
Satanta	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.79	No ground water	1.00
1370:							
Bayard	90	Very limited		Not limited		Very limited	
		Seepage	1.00			No ground water	1.00

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1371:							
Bayard	90	Very limited		Not limited		Very limited	
		Seepage	1.00			No ground water	1.00
1780:							
Broadwater	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.61	No ground water	1.00
1797:							
Brownson	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	No ground water	1.00
		Depth to bedrock	0.74	Piping	0.48		
Rosebud	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	No ground water	1.00
		Depth to bedrock	0.11	Thin layer	0.85		
Canyon	20	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	No ground water	1.00
		Depth to bedrock	0.74				
2055:							
Chappell	40	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.66	No ground water	1.00
Bayard	35	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.04	No ground water	1.00
Broadwater	20	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.61	No ground water	1.00
2665:							
Dwyer	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.27	No ground water	1.00
2687:							
Eckley	70	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.61	No ground water	1.00
		Slope	0.12				
Altvan	15	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.61	No ground water	1.00
		Slope	0.01				
3050:							
Glenberg	85	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.27	No ground water	1.00
4030:							
Jayem	85	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.01	No ground water	1.00
4031:							
Jayem	85	Very limited		Somewhat limited		Very limited	
4150:							
Keith	90	Somewhat limited		Very limited		Very limited	
		Seepage	0.72	Piping	1.00	No ground water	1.00

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
4151:							
Keith	85	Somewhat limited Seepage	 0.72	Very limited Piping	 1.00	Very limited No ground water	 1.00
4310:							
Kuma	90	Somewhat limited Seepage	 0.70	Very limited Piping	 1.00	Very limited No ground water	 1.00
4472:							
Las Animas	95	Very limited Seepage	 1.00	Very limited Depth to saturated zone Seepage	 1.00 0.61	Very limited Cutbanks cave	 1.00
4662:							
Lodgepole	100	Somewhat limited Seepage	 0.72	Very limited Ponding Depth to saturated zone Piping	 1.00 1.00 0.90	Somewhat limited Slow refill Cutbanks cave	 0.28 0.10
6420:							
Rosebud	85	Very limited Seepage Depth to bedrock	 1.00 0.11	Somewhat limited Piping Thin layer Seepage	 0.97 0.85 0.03	Very limited No ground water	 1.00
6430:							
Rosebud	60	Very limited Seepage Depth to bedrock	 1.00 0.11	Somewhat limited Thin layer Piping	 0.85 0.76	Very limited No ground water	 1.00
Canyon	25	Very limited Seepage Depth to bedrock	 1.00 0.74	Very limited Thin layer	 1.00	Very limited No ground water	 1.00
6440:							
Rosebud	65	Very limited Seepage Depth to bedrock	 1.00 0.11	Very limited Piping Thin layer	 1.00 0.85	Very limited No ground water	 1.00
Hemingford	20	Very limited Seepage Depth to bedrock	 1.00 0.01	Somewhat limited Piping Thin layer	 0.99 0.11	Very limited No ground water	 1.00
6442:							
Rosebud	55	Very limited Seepage Depth to bedrock	 1.00 0.11	Very limited Piping Thin layer	 1.00 0.85	Very limited No ground water	 1.00
Blanche	30	Very limited Seepage Depth to bedrock	 1.00 0.11	Somewhat limited Thin layer Seepage	 0.85 0.01	Very limited No ground water	 1.00
6446:							
Rosebud	70	Very limited Seepage Depth to bedrock	 1.00 0.11	Very limited Piping Thin layer	 1.00 0.85	Very limited No ground water	 1.00

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
6446:							
Tassel	20	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	No ground water	1.00
		Depth to bedrock	0.74	Seepage	0.02		
7152:							
Tassel	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	No ground water	1.00
		Depth to bedrock	0.74	Seepage	0.04		
		Slope	0.72				
Ashollow	25	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Piping	1.00	No ground water	1.00
		Slope	0.50				
Rock outcrop	15	Very limited		Not rated		Not rated	
		Depth to bedrock	1.00				
		Slope	0.88				
7153:							
Tassel	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	No ground water	1.00
		Depth to bedrock	0.74	Seepage	0.02		
Blanche	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.85	No ground water	1.00
		Depth to bedrock	0.11	Seepage	0.01		
7154:							
Tassel	60	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	No ground water	1.00
		Depth to bedrock	0.74	Seepage	0.02		
		Slope	0.12				
Blanche	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.85	No ground water	1.00
		Depth to bedrock	0.11	Seepage	0.01		
		Slope	0.03				
7180:							
Dix	35	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.54	No ground water	1.00
		Slope	0.12				
Altvan	25	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.61	No ground water	1.00
		Slope	0.01				
Tassel	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	No ground water	1.00
		Depth to bedrock	0.74				
		Slope	0.12				
7324:							
Tripp	90	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Piping	1.00	No ground water	1.00
7325:							
Tripp	85	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Piping	1.00	No ground water	1.00

Table 15.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9900: Arents, earthen dam-	100	Not rated		Not rated		Not rated	
9970: Borrow pits---	100	Not rated		Not rated		Not rated	
9975: Sanitary landfill---	100	Not rated		Not rated		Not rated	
9985: Pits---	100	Somewhat limited Slope	0.03	Not rated		Not rated	
9998: Water---	100	Not rated		Not rated		Not rated	

Table 16.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
1080:												
Albinas	0-7	Loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	30-40	5-15
	7-22	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	22-24	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	24-34	Sandy clay loam	SC	A-6	0	0	100	100	80-90	35-45	30-40	10-20
	34-45	Loam	ML	A-4	0	0	100	100	85-95	60-75	30-40	NP-15
	45-80	Gravelly coarse sand	SP-SC	A-1	0	0	70-100	50-95	25-65	0-15	0-0	NP
Cheyenne	0-6	Loam	CL, CL-ML	A-4, A-6	0	0	90-100	90-100	85-100	65-90	25-40	4-15
	6-10	Loam	CL, CL-ML	A-4, A-6	0	0	90-100	90-100	85-100	65-90	25-40	4-15
	10-24	Loam, clay loam	CL, CL-ML	A-4, A-6	0	0	90-100	90-100	85-100	65-90	25-40	4-15
	24-32	Gravelly loamy sand	SM, SP, SP-SM	A-1	0	0	60-80	50-70	5-15	0-15	5-15	NP-5
	32-60	Gravelly coarse sand, very gravelly coarse sand	GM, GP-GM, SM, SP-SM	A-1	0	0	40-70	30-60	5-20	0-15	0-5	NP-4
1132:												
Alliance	0-6	Loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	30-40	5-15
	6-17	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	17-24	Loam	ML	A-4	0	0	100	100	85-95	60-75	30-40	NP-15
	24-34	Loam	ML	A-4	0	0	100	100	85-95	60-75	30-40	NP-15
	34-47	Very fine sandy loam	ML	A-4	0	0	100	100	70-100	50-65	20-30	NP-10
	47-54	Loamy fine sand	SP-SM	A-2	0	0	100	100	50-70	5-15	0-0	NP
	54-80	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---
1180:												
Altvan	0-6	Loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	30-40	5-15
	6-8	Loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	30-40	5-15
	8-12	Loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	30-40	5-15
	12-23	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	23-26	Loam	CL	A-6, A-7	0	0	100	100	85-100	60-75	30-40	10-20
	26-35	Loam	CL	A-6, A-7	0	0	100	100	85-100	60-75	30-40	10-20
	35-60	Gravelly sand	SP-SM	A-3	0	0	100	100	50-70	5-15	0-0	NP
1185:												
Altvan	0-6	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	6-11	Clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	35-45	15-25
	11-22	Clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	35-45	15-25
	22-26	Loam	CL	A-6, A-7	0	0	100	100	85-100	60-75	30-40	10-20
	22-29	Sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	29-80	Coarse sand	SP-SC	A-1, A-2, A-3	0	0	70-100	50-95	25-65	0-15	0-0	NP
1196:												
Altvan	0-7	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	7-12	Loam	CL	A-4	0	0	100	100	85-95	60-75	30-40	5-15
	12-17	Clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	35-45	15-25
	17-25	Very fine sandy loam	ML	A-4	0	0	100	100	70-100	50-65	20-30	NP-10
	25-31	Loamy sand	SC	A-2, A-4, A-1-b	0	0	100	100	50-75	15-30	15-25	NP-10
	31-80	Gravelly coarse sand	SP-SC	A-1	0	0	70-100	50-95	25-65	0-15	0-0	NP

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
1196:												
Eckley----------	0-5	Gravelly sandy loam	SC, SC-SM, SM	A-1, A-2, A-4	0	0	100	100	60-70	30-40	15-30	NP-10
	7-9	Gravelly sandy clay loam	SC	A-6	0	0	100	100	80-90	35-45	30-40	10-20
	9-15	Gravelly sandy loam	SC	A-2, A-6	0	0	70-95	50-95	60-70	30-40	15-30	NP-10
	15-80	Gravelly coarse sand	SP-SC	A-1	0	0	70-95	50-95	25-65	0-15	0-0	NP
1199:												
Altvan----------	0-5	Fine sandy loam	CL	A-4	0	0	100	100	85-95	60-75	30-40	5-15
	5-10	Clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	35-45	15-25
	10-17	Clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	35-45	15-25
	17-24	Loam	CL	A-4	0	0	100	100	85-95	60-75	30-40	5-15
	24-30	Loam	CL	A-4	0	0	100	100	85-95	60-75	30-40	5-15
	30-80	Coarse sand	SP-SC	A-1, A-2, A-3	0	0	85-100	75-95	25-65	3-15	0-0	NP
Satanta----------	0-9	Fine sandy loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	30-40	5-15
	9-14	Fine sandy loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	30-40	5-15
	14-26	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	26-31	Loam	CL	A-6, A-7	0	0	100	100	85-100	60-75	30-40	10-20
	31-55	Very fine sandy loam	ML	A-4, A-6	0	0	100	100	85-95	50-65	20-30	NP-10
	55-80	Sand	SP-SM	A-3	0	0	100	100	50-70	5-15	0-0	NP
1200:												
Altvan----------	0-7	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	7-12	Loam	CL	A-4	0	0	100	100	85-95	60-75	30-40	5-15
	12-17	Clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	35-45	15-25
	17-25	Very fine sandy loam	ML	A-4	0	0	100	100	70-100	50-65	20-30	NP-10
	25-31	Loamy sand	SC	A-2, A-4, A-1-b	0	0	100	100	50-75	15-30	15-25	NP-10
	31-80	Gravelly coarse sand	SP-SC	A-1	0	0	70-100	50-95	25-65	0-15	0-0	NP
Eckley----------	0-5	Gravelly sandy loam	GC-GM, GM, SC-SM, SM	A-1, A-2, A-4	0	0	60-80	50-75	35-65	20-50	20-30	NP-10
	5-8	Sandy clay loam	SC	A-6	0	0	100	100	80-90	35-45	30-40	10-20
	8-11	Gravelly sandy loam	SC	A-2, A-6	0	0	70-100	50-95	50-70	30-40	15-30	NP-10
	11-80	Gravelly coarse sand	SP-SC	A-1	0	0	70-100	50-95	25-65	0-15	0-0	NP
Tassel----------	0-4	Fine sandy loam	SC	A-4	0	0	100	100	70-85	40-55	0-0	NP-10
	4-8	Gravelly fine sandy loam	SC	A-1, A-2	0	0-5	60-75	60-75	45-65	20-35	0-0	NP-10
	8-60	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---
1202:												
Altvan----------	0-5	Loam	CL	A-4	0	0	100	100	85-95	60-75	30-40	5-15
	5-10	Clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	35-45	15-25
	10-17	Clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	35-45	15-25
	17-24	Loam	CL	A-4	0	0	100	100	85-95	60-75	30-40	5-15
	24-30	Loam	CL	A-4	0	0	100	100	85-95	60-75	30-40	5-15
	30-80	Coarse sand	SP-SC	A-1, A-2, A-3	0	0	85-100	75-95	25-65	3-15	0-0	NP

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
1202:												
Satanta---------	0-9	Loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	30-40	5-15
	9-14	Loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	30-40	5-15
	14-26	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	26-31	Loam	CL	A-6, A-7	0	0	100	100	85-100	60-75	30-40	10-20
	31-55	Very fine sandy loam	ML	A-4, A-6	0	0	100	100	85-95	50-65	20-30	NP-10
	55-80	Sand	SP-SM	A-3	0	0	100	100	50-70	5-15	0-0	NP
1370:												
Bayard----------	0-6	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	6-10	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	10-16	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	16-60	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
1371:												
Bayard----------	0-7	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	7-13	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	13-22	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	22-60	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
1780:												
Broadwater------	0-3	Loamy sand	SC	A-1-b, A-2, A-4	0	0	100	100	50-75	15-30	15-25	NP-10
	3-6	Gravelly coarse sand	SP	A-1, A-2, A-3	0	0	70-100	50-95	25-60	0-15	0-0	NP
	6-60	Stratified gravelly coarse sand to sand	SP	A-1, A-2, A-3	0	0	70-100	50-95	25-60	0-15	0-0	NP
1797:												
Brownson--------	0-5	Loam	CL	A-4, A-6	0	0	100	100	85-95	65-75	30-40	5-15
	5-13	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	13-60	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Rosebud---------	0-6	Loam	CL	A-4, A-6	0	0	100	100	85-95	65-75	30-40	5-15
	6-17	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	17-23	Loam	ML	A-4	0	0	100	100	85-95	60-75	30-40	NP-15
	23-60	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---
Canyon----------	0-9	Loam	CL, CL-ML, ML	A-4	0	0-5	90-95	75-95	50-95	50-75	15-30	2-10
	9-60	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
2055:												
Chappell--------	0-8	Sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	8-20	Sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	20-25	Sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	25-60	Coarse sand	SP-SC	A-1	0	0-5	70-85	50-85	25-65	0-15	0-0	NP
Bayard----------	0-8	Sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	8-15	Sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	15-27	Sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	27-80	Sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
2055:												
Broadwater------	0-3	Loamy sand	SC	A-1-b, A-2, A-4	0	0	100	100	50-75	15-30	15-25	NP-10
	3-6	Gravelly coarse sand	SP	A-1, A-2, A-3	0	0	70-100	50-95	25-60	0-15	0-0	NP
	6-60	Stratified gravelly coarse sand to sand	SP	A-1, A-2, A-3	0	0	70-100	50-95	25-60	0-15	0-0	NP
2665:												
Dwyer-----------	0-7	Loamy sand	SM	A-2, A-4	0	0	100	90-100	50-75	15-30	15-25	NP-10
	7-21	Loamy fine sand	SM	A-2, A-4	0	0	100	90-100	50-75	15-30	15-25	NP-10
	21-80	Fine sand	SM	A-2, A-3	0	0	100	90-100	50-70	5-35	0-0	NP
2687:												
Eckley----------	0-3	Gravelly sandy loam	SC, SC-SM, SM	A-1, A-2, A-4	0	0	100	100	60-70	30-40	15-30	NP-10
	3-7	Gravelly sandy clay loam	SC	A-6	0	0	100	100	80-90	35-45	30-40	10-20
	7-16	Gravelly sandy loam	SC	A-2, A-6	0	0	70-100	60-95	60-70	30-40	15-30	NP-10
	16-80	Gravelly coarse sand	SP-SC	A-1	0	0	70-100	50-95	25-65	0-15	0-0	NP
Altvan----------	0-6	Sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	6-11	Sandy clay loam	SC	A-6	0	0	100	100	80-90	35-45	30-40	10-20
	11-19	Sandy clay loam	SC	A-6	0	0	100	100	80-90	35-45	30-40	10-20
	19-24	Loamy coarse sand	SC	A-2, A-4, A-1-b	0	0	100	100	50-75	15-30	15-25	NP-10
	24-48	Coarse sand	SP-SC	A-1, A-2, A-3	0	0	70-100	50-95	25-65	0-15	0-0	NP
	48-80	Gravelly coarse sand	SP-SC	A-1	0	0	70-100	50-95	25-65	0-15	0-0	NP
3050:												
Glenberg--------	0-6	Fine sandy loam	SC-SM, SM	A-2, A-4	0	0	95-100	85-100	60-80	30-45	15-25	NP-7
	6-60	Fine sand, loam	SM	A-2, A-3	0	0	100	90-100	50-70	5-35	0-0	NP
4030:												
Jayem-----------	0-6	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	6-9	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	9-22	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	22-50	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	50-60	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
4031:												
Jayem-----------	0-6	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	6-9	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	9-22	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	22-50	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	50-60	Fine sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
4150:												
Keith-----------	0-9	Loam	CL	A-4	0	0	100	100	85-95	60-75	30-40	5-15
	9-25	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	85-95	35-50	5-15
	25-48	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	90-100	70-90	25-35	5-15
	48-60	Very fine sandy loam	ML	A-4, A-6	0	0	100	100	85-95	50-65	20-30	NP-10

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
4151:												
Keith	0-9	Loam	CL	A-4	0	0	100	100	85-95	60-75	30-40	5-15
	9-25	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	85-95	35-50	5-15
	25-48	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	90-100	70-90	25-35	5-15
	48-60	Very fine sandy loam	ML	A-4, A-6	0	0	100	100	85-95	50-65	20-30	NP-10
4310:												
Kuma	0-7	Loam	CL	A-4	0	0	100	100	85-95	60-75	30-40	5-15
	7-14	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	85-95	35-50	5-15
	14-24	Silt loam	CL	A-6, A-7	0	0	100	100	85-95	60-75	30-40	5-15
	24-32	Silt loam	CL	A-6, A-7	0	0	100	100	85-95	60-75	30-40	5-15
	32-42	Silt loam	CL	A-6, A-7	0	0	100	100	85-95	60-75	30-40	5-15
	42-56	Silt loam	CL	A-6, A-7	0	0	100	100	85-95	60-75	30-40	5-15
	56-60	Very fine sandy loam	ML	A-4, A-6	0	0	100	100	85-95	50-65	20-30	NP-10
4472:												
Las Animas	0-20	Loam	CL	A-4	0	0	100	100	85-95	60-75	30-40	5-15
	20-25	Loam	CL	A-4	0	0	100	100	85-95	60-75	30-40	5-15
	25-30	Sandy loam	SC	A-2, A-4	0	0	100	100	55-90	15-70	15-30	NP-10
	30-60	Stratified gravelly coarse sand to sand	SP	A-1, A-2, A-3	0	0	70-100	50-95	25-60	0-15	0-0	NP
4662:												
Lodgepole	0-6	Loam	CL	A-4, A-6	0	0	100	100	85-95	65-75	30-40	5-15
	6-18	Silty clay	CH, CL	A-7	0	0	100	100	95-100	85-95	50-70	25-40
	18-23	Silty clay	CH, CL	A-7	0	0	100	100	95-100	85-95	50-70	25-40
	23-29	Silty clay loam	CL	A-7	0	0	100	100	95-100	85-95	35-50	15-25
	29-43	Loam	ML	A-4	0	0	100	100	85-95	60-75	30-40	NP-15
	43-80	Very fine sandy loam	ML	A-4	0	0	100	100	70-100	50-65	20-30	NP-10
6420:												
Rosebud	0-6	Loam	CL	A-4, A-6	0	0	100	100	85-95	65-75	30-40	5-15
	6-11	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	11-15	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	15-19	Sandy clay loam	SC	A-6	0	0	100	100	80-90	35-45	30-40	10-20
	19-30	Sandy loam	SM, CL-ML, SC-SM, ML	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	30-80	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---
6430:												
Rosebud	0-6	Loam	CL	A-4, A-6	0	0	100	100	85-95	65-75	30-40	5-15
	6-12	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	12-22	Clay loam	CL	A-7, A-6	0	0	100	100	90-100	70-80	35-45	15-25
	22-25	Loam	ML	A-4	0	0	100	100	85-95	60-75	30-40	NP-15
	25-31	Sandy loam	SM, CL-ML, SC-SM, ML	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	31-60	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---
Canyon	0-6	Loam	CL, CL-ML, ML	A-4	0	0-5	90-95	75-95	50-95	50-75	15-30	2-10
	6-10	Very fine sandy loam	ML	A-4	0	0	100	100	70-100	50-65	20-30	NP-10
	10-60	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
6440:												
Rosebud---------	0-6	Loam	CL	A-4, A-6	0	0	100	100	85-95	65-75	30-40	5-15
	6-17	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	17-23	Loam	ML	A-4	0	0	100	100	85-95	60-75	30-40	NP-15
	23-60	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---
6440:												
Hemingford------	0-6	Loam	CL	A-4, A-6	0	0	100	100	85-95	65-75	30-40	5-15
	6-12	Loam	CL	A-4, A-6	0	0	100	100	85-95	65-75	30-40	5-15
	12-29	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	29-52	Loam	ML	A-4	0	0	100	100	85-95	60-75	30-40	NP-15
	52-60	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---
6442:												
Rosebud---------	0-6	Loam	CL	A-4, A-6	0	0	100	100	85-95	65-75	30-40	5-15
	6-17	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	17-23	Loam	ML	A-4	0	0	100	100	85-95	60-75	30-40	NP-15
	23-60	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---
Blanche---------	0-5	Sandy loam	SM, CL-ML, SC-SM, ML	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	5-17	Sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	17-22	Sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	22-27	Sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	27-60	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
6446:												
Rosebud---------	0-5	Sandy loam	SC	A-4	0	0	100	100	70-85	40-55	0-0	NP-10
	5-15	Clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-80	35-45	15-25
	15-27	Loam	ML	A-4	0	0	100	100	85-95	60-75	30-40	NP-15
	27-37	Sandy loam	SC	A-1, A-2	0	0-5	100	50-95	50-70	30-40	0-0	NP-10
	37-60	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---
Tassel----------	0-4	Sandy loam	SC	A-4	0	0	100	100	70-85	40-55	0-0	NP-10
	4-16	Gravelly sandy loam	SC	A-1, A-2	0	0-5	100	50-95	50-70	30-40	0-0	NP-10
	16-60	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---
7152:												
Tassel----------	0-4	Gravelly sandy loam	GC-GM, GM, SC-SM, SM	A-1, A-2, A-4	0	0	60-80	50-75	35-65	20-50	20-30	NP-10
	4-8	Gravelly sandy loam	SC	A-1, A-2	0	0-5	100	50-95	45-70	30-40	0-0	NP-10
	8-60	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---
Ashollow--------	0-3	Very fine sandy loam	ML	A-1-b, A-2, A-4, A-6	0	0	100	100	85-95	50-65	20-30	NP-10
	3-10	Very fine sandy loam	ML	A-1-b, A-2, A-4, A-6	0	0	100	100	85-95	50-65	20-30	NP-10
	10-32	Very fine sandy loam	ML	A-1-b, A-2, A-4, A-6	0	0	100	100	85-95	50-65	20-30	NP-10
	32-60	Very fine sandy loam	ML	A-1-b, A-2, A-4, A-6	0	0	100	100	85-95	50-65	20-30	NP-10

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
7152:												
Rock outcrop----	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	0-14	NP
7153:												
Tassel----------	0-6	Sandy loam	SC	A-4	0	0	100	100	70-85	40-55	0-0	NP-10
	6-60	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---
Blanche---------	0-5	Sandy loam	SM, CL-ML, SC-SM, ML	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	5-17	Sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	17-22	Sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	22-27	Sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	27-60	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
7154:												
Tassel----------	0-5	Sandy loam	SC	A-4	0	0	100	100	70-85	40-55	0-0	NP-10
	5-11	Sandy loam	SC	A-1, A-2	0	0-5	100	50-95	50-70	30-40	0-0	NP-10
	11-60	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---
Blanche---------	0-8	Sandy loam	SM, CL-ML, SC-SM, ML	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	8-12	Sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	12-19	Sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	19-28	Sandy loam	SM, SC-SM, ML, CL-ML	A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	28-60	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
7180:												
Dix----------	0-7	Gravelly sandy loam	SC, SC-SM, SM	A-1, A-2, A-4	0	0	100	100	60-70	30-40	15-30	NP-10
	7-10	Gravelly sandy loam	SC	A-2, A-6	0	0	70-100	60-95	60-70	30-40	15-30	NP-10
	10-80	Gravelly coarse sand	SP-SC	A-1	0	0	70-100	50-95	25-65	0-15	0-0	NP
Altvan----------	0-6	Sandy loam	SC	A-2, A-4	0	0	100	100	70-85	40-55	15-30	NP-10
	6-11	Sandy clay loam	SC	A-6	0	0	100	100	80-90	35-45	30-40	10-20
	11-19	Sandy clay loam	SC	A-6	0	0	100	100	80-90	35-45	30-40	10-20
	19-24	Loamy coarse sand	SC	A-2, A-4, A-1-b	0	0	100	100	50-75	15-30	15-25	NP-10
	24-48	Coarse sand	SP-SC	A-1, A-2, A-3	0	0	70-100	50-95	25-65	0-15	0-0	NP
	48-80	Gravelly coarse sand	SP-SC	A-1	0	0	70-100	50-95	25-65	0-15	0-0	NP
Tassel----------	0-4	Fine sandy loam	SC	A-4	0	0	100	100	70-85	40-55	0-0	NP-10
	4-8	Gravelly fine sandy loam	SC	A-1, A-2	0	0-5	100	60-95	60-70	30-40	0-0	NP-10
	8-60	Weathered bedrock	---	---	---	---	---	---	---	---	0-0	---

Table 16.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
7324:												
Tripp----------	0-9	Loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	30-40	5-15
	9-24	Loam, clay loam	CL, CL-ML	A-4, A-6	0	0	90-100	90-100	85-100	65-90	25-40	4-15
	24-35	Loam, very fine sandy loam	CL, CL-ML, ML	A-4, A-6	0	0	95-100	95-100	85-100	60-90	20-35	2-12
	35-60	Loam, very fine sandy loam	CL, CL-ML, ML	A-4, A-6	0	0	95-100	95-100	85-100	60-90	20-35	2-12
9900. Arents, earthen dam												
9970. Borrow pits												
9975. Sanitary landfill												
9985. Pits												
9998. Water												

Table 17.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
1080:														
Albinas	0-7	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	7-22	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-2.0	.28	.28			
	22-24	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-2.0	.28	.28			
	24-34	44-75	4-28	20-30	1.35-1.55	1.41-4.23	0.16-0.18	0.0-2.9	0.5-2.0	.15	.28			
	34-45	26-52	28-50	7-20	1.45-1.65	4.23-14.11	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	45-80	88-98	1-10	0-5	1.65-1.85	141.15-141.15	0.02-0.04	0.0-2.9	0.5-1.0	.10	.28			
Cheyenne	0-6	25-52	28-50	16-27	1.20-1.40	4.23-14.11	0.20-0.24	0.0-2.9	1.0-2.0	.28	.28	4	5	56
	6-10	25-52	28-50	16-27	1.20-1.40	4.23-14.11	0.20-0.24	0.0-2.9	1.0-2.0	.28	.28			
	10-24	25-52	18-50	18-30	1.30-1.50	4.23-14.11	0.15-0.19	0.0-2.9	0.5-1.0	.37	.37			
	24-32	72-90	0-28	2-10	1.50-1.70	141.00-141.00	0.02-0.04	0.0-2.9	0.0-0.5	.10	.17			
	32-60	88-98	0-12	0-3	1.50-1.70	141.00-141.00	0.02-0.04	0.0-2.9	0.0-0.5	.05	.10			
1132:														
Alliance	0-6	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	6-17	20-52	28-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	17-24	26-52	28-52	10-27	1.45-1.65	4.23-14.11	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	24-34	26-52	28-50	10-27	1.45-1.65	4.23-14.11	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	34-47	52-80	20-50	10-20	1.30-1.40	4.23-14.10	0.16-0.17	0.0-1.0	0.5-1.0	.24	.24			
	47-54	72-88	5-25	2-5	1.60-1.80	141.15-141.15	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
	54-80	---	---	---	---	10.00-100.00	---	---	---	---	---			
1180:														
Altvan	0-6	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	6-8	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-2.0	.28	.28			
	8-12	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-2.0	.28	.28			
	12-23	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-2.0	.28	.28			
	23-26	26-52	28-50	10-20	1.45-1.65	4.23-14.11	0.17-0.19	0.0-2.9	0.5-2.0	.28	.28			
	26-35	26-52	28-50	8-15	1.45-1.65	4.23-14.11	0.17-0.19	0.0-2.9	0.5-2.0	.28	.28			
	35-60	85-98	0-10	2-5	1.60-1.80	141.15-141.15	0.05-0.07	0.0-0.0	0.0-0.5	.15	.15			
1185:														
Altvan	0-6	52-80	10-50	8-20	1.30-1.50	14.10-42.33	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20	4	3	86
	6-11	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	11-22	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	22-26	26-52	28-50	10-20	1.45-1.65	4.23-14.11	0.17-0.19	0.0-2.9	0.5-2.0	.28	.28			
	22-29	52-80	10-50	5-15	1.50-1.70	14.11-42.33	0.15-0.17	0.0-2.9	0.0-0.5	.28	.28			
	29-80	85-99	1-10	0-3	1.65-1.85	141.15-141.15	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
1196:														
Altvan	0-7	52-80	10-50	8-20	1.30-1.50	14.10-42.33	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20	4	3	86
	7-12	26-52	28-50	18-27	1.45-1.65	4.23-14.11	0.20-0.22	0.0-2.9	1.0-2.0	.28	.28			
	12-17	20-52	28-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	17-25	52-88	10-50	10-20	1.30-1.40	4.23-14.10	0.16-0.17	0.0-1.0	0.5-1.0	.24	.24			
	25-31	72-88	5-20	3-10	1.55-1.75	42.33-141.15	0.08-0.10	0.0-2.9	0.5-1.0	.17	.17			
	31-80	88-98	1-10	0-5	1.65-1.85	141.15-141.15	0.02-0.04	0.0-2.9	0.5-1.0	.10	.28			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
1196:														
Eckley----------	0-5	52-80	10-52	10-20	1.30-1.50	14.11-42.33	0.13-0.15	0.0-1.0	1.0-3.0	.20	.28	2	5	56
	7-9	44-75	4-28	20-30	1.35-1.55	1.41-4.23	0.16-0.18	0.0-2.9	0.5-2.0	.15	.28			
	9-15	52-80	10-52	10-20	1.50-1.70	14.10-42.33	0.12-0.14	0.0-2.9	0.5-1.0	.15	.28			
	15-80	88-98	1-10	0-5	1.65-1.85	141.15-141.15	0.02-0.04	0.0-2.9	0.5-1.0	.10	.28			
1199:														
Altvan----------	0-5	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	3	86
	5-10	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	10-17	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	17-24	26-52	28-50	18-27	1.45-1.65	4.23-14.11	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	24-30	26-52	28-50	8-15	1.45-1.65	4.23-14.11	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	30-80	85-99	1-10	0-3	1.65-1.85	141.15-141.15	0.02-0.04	0.0-0.0	0.0-0.5	.10	.15			
Satanta----------	0-9	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	3	86
	9-14	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-2.0	.28	.28			
	14-26	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-2.0	.28	.28			
	26-31	26-52	28-50	10-20	1.45-1.65	4.23-14.11	0.17-0.19	0.0-2.9	0.5-2.0	.28	.28			
	31-55	52-88	10-50	8-20	1.40-1.60	4.23-14.11	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
	55-80	85-98	0-10	2-5	1.60-1.80	141.15-141.15	0.05-0.07	0.0-0.0	0.0-0.5	.15	.15			
1200:														
Altvan----------	0-7	52-80	10-50	8-20	1.30-1.50	14.10-42.33	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20	4	3	86
	7-12	26-52	28-50	18-27	1.45-1.65	4.23-14.11	0.20-0.22	0.0-2.9	1.0-2.0	.28	.28			
	12-17	20-52	28-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	17-25	52-88	10-50	10-20	1.30-1.40	4.23-14.10	0.16-0.17	0.0-1.0	0.5-1.0	.24	.24			
	25-31	72-88	5-20	3-10	1.55-1.75	42.33-141.15	0.08-0.10	0.0-2.9	0.5-1.0	.17	.17			
	31-80	88-98	1-10	0-5	1.65-1.85	141.15-141.15	0.02-0.04	0.0-2.9	0.5-1.0	.10	.28			
Eckley----------	0-5	52-80	10-52	10-20	1.30-1.35	14.11-42.33	0.09-0.12	0.0-2.9	2.0-4.0	.15	.28	2	5	56
	5-8	44-75	4-28	20-30	1.35-1.55	1.41-4.23	0.16-0.18	0.0-2.9	0.5-2.0	.15	.28			
	8-11	52-80	10-52	10-20	1.50-1.70	14.10-42.33	0.12-0.14	0.0-2.9	0.5-1.0	.15	.28			
	11-80	85-99	1-10	0-5	1.65-1.85	141.15-141.15	0.02-0.04	0.0-2.9	0.5-1.0	.10	.28			
Tassel----------	0-4	52-80	10-50	5-12	1.30-1.70	14.11-42.33	0.16-0.18	0.0-2.9	0.5-1.0	.24	.24	2	3	86
	4-8	52-80	10-50	5-12	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.0-0.5	.10	.20			
	8-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
1202:														
Altvan----------	0-5	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	5-10	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	10-17	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	17-24	26-52	28-50	18-27	1.45-1.65	4.23-14.11	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	24-30	26-52	28-50	8-15	1.45-1.65	4.23-14.11	0.17-0.19	0.0-2.9	0.5-1.0	.37	.37			
	30-80	85-99	1-10	0-3	1.65-1.85	141.15-141.15	0.02-0.04	0.0-0.0	0.0-0.5	.10	.15			
Satanta----------	0-9	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	9-14	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-2.0	.28	.28			
	14-26	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-2.0	.28	.28			
	26-31	26-52	28-50	10-20	1.45-1.65	4.23-14.11	0.17-0.19	0.0-2.9	0.5-2.0	.28	.28			
	31-55	52-88	10-50	8-20	1.40-1.60	4.23-14.11	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
	55-80	85-98	0-10	2-5	1.60-1.80	141.15-141.15	0.05-0.07	0.0-0.0	0.0-0.5	.15	.15			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
1370:														
Bayard----------	0-6	52-80	10-50	8-20	1.30-1.50	14.11-42.33	0.16-0.18	0.0-2.9	1.0-2.0	.20	.20	5	3	86
	6-10	52-80	10-50	8-20	1.30-1.50	14.11-42.33	0.12-0.16	0.0-2.9	1.0-2.0	.20	.20			
	10-16	52-80	10-50	8-20	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.5-1.0	.28	.28			
	16-60	52-80	10-50	8-20	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.5-1.0	.28	.28			
1371:														
Bayard----------	0-7	52-80	10-50	8-20	1.30-1.50	14.11-42.33	0.16-0.18	0.0-2.9	1.0-2.0	.20	.20	5	3	86
	7-13	52-80	10-50	8-20	1.30-1.50	14.11-42.33	0.12-0.16	0.0-2.9	1.0-2.0	.20	.20			
	13-22	52-80	10-50	8-20	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.5-1.0	.28	.28			
	22-60	52-80	10-50	8-20	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.5-1.0	.28	.28			
1780:														
Broadwater------	0-3	72-88	5-15	7-15	1.35-1.55	42.33-141.15	0.10-0.12	0.0-1.0	0.5-1.0	.17	.17	5	2	134
	3-6	88-99	1-10	0-3	1.65-1.85	141.15-141.15	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
	6-60	88-99	1-10	0-3	1.65-1.85	141.15-141.15	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
1797:														
Brownson--------	0-5	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	2	5	56
	5-13	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.18	3.0-5.9	0.5-1.0	.43	.43			
	13-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
Rosebud---------	0-6	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	6-17	20-52	28-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	17-23	26-52	28-50	10-27	1.45-1.65	4.23-14.11	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	23-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
Canyon----------	0-9	26-52	28-50	12-20	1.20-1.30	4.23-14.11	0.20-0.22	0.0-2.9	0.5-1.0	.32	.32	2	4L	86
	9-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
2055:														
Chappell--------	0-8	52-80	10-50	5-15	1.30-1.50	14.11-42.33	0.16-0.18	0.0-2.9	1.0-2.0	.20	.20	4	3	86
	8-20	52-80	10-50	5-15	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.5-1.0	.28	.28			
	20-25	52-80	10-50	5-15	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.5-1.0	.28	.28			
	25-60	88-99	1-10	0-5	1.65-1.85	141.15-141.15	0.02-0.04	0.0-2.9	0.0-0.5	.10	.10			
Bayard----------	0-8	52-80	10-50	8-20	1.30-1.50	14.11-42.33	0.16-0.18	0.0-2.9	1.0-2.0	.20	.20	5	3	86
	8-15	52-80	10-50	8-20	1.30-1.50	14.11-42.33	0.12-0.16	0.0-2.9	1.0-2.0	.20	.20			
	15-27	52-80	10-50	8-20	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.5-1.0	.28	.28			
	27-80	52-80	10-50	8-20	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.5-1.0	.28	.28			
Broadwater------	0-3	72-88	5-15	7-15	1.35-1.55	42.33-141.15	0.10-0.12	0.0-1.0	0.5-1.0	.17	.17	5	2	134
	3-6	88-99	1-10	0-3	1.65-1.85	141.15-141.15	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
	6-60	88-99	1-10	0-3	1.65-1.85	141.15-141.15	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
2665:														
Dwyer-----------	0-7	72-88	5-15	3-15	1.35-1.55	42.33-141.15	0.10-0.12	0.0-2.9	1.0-2.0	.17	.17	5	2	134
	7-21	72-88	5-15	3-15	1.55-1.75	42.33-141.15	0.09-0.11	0.0-2.9	0.5-1.5	.17	.17			
	21-80	85-98	0-5	1-7	1.60-1.80	42.33-141.15	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
2687:														
Eckley----------	0-3	52-80	10-52	10-20	1.30-1.50	14.11-42.33	0.13-0.15	0.0-1.0	1.0-3.0	.20	.28	2	5	56
	3-7	44-75	4-28	20-30	1.35-1.55	1.41-4.23	0.16-0.18	0.0-2.9	0.5-2.0	.15	.28			
	7-16	52-80	10-52	10-20	1.50-1.70	14.10-42.33	0.12-0.14	0.0-2.9	0.5-1.0	.15	.28			
	16-80	88-98	1-10	0-5	1.65-1.85	141.15-141.15	0.02-0.04	0.0-2.9	0.5-1.0	.10	.28			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
2687:														
Altvan----------	0-6	52-80	10-50	8-20	1.30-1.50	14.10-42.33	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20	4	3	86
	6-11	44-75	4-28	20-30	1.35-1.55	1.41-4.23	0.16-0.18	0.0-2.9	0.5-2.0	.15	.28			
	11-19	44-75	4-28	20-30	1.35-1.55	1.41-4.23	0.16-0.18	0.0-2.9	0.5-2.0	.15	.28			
	19-24	72-88	5-20	3-10	1.55-1.75	42.33-141.15	0.08-0.10	0.0-2.9	0.5-1.0	.17	.17			
	24-48	85-99	1-10	0-3	1.65-1.85	141.15-141.15	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
	48-80	88-98	1-10	0-5	1.65-1.85	141.15-141.15	0.02-0.04	0.0-2.9	0.5-1.0	.10	.28			
3050:														
Glenberg--------	0-6	50-80	5-50	8-18	1.30-1.50	14.11-42.33	0.16-0.18	0.0-2.9	0.5-2.0	.24	.24	5	3	86
	6-60	85-98	0-5	1-7	1.60-1.80	42.33-141.15	0.05-0.07	0.0-2.9	0.0-0.5	.15	.15			
4030:														
Jayem-----------	0-6	52-80	10-50	5-18	1.30-1.50	14.11-42.33	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	6-9	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20			
	9-22	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.15-0.17	0.0-2.9	0.5-1.0	.32	.32			
	22-50	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.1-0.5	.32	.32			
	50-60	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.1-0.5	.32	.32			
4031:														
Jayem-----------	0-6	52-80	10-50	5-18	1.30-1.50	14.11-42.33	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	6-9	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20			
	9-22	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.15-0.17	0.0-2.9	0.5-1.0	.32	.32			
	22-50	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.1-0.5	.32	.32			
	50-60	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.1-0.5	.32	.32			
4150:														
Keith-----------	0-9	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	9-25	2-10	50-70	27-35	1.25-1.45	1.41-4.23	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
	25-48	2-40	50-80	18-27	1.40-1.65	4.23-14.11	0.18-0.20	0.0-2.9	0.0-0.5	.43	.43			
	48-60	52-80	10-50	10-18	1.40-1.65	4.23-14.11	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
4151:														
Keith-----------	0-9	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	9-25	2-10	50-70	27-35	1.25-1.45	1.41-4.23	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
	25-48	2-40	50-80	18-27	1.40-1.65	4.23-14.11	0.18-0.20	0.0-2.9	0.0-0.5	.43	.43			
	48-60	52-80	10-50	10-18	1.40-1.65	4.23-14.11	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
4310:														
Kuma------------	0-7	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	7-14	2-20	50-70	27-35	1.25-1.45	1.41-4.23	0.18-0.20	3.0-5.9	0.5-1.0	.43	.43			
	14-24	26-52	28-50	18-27	1.45-1.65	4.23-14.11	0.17-0.19	0.0-2.9	1.0-2.0	.37	.37			
	24-32	26-52	28-50	18-27	1.45-1.65	4.23-14.11	0.17-0.19	0.0-2.9	1.0-2.0	.37	.37			
	32-42	26-52	28-50	18-27	1.45-1.65	4.23-14.11	0.17-0.19	0.0-2.9	1.0-2.0	.37	.37			
	42-56	26-52	28-50	18-27	1.45-1.65	4.23-14.11	0.17-0.19	0.0-2.9	1.0-2.0	.32	.32			
	56-60	52-80	10-50	10-18	1.40-1.65	4.23-14.11	0.16-0.18	0.0-1.0	0.0-0.5	.43	.43			
4472:														
Las Animas------	0-20	26-52	28-50	15-25	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-2.0	.28	.28	5	4L	86
	20-25	26-52	28-50	15-25	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-2.0	.28	.28			
	25-30	52-80	10-50	8-18	1.50-1.75	14.11-42.33	0.11-0.16	0.0-1.0	0.5-1.0	.24	.24			
	30-60	88-99	1-10	0-3	1.65-1.85	141.15-141.15	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
4662:														
Lodgepole-------	0-6	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	3	6	48
	6-18	2-12	40-60	40-50	1.20-1.40	0.07-0.42	0.13-0.17	6.0-8.9	1.0-3.0	.28	.28			
	18-23	2-12	40-60	40-50	1.20-1.40	0.07-0.42	0.11-0.16	6.0-8.9	1.0-3.0	.28	.28			
	23-29	2-20	40-70	35-40	1.25-1.45	1.41-4.23	0.18-0.20	6.0-8.9	1.0-2.0	.32	.32			
	29-43	26-52	28-50	10-27	1.45-1.65	4.23-14.11	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	43-80	52-88	10-50	10-20	1.30-1.40	4.23-14.10	0.16-0.17	0.0-1.0	0.5-1.0	.24	.24			

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
6420:														
Rosebud	0-6	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	6-11	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	11-15	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.18	3.0-5.9	0.5-1.0	.43	.43			
	15-19	44-75	4-28	20-30	1.35-1.55	1.41-4.23	0.16-0.18	0.0-2.9	0.5-1.0	.15	.28			
	19-30	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.10-0.12	0.0-2.9	0.5-1.0	.17	.17			
	30-80	---	---	---	---	10.00-100.00	---	---	---	---	---			
6430:														
Rosebud	0-6	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	6-12	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	12-22	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	22-25	26-52	28-50	10-27	1.45-1.65	4.23-14.11	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	25-31	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.10-0.12	0.0-2.9	0.5-1.0	.17	.17			
	31-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
Canyon	0-6	26-52	28-50	12-20	1.20-1.30	4.23-14.11	0.20-0.22	0.0-2.9	0.5-1.0	.32	.32	2	4L	86
	6-10	52-88	10-50	10-20	1.30-1.40	4.23-14.10	0.16-0.17	0.0-1.0	0.5-1.0	.24	.24			
	10-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
6440:														
Rosebud	0-6	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	6-17	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	17-23	26-52	28-50	10-27	1.45-1.65	4.23-14.11	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	23-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
6442:														
Rosebud	0-6	26-52	28-50	18-27	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	6-17	20-45	15-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	17-23	26-52	28-50	10-27	1.45-1.65	4.23-14.11	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	23-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
Blanche	0-5	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.10-0.12	0.0-2.9	1.0-2.0	.20	.20	4	3	86
	5-17	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.15-0.17	0.0-2.9	0.0-1.0	.28	.28			
	17-22	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.15-0.17	0.0-2.9	0.0-0.5	.28	.28			
	22-27	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.15-0.17	0.0-2.9	0.0-0.5	.28	.28			
	27-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
6446:														
Rosebud	0-5	52-80	10-80	5-12	1.30-1.70	14.11-42.33	0.16-0.18	0.0-2.9	0.5-1.0	.20	.20	4	3	86
	5-15	20-52	28-50	25-35	1.30-1.50	1.41-4.23	0.17-0.19	3.0-5.9	0.5-1.0	.37	.37			
	15-27	26-52	28-50	10-27	1.45-1.65	4.23-14.11	0.17-0.18	0.0-2.9	0.5-1.0	.24	.24			
	27-37	52-80	10-50	5-12	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.0-0.5	.10	.20			
	37-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
Tassel	0-4	52-80	10-50	5-12	1.30-1.70	14.11-42.33	0.16-0.18	0.0-2.9	0.5-1.0	.24	.24	2	3	86
	4-16	52-80	10-50	5-12	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.0-0.5	.10	.20			
	16-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
7152:														
Tassel	0-4	52-80	10-52	10-20	1.30-1.35	14.11-42.33	0.09-0.12	0.0-2.9	2.0-4.0	.17	.17	2	2	134
	4-8	50-80	10-50	5-12	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.0-0.5	.10	.20			
	8-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
Ashollow	0-3	50-80	5-50	5-18	1.20-1.40	4.23-14.10	0.17-0.19	0.0-1.0	1.0-2.0	.17	.17	5	2	134
	3-10	50-80	5-50	5-18	1.40-1.65	4.23-14.10	0.16-0.18	0.0-1.0	1.0-2.0	.37	.37			
	10-32	50-80	5-50	5-18	1.40-1.65	4.23-14.10	0.16-0.18	0.0-1.0	0.5-1.0	.43	.43			
	32-60	50-80	5-50	5-18	1.40-1.65	4.23-14.10	0.16-0.18	0.0-1.0	0.5-1.0	.43	.43			
Rock outcrop	0-60	---	---	0-0	---	---	0.00-0.00	---	---	---	---	--	8	0

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
7153:														
Tassel	0-6	52-80	10-50	5-12	1.30-1.70	14.11-42.33	0.16-0.18	0.0-2.9	0.5-1.0	.24	.24	2	3	86
	6-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
Blanche	0-5	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.10-0.12	0.0-2.9	1.0-2.0	.17	.17	4	3	86
	5-17	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.15-0.17	0.0-2.9	0.0-1.0	.28	.28			
	17-22	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.15-0.17	0.0-2.9	0.0-0.5	.28	.28			
	22-27	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.15-0.17	0.0-2.9	0.0-0.5	.28	.28			
	27-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
7154:														
Tassel	0-5	52-80	10-50	5-12	1.30-1.70	14.11-42.33	0.16-0.18	0.0-2.9	0.5-1.0	.24	.24	2	3	86
	5-11	52-80	10-50	5-12	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.0-0.5	.10	.20			
	11-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
Blanche	0-8	52-80	10-50	5-18	1.50-1.70	14.11-42.33	0.10-0.12	0.0-2.9	1.0-2.0	.17	.17	4	3	86
	8-12	50-80	10-50	5-18	1.50-1.70	14.11-42.33	0.15-0.17	0.0-2.9	0.0-1.0	.28	.28			
	12-19	50-80	10-50	5-18	1.50-1.70	14.11-42.33	0.15-0.17	0.0-2.9	0.0-0.5	.28	.28			
	19-28	50-80	10-50	5-18	1.50-1.70	14.11-42.33	0.15-0.17	0.0-2.9	0.0-0.5	.28	.28			
	28-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
7180:														
Dix	0-7	52-80	10-52	10-20	1.30-1.50	14.11-42.33	0.13-0.15	0.0-1.0	1.0-3.0	.20	.28	2	5	56
	7-10	52-80	10-52	10-20	1.50-1.70	14.10-42.33	0.12-0.14	0.0-2.9	0.5-1.0	.15	.28			
	10-80	85-99	1-10	0-5	1.65-1.85	141.15-141.15	0.02-0.04	0.0-2.9	0.5-1.0	.10	.28			
Altvan	0-6	52-80	10-50	8-20	1.30-1.50	14.10-42.33	0.16-0.18	0.0-2.9	1.0-3.0	.20	.20	4	3	86
	6-11	44-75	4-28	20-30	1.35-1.55	1.41-4.23	0.16-0.18	0.0-2.9	0.5-2.0	.15	.28			
	11-19	44-75	4-28	20-30	1.35-1.55	1.41-4.23	0.16-0.18	0.0-2.9	0.5-2.0	.15	.28			
	19-24	72-88	5-20	3-10	1.55-1.75	42.33-141.15	0.08-0.10	0.0-2.9	0.5-1.0	.17	.17			
	24-48	85-99	1-10	0-3	1.65-1.85	141.15-141.15	0.02-0.04	0.0-0.0	0.0-0.5	.05	.10			
	48-80	88-98	1-10	0-5	1.65-1.85	141.15-141.15	0.02-0.04	0.0-2.9	0.5-1.0	.10	.28			
Tassel	0-4	52-80	10-50	5-12	1.30-1.70	14.11-42.33	0.16-0.18	0.0-2.9	0.5-1.0	.24	.24	2	3	86
	4-8	52-80	10-50	5-12	1.50-1.70	14.11-42.33	0.12-0.16	0.0-2.9	0.0-0.5	.10	.20			
	8-60	---	---	---	---	10.00-100.00	---	---	---	---	---			
7324:														
Tripp	0-9	26-52	28-50	7-18	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	9-24	20-52	25-50	7-18	1.30-1.50	4.23-14.11	0.15-0.19	0.0-2.9	0.5-1.0	.37	.37			
	24-35	25-80	25-50	7-18	1.40-1.65	4.23-14.11	0.16-0.20	0.0-2.9	0.0-0.5	.43	.43			
	35-60	25-80	25-50	5-18	1.40-1.65	4.23-14.11	0.16-0.20	0.0-2.9	0.0-0.5	.43	.43			
7325:														
Tripp	0-9	26-52	28-50	7-18	1.25-1.45	4.23-14.11	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	9-24	20-52	25-50	7-18	1.30-1.50	4.23-14.11	0.15-0.19	0.0-2.9	0.5-1.0	.37	.37			
	24-35	25-80	25-50	7-18	1.40-1.65	4.23-14.11	0.16-0.20	0.0-2.9	0.0-0.5	.43	.43			
	35-60	25-80	25-50	5-18	1.40-1.65	4.23-14.11	0.16-0.20	0.0-2.9	0.0-0.5	.43	.43			
9900. Arents, earthen dam														
9970. Borrow pits														
9975. Sanitary landfill														

Table 17.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	Pct	Pct	Pct	g/cc	um/sec	In/in	Pct	Pct					
9985:														
Pits	---	---	---	---	---	---	---	---	---	---	---	2	8	0
9998.														
Water														

Table 18.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
1080:							
Albinas	0-7	10-40	6.6-7.8	0	0	0	0
	7-22	20-30	6.6-7.8	0	0	0	0
	22-24	20-30	6.6-7.8	0	0	0	0
	24-34	5.0-25	6.6-7.8	0	0	0	0
	34-45	5.0-20	7.4-8.4	1-10	0	0	0
	45-80	0.0-5.0	6.6-7.8	0-5	0	0	0
Cheyenne	0-6	12-20	6.6-7.8	0	0	0	0
	6-10	12-20	6.6-7.8	0	0	0	0
	10-24	13-21	6.6-8.4	0-10	0	0	0
	24-32	1.0-8.0	7.4-8.4	1-10	0	0	0
	32-60	0.0-2.0	7.4-8.4	1-10	0	0	0
1132:							
Alliance	0-6	10-40	6.6-7.8	0	0	0	0
	6-17	20-30	6.6-7.8	0	0	0	0
	17-24	5.0-20	7.4-8.4	1-10	0	0	0
	24-34	5.0-20	7.4-8.4	1-10	0	0	0
	34-47	5.0-15	7.4-8.4	1-10	0	0	0
	47-54	0.0-5.0	6.6-7.8	0	0	0	0
	54-80	---	---	---	---	---	---
1180:							
Altvan	0-6	10-40	6.6-7.8	0	0	0	0
	6-8	10-40	6.6-7.8	0	0	0	0
	8-12	10-40	6.6-7.8	0	0	0	0
	12-23	20-30	6.6-7.8	0	0	0	0
	23-26	10-30	6.6-8.4	1-10	0	0	0
	26-35	10-30	6.6-8.4	1-10	0	0	0
	35-60	0.0-5.0	6.6-7.8	0	0	0	0
1185:							
Altvan	0-6	5.0-20	6.6-7.8	0	0	0	0
	6-11	10-20	6.6-8.4	0	0	0	0
	11-22	10-20	6.6-8.4	0	0	0	0
	22-26	10-30	6.6-8.4	0-10	0	0	0
	22-29	0.0-5.0	7.9-8.4	1-10	0	0	0
	29-80	0.0-0.0	7.4-8.4	0-5	0	0	0
1196:							
Altvan	0-7	5.0-20	6.6-7.8	0	0	0	0
	7-12	10-30	6.1-7.8	0	0	0	0
	12-17	10-20	6.6-8.4	0	0	0	0
	17-25	5.0-15	7.4-8.4	1-10	0	0	0
	25-31	0.0-5.0	6.6-7.8	0-5	0	0	0
	31-80	0.0-5.0	6.6-7.8	0-5	0	0	0
Eckley	0-5	10-30	6.6-7.3	0	0	0	0
	7-9	5.0-25	6.6-7.8	0	0	0	0
	9-15	0.0-15	6.6-7.8	0	0	0	0
	15-80	0.0-5.0	6.6-7.8	0-5	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
1199:							
Altvan	0-5	10-40	6.1-7.8	0	0	0	0
	5-10	10-20	6.6-8.4	0	0	0	0
	10-17	10-20	6.6-8.4	0	0	0	0
	17-24	10-20	7.4-8.4	1-10	0	0	0
	24-30	10-20	7.4-8.4	1-10	0	0	0
	30-80	0.0-0.0	7.4-8.4	1-5	0	0	0
Satanta	0-9	10-40	6.6-7.8	0	0	0	0
	9-14	10-40	6.6-7.8	0	0	0	0
	14-26	20-30	6.6-7.8	0	0	0	0
	26-31	10-30	6.6-8.4	1-10	0	0	0
	31-55	5.0-15	7.4-8.4	1-10	0	0	0
	55-80	0.0-5.0	6.6-7.8	1-10	0	0	0
1200:							
Altvan	0-7	5.0-20	6.6-7.8	0	0	0	0
	7-12	10-30	6.1-7.8	0	0	0	0
	12-17	10-20	6.6-8.4	0	0	0	0
	17-25	5.0-15	7.4-8.4	1-10	0	0	0
	25-31	0.0-5.0	6.6-7.8	0-5	0	0	0
	31-80	0.0-5.0	6.6-7.8	0-5	0	0	0
Eckley	0-5	5.0-20	6.6-7.3	0	0	0	0
	5-8	5.0-25	6.6-7.8	0	0	0	0
	8-11	0.0-15	6.6-7.8	0	0	0	0
	11-80	0.0-5.0	6.6-7.8	0-5	0	0	0
Tassel	0-4	5.0-15	7.4-8.4	2-10	0	0	0
	4-8	0.0-5.0	7.4-8.4	2-15	0	0	0
	18-60	---	---	---	---	---	---
1202:							
Altvan	0-5	10-40	6.1-7.8	0	0	0	0
	5-10	10-20	6.6-8.4	0	0	0	0
	10-17	10-20	6.6-8.4	0	0	0	0
	17-24	10-20	7.4-8.4	1-10	0	0	0
	24-30	10-20	7.4-8.4	1-10	0	0	0
	30-80	0.0-0.0	7.4-8.4	1-5	0	0	0
Satanta	0-9	10-40	6.6-7.8	0	0	0	0
	9-14	10-40	6.6-7.8	0	0	0	0
	14-26	20-30	6.6-7.8	0	0	0	0
	26-31	10-30	6.6-8.4	1-10	0	0	0
	31-55	5.0-15	7.4-8.4	1-10	0	0	0
	55-80	0.0-5.0	6.6-7.8	1-10	0	0	0
1370:							
Bayard	0-6	5.0-25	6.1-7.3	0	0	0	0
	6-10	5.0-25	6.1-7.3	0	0	0	0
	10-16	5.0-15	6.6-7.3	0	0	0	0
	16-60	0.0-15	6.6-7.8	0-5	0	0	0
1371:							
Bayard	0-7	5.0-25	6.1-7.3	0	0	0	0
	7-13	5.0-25	6.1-7.3	0	0	0	0
	13-22	5.0-15	6.6-7.3	0	0	0	0
	22-60	0.0-15	6.6-7.8	0-5	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
1780:							
Broadwater	0-3	0.0-10	6.6-7.8	0-5	0	0	0
	3-6	0.0-0.0	6.6-7.8	0-5	0	0	0
	6-60	0.0-0.0	6.6-7.8	0-5	0	0	0
1797:							
Brownson	0-5	10-40	6.6-7.8	0	0	0	0
	5-13	20-30	6.6-7.8	0	0	0	0
	13-60	---	---	---	---	---	---
Rosebud	0-6	10-40	6.6-7.8	0	0	0	0
	6-17	20-30	6.6-7.8	0	0	0	0
	17-23	5.0-20	7.4-8.4	1-10	0	0	0
	23-60	---	---	---	---	---	---
Canyon	0-9	5.0-20	7.4-8.4	1-10	0	0.0-2.0	0
	9-60	---	---	---	---	---	---
2055:							
Chappell	0-8	5.0-25	6.1-7.3	0	0	0	0
	8-20	5.0-15	6.6-7.3	0	0	0	0
	20-25	0.0-15	6.6-7.8	0-5	0	0	0
	25-60	0.0-0.0	6.6-7.8	0-5	0	0	0
Bayard	0-8	5.0-25	6.1-7.3	0	0	0	0
	8-15	5.0-25	6.1-7.3	0	0	0	0
	15-27	5.0-15	6.6-7.3	0	0	0	0
	27-80	0.0-15	6.6-7.8	0-5	0	0	0
Broadwater	0-3	0.0-10	6.6-7.8	0-5	0	0	0
	3-6	0.0-0.0	6.6-7.8	0-5	0	0	0
	6-60	0.0-0.0	6.6-7.8	0-5	0	0	0
2665:							
Dwyer	0-7	0.0-20	6.6-7.3	0	0	0	0
	7-21	0.0-10	6.6-7.3	0	0	0	0
	21-80	0.0-5.0	6.6-7.3	0	0	0	0
2687:							
Eckley	0-3	10-30	6.6-7.3	0	0	0	0
	3-7	5.0-25	6.6-7.8	0	0	0	0
	7-16	0.0-15	6.6-7.8	0	0	0	0
	16-80	0.0-5.0	6.6-7.8	0-5	0	0	0
Altvan	0-6	5.0-20	6.6-7.8	0	0	0	0
	6-11	5.0-25	6.6-7.8	0	0	0	0
	11-19	5.0-25	6.6-7.8	0	0	0	0
	19-24	0.0-5.0	6.6-7.8	0-5	0	0	0
	24-48	0.0-0.0	7.4-8.4	0-5	0	0	0
	48-80	0.0-5.0	6.6-7.8	0-5	0	0	0
3050:							
Glenberg	0-6	5.0-20	7.4-8.4	0-5	0	0	0
	6-60	0.0-5.0	6.6-7.3	0	0	0	0
4030:							
Jayem	0-6	5.0-25	6.6-7.8	0	0	0	0
	6-9	5.0-15	6.6-7.8	0	0	0	0
	9-22	5.0-15	6.6-7.8	0	0	0	0
	22-50	5.0-15	6.6-7.8	0-2	0	0	0
	50-60	5.0-15	6.6-7.8	0-2	0	0	0

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
4031:							
Jayem	0-6	5.0-25	6.6-7.8	0	0	0	0
	6-9	5.0-15	6.6-7.8	0	0	0	0
	9-22	5.0-15	6.6-7.8	0	0	0	0
	22-50	5.0-15	6.6-7.8	0-2	0	0	0
	50-60	5.0-15	6.6-7.8	0-2	0	0	0
4150:							
Keith	0-9	10-40	6.6-7.3	0	0	0	0
	9-25	20-30	6.6-7.8	0	0	0	0
	25-48	10-20	7.4-8.4	1-10	0	0	0
	48-60	0.0-15	7.4-8.4	1-10	0	0	0
4151:							
Keith	0-9	10-40	6.6-7.3	0	0	0	0
	9-25	20-30	6.6-7.8	0	0	0	0
	25-48	10-20	7.4-8.4	1-10	0	0	0
	48-60	0.0-15	7.4-8.4	1-10	0	0	0
4310:							
Kuma	0-7	10-40	6.6-7.8	0	0	0	0
	7-14	20-30	6.6-7.8	0	0	0	0
	14-24	10-30	6.6-7.8	0	0	0	0
	24-32	10-30	6.6-7.8	0	0	0	0
	32-42	5.0-15	6.6-8.4	1-10	0	0	0
	42-56	5.0-15	7.2-8.4	1-10	0	0	0
	56-60	0.0-15	7.4-8.4	1-10	0	0	0
4472:							
Las Animas	0-20	10-40	7.4-8.4	1-10	0	0.0-4.0	0
	20-25	10-40	7.4-8.4	1-10	0	0.0-4.0	0
	25-30	5.0-15	7.4-8.4	1-10	0	0.0-4.0	0
	30-60	0.0-0.0	6.6-7.8	0-5	0	0	0
4662:							
Lodgepole	0-6	10-40	6.6-7.8	0	0	0	0
	6-18	30-105	6.1-6.5	0	0	0	0
	18-23	30-105	6.1-6.5	0	0	0	0
	23-29	25-85	6.6-7.3	0	0	0	0
	29-43	5.0-20	7.4-8.4	1-10	0	0	0
	43-80	5.0-15	7.4-8.4	1-10	0	0	0
6420:							
Rosebud	0-6	10-40	6.6-7.8	0	0	0	0
	6-11	20-30	6.6-7.8	0	0	0	0
	11-15	20-30	6.6-7.8	1-10	0	0	0
	15-19	5.0-25	6.6-7.8	0	0	0	0
	19-30	0.0-20	7.4-7.8	0	0	0	0
	30-80	---	---	---	---	---	---
6430:							
Rosebud	0-6	10-40	6.6-7.8	0	0	0	0
	6-12	20-30	6.6-7.8	0	0	0	0
	12-22	20-30	6.6-7.8	0	0	0	0
	22-25	5.0-20	7.4-8.4	1-10	0	0	0
	25-31	0.0-20	7.4-7.8	0	0	0	0
	31-60	---	---	---	---	---	---
Canyon	0-6	5.0-20	7.4-8.4	1-10	0	0.0-2.0	0
	6-10	5.0-15	7.4-8.4	1-10	0	0	0
	10-60	---	---	---	---	---	---

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
6440:							
Rosebud	0-6	10-40	6.6-7.8	0	0	0	0
	6-17	20-30	6.6-7.8	0	0	0	0
	17-23	5.0-20	7.4-8.4	1-10	0	0	0
	23-60	---	---	---	---	---	---
Hemingford	0-6	10-40	6.6-7.8	0	0	0	0
	6-12	10-40	6.6-7.8	0	0	0	0
	12-29	20-30	6.6-7.8	0	0	0	0
	29-52	5.0-20	7.4-8.4	1-10	0	0	0
	52-60	---	---	---	---	---	---
6442:							
Rosebud	0-6	10-40	6.6-7.8	0	0	0	0
	6-17	20-30	6.6-7.8	0	0	0	0
	17-23	5.0-20	7.4-8.4	1-10	0	0	0
	23-60	---	---	---	---	---	---
Blanche	0-5	0.0-20	7.4-7.8	0	0	0	0
	5-17	0.0-15	7.4-7.8	1-10	0	0	0
	17-22	0.0-5.0	7.9-8.4	1-10	0	0	0
	22-27	0.0-5.0	7.9-8.4	1-10	0	0	0
	27-60	---	---	---	---	---	---
6446:							
Rosebud	0-5	5.0-15	6.6-7.8	0	0	0	0
	5-15	20-30	6.6-7.8	0	0	0	0
	15-27	5.0-20	7.4-8.4	1-10	0	0	0
	27-37	0.0-5.0	7.4-8.4	2-15	0	0	0
	37-60	---	---	---	---	---	---
Tassel	0-4	5.0-15	7.4-8.4	2-10	0	0	0
	4-16	0.0-5.0	7.4-8.4	2-15	0	0	0
	16-60	---	---	---	---	---	---
7152:							
Tassel	0-4	5.0-20	6.6-7.3	0	0	0	0
	4-8	0.0-5.0	7.4-8.4	2-15	0	0	0
	8-60	---	---	---	---	---	---
Ashollow	0-3	5.0-20	7.4-8.4	1-5	0	0	0
	3-10	0.0-10	7.4-8.4	1-5	0	0	0
	10-32	0.0-10	7.4-8.4	1-10	0	0	0
	32-60	0.0-10	7.4-8.4	1-10	0	0	0
Rock outcrop.							
7153:							
Tassel	0-6	5.0-15	7.4-8.4	2-10	0	0	0
	6-60	---	---	---	---	---	---
Blanche	0-5	0.0-20	7.4-7.8	0	0	0	0
	5-17	0.0-15	7.4-7.8	1-10	0	0	0
	17-22	0.0-5.0	7.9-8.4	1-10	0	0	0
	22-27	0.0-5.0	7.9-8.4	1-10	0	0	0
	27-60	---	---	---	---	---	---

Table 18.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Soil reaction	Calcium carbonate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100 g	pH	Pct	Pct	mmhos/cm	
7154:							
Tassel	0-5	5.0-15	7.4-8.4	2-10	0	0	0
	5-11	0.0-5.0	7.4-8.4	2-15	0	0	0
	11-60	---	---	---	---	---	---
Blanche	0-8	0.0-20	7.4-7.8	0	0	0	0
	8-12	0.0-15	7.4-7.8	1-10	0	0	0
	12-19	0.0-5.0	7.9-8.4	1-10	0	0	0
	19-28	0.0-5.0	7.9-8.4	1-10	0	0	0
	28-60	---	---	---	---	---	---
7180:							
Dix	0-7	10-30	6.6-7.3	0	0	0	0
	7-10	0.0-15	6.6-7.8	0	0	0	0
	10-80	0.0-5.0	6.6-7.8	0-5	0	0	0
Altvan	0-6	5.0-20	6.6-7.8	0	0	0	0
	6-11	5.0-25	6.6-7.8	0	0	0	0
	11-19	5.0-25	6.6-7.8	0	0	0	0
	19-24	0.0-5.0	6.6-7.8	0-5	0	0	0
	24-48	0.0-0.0	7.4-8.4	0-5	0	0	0
	48-80	0.0-5.0	6.6-7.8	0-5	0	0	0
Tassel	0-4	5.0-15	7.4-8.4	2-10	0	0	0
	4-8	0.0-5.0	7.4-8.4	2-15	0	0	0
	18-60	---	---	---	---	---	---
7324:							
Tripp	0-9	10-40	6.6-7.8	0	0	0	0
	9-24	13-21	6.6-8.4	0-10	0	0	0
	24-35	9.0-14	7.4-8.4	1-10	0	0.0-2.0	0
	35-60	9.0-14	7.4-8.4	1-10	0	0.0-2.0	0
7325:							
Tripp	0-9	10-40	6.6-7.8	0	0	0	0
	9-24	13-21	6.6-8.4	0-10	0	0	0
	24-35	9.0-14	7.4-8.4	1-10	0	0.0-2.0	0
	35-60	9.0-14	7.4-8.4	1-10	0	0.0-2.0	0
9900.							
Arents, earthen dam							
9970.							
Borrow pits							
9975.							
Sanitary landfill							
9985.							
Pits							
9998.							
Water							

Table 19.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
1080:						
Albinas	---	---	---	Moderate	High	Low
Cheyenne	---	---	---	Low	Low	Low
1132:						
Alliance	Bedrock (paralithic)	40-60	Weakly cemented	Moderate	Moderate	Low
1180:						
Altvan	---	---	---	Moderate	Low	Low
1185:						
Altvan	---	---	---	Moderate	Low	Low
1196:						
Altvan	---	---	---	Moderate	Low	Low
Eckley	---	---	---	Low	Moderate	Low
1199:						
Altvan	---	---	---	Moderate	Low	Low
Satanta	---	---	---	Moderate	Low	Low
1200:						
Altvan	---	---	---	Moderate	Low	Low
Eckley	---	---	---	Low	Moderate	Low
Tassel	Bedrock (paralithic)	6-20	Moderately cemented	Low	High	Low
1202:						
Altvan	---	---	---	Moderate	Moderate	Low
Satanta	---	---	---	Moderate	Low	Low
1370:						
Bayard	---	---	---	Moderate	Low	Low
1371:						
Bayard	---	---	---	Moderate	Low	Low
1780:						
Broadwater	---	---	---	Low	Low	Low
1797:						
Brownson	Bedrock (paralithic)	6-20	Moderately cemented	Moderate	High	Low
Rosebud	Bedrock (paralithic)	20-40	Weakly cemented	Moderate	High	Low
Canyon	Bedrock (paralithic)	6-20	Weakly cemented	Low	High	Low

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
2055:						
Chappell	---	---	---	Low	Low	Low
Bayard	---	---	---	Moderate	Low	Low
Broadwater	---	---	---	Low	Low	Low
2665:						
Dwyer	---	---	---	Low	High	Low
2687:						
Eckley	---	---	---	Low	Moderate	Low
Altvan	---	---	---	Moderate	Low	Low
3050:						
Glenberg	---	---	---	Moderate	Low	Low
4030:						
Jayem	---	---	---	Low	Moderate	Low
4031:						
Jayem	---	---	---	Low	Moderate	Low
4150:						
Keith	---	---	---	Moderate	Moderate	Low
4151:						
Keith	---	---	---	Moderate	Moderate	Low
4310:						
Kuma	---	---	---	Moderate	High	Moderate
4472:						
Las Animas	---	---	---	High	High	Moderate
4662:						
Lodgepole	---	---	---	High	High	Low
6420:						
Rosebud	Bedrock (paralithic)	20-40	Weakly cemented	Moderate	High	Low
6430:						
Rosebud	Bedrock (paralithic)	20-40	Weakly cemented	Moderate	High	Low
Canyon	Bedrock (paralithic)	6-20	Weakly cemented	Low	High	Low
6440:						
Rosebud	Bedrock (paralithic)	20-40	Weakly cemented	Moderate	High	Low
Hemingford	Bedrock (paralithic)	40-60	Weakly cemented	Moderate	High	Low
6442:						
Rosebud	Bedrock (paralithic)	20-40	Weakly cemented	Moderate	High	Low
Blanche	Bedrock (paralithic)	20-40	Weakly cemented	Low	Low	Low

Table 19.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Hardness		Uncoated steel	Concrete
		In				
6446:						
Rosebud	Bedrock (paralithic)	20-40	Weakly cemented	Moderate	High	Low
Tassel	Bedrock (paralithic)	6-20	Moderately cemented	Low	High	Low
7152:						
Tassel	Bedrock (paralithic)	6-20	Moderately cemented	Low	High	Low
Ashollow	---	---	---	Low	Low	Low
Rock outcrop	Bedrock (paralithic)	0-0	---	None	---	---
7153:						
Tassel	Bedrock (paralithic)	6-20	Moderately cemented	Low	High	Low
Blanche	Bedrock (paralithic)	20-40	Weakly cemented	Low	Low	Low
7154:						
Tassel	Bedrock (paralithic)	6-20	Moderately cemented	Low	High	Low
Blanche	Bedrock (paralithic)	20-40	Weakly cemented	Low	Low	Low
7180:						
Dix	---	---	---	Low	Low	Low
Altvan	---	---	---	Moderate	Low	Low
Tassel	Bedrock (paralithic)	6-20	Moderately cemented	Low	High	Low
7324:						
Tripp	---	---	---	Moderate	Low	Low
7325:						
Tripp	---	---	---	Moderate	Low	Low
9900.						
Arents, earthen dam	---					
9970.						
Borrow pits	---					
9975.						
Sanitary landfill	---					
9985:						
Pits	---		---	Low	Low	Low
9998.						
Water						

Table 20.--Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
1080:									
Albinas	B								
		April	---	---	---	---	None	Brief	Rare
		May	---	---	---	---	None	Brief	Rare
		June	---	---	---	---	None	Brief	Rare
		July	---	---	---	---	None	Brief	Rare
		August	---	---	---	---	None	Brief	Rare
		September	---	---	---	---	None	Brief	Rare
Cheyenne	B								
		Jan-Dec	---	---	---	---	None	---	None
1132:									
Alliance	B								
		Jan-Dec	---	---	---	---	None	---	None
1180:									
Altvan	B								
		Jan-Dec	---	---	---	---	None	---	None
1185:									
Altvan	B								
		Jan-Dec	---	---	---	---	None	---	None
1196:									
Altvan	B								
		Jan-Dec	---	---	---	---	None	---	None
Eckley	B								
		Jan-Dec	---	---	---	---	None	---	None
1199:									
Altvan	B								
		Jan-Dec	---	---	---	---	None	---	None
Satanta	B								
		Jan-Dec	---	---	---	---	None	---	None
1200:									
Altvan	B								
		Jan-Dec	---	---	---	---	None	---	None
Eckley	B								
		Jan-Dec	---	---	---	---	None	---	None
Tassel	D								
		Jan-Dec	---	---	---	---	None	---	None
1202:									
Altvan	B								
		Jan-Dec	---	---	---	---	None	---	None
Satanta	B								
		Jan-Dec	---	---	---	---	None	---	None
1370:									
Bayard	B								
		Jan-Dec	---	---	---	---	None	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
1371:									
Bayard	B								
		Jan-Dec	---	---	---	---	None	---	None
1780:									
Broadwater	A								
		April	---	---	---	---	None	Very brief	Occasional
		May	---	---	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
		September	---	---	---	---	None	Very brief	Occasional
1797:									
Brownson	B								
		Jan-Dec	---	---	---	---	None	---	None
Rosebud	B								
		Jan-Dec	---	---	---	---	None	---	None
Canyon	D								
		Jan-Dec	---	---	---	---	None	---	None
2055:									
Chappell	A								
		Jan-Dec	---	---	---	---	None	---	None
Bayard	B								
		Jan-Dec	---	---	---	---	None	---	None
Broadwater	A								
		January	---	---	---	---	None	Very brief	Occasional
		February	---	---	---	---	None	Very brief	Occasional
		March	---	---	---	---	None	Very brief	Occasional
		April	---	---	---	---	None	Very brief	Occasional
		May	---	---	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
		September	---	---	---	---	None	Very brief	Occasional
		October	---	---	---	---	None	Very brief	Occasional
		November	---	---	---	---	None	Very brief	Occasional
		December	---	---	---	---	None	Very brief	Occasional
2665:									
Dwyer	A								
		Jan-Dec	---	---	---	---	None	---	None
2687:									
Eckley	B								
		Jan-Dec	---	---	---	---	None	---	None
Altvan	B								
		Jan-Dec	---	---	---	---	None	---	None
3050:									
Glenberg	B								
		March	---	---	---	---	None	Brief	Rare
		April	---	---	---	---	None	Brief	Rare
		May	---	---	---	---	None	Brief	Rare
		June	---	---	---	---	None	Brief	Rare
		July	---	---	---	---	None	Brief	Rare
		August	---	---	---	---	None	Brief	Rare

Table 20.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
4030:									
Jayem	B								
		Jan-Dec	---	---	---	---	None	---	None
4031:									
Jayem	B								
		Jan-Dec	---	---	---	---	None	---	None
4150:									
Keith	B								
		Jan-Dec	---	---	---	---	None	---	None
4151:									
Keith	B								
		Jan-Dec	---	---	---	---	None	---	None
4310:									
Kuma	B								
		Jan-Dec	---	---	---	---	None	---	None
4472:									
Las Animas	D								
		January	0.0-1.5	>6.0	---	---	None	---	None
		February	0.0-1.5	>6.0	---	---	None	---	None
		March	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		April	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		May	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		June	0.0-1.5	>6.0	---	---	None	Brief	Occasional
		July	---	---	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		November	0.0-1.5	>6.0	---	---	None	---	None
		December	0.0-1.5	>6.0	---	---	None	---	None
4662:									
Lodgepole	D								
		January	0.0	0.4-2.0	0.0-0.5	Brief	Occasional	---	None
		February	0.0	0.4-2.0	0.0-0.5	Brief	Occasional	---	None
		March	0.0	0.4-2.0	0.0-0.5	Brief	Occasional	---	None
		April	0.0	0.4-2.0	0.0-0.5	Brief	Occasional	---	None
		May	0.0	0.4-2.0	0.0-0.5	Brief	Occasional	---	None
		June	0.0	0.4-2.0	0.0-0.5	Brief	Occasional	---	None
		July	0.0	0.4-2.0	0.0-0.5	Brief	Occasional	---	None
		August	0.0	0.4-2.0	0.0-0.5	Brief	Occasional	---	None
		September	0.0	0.4-2.0	0.0-0.5	Brief	Occasional	---	None
		October	0.0	0.4-2.0	0.0-0.5	Brief	Occasional	---	None
		November	0.0	0.4-2.0	0.0-0.5	Brief	Occasional	---	None
		December	0.0	0.4-2.0	0.0-0.5	Brief	Occasional	---	None
6420:									
Rosebud	B								
		Jan-Dec	---	---	---	---	None	---	None
6430:									
Rosebud	B								
		Jan-Dec	---	---	---	---	None	---	None
Canyon	D								
		Jan-Dec	---	---	---	---	None	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
6440:									
Rosebud	B								
		Jan-Dec	---	---	---	---	None	---	None
Hemingford	B								
		Jan-Dec	---	---	---	---	None	---	None
6442:									
Rosebud	B								
		Jan-Dec	---	---	---	---	None	---	None
Blanche	B								
		Jan-Dec	---	---	---	---	None	---	None
6446:									
Rosebud	B								
		Jan-Dec	---	---	---	---	None	---	None
Tassel	D								
		Jan-Dec	---	---	---	---	None	---	None
7152:									
Tassel	D								
		Jan-Dec	---	---	---	---	None	---	None
Ashollow	B								
		Jan-Dec	---	---	---	---	None	---	None
Rock outcrop	D								
		Jan-Dec	---	---	---	---	None	---	None
7153:									
Tassel	D								
		Jan-Dec	---	---	---	---	None	---	None
Blanche	B								
		Jan-Dec	---	---	---	---	None	---	None
7154:									
Tassel	D								
		Jan-Dec	---	---	---	---	None	---	None
Blanche	B								
		Jan-Dec	---	---	---	---	None	---	None
7180:									
Dix	A								
		Jan-Dec	---	---	---	---	None	---	None
Altvan	B								
		Jan-Dec	---	---	---	---	None	---	None
Tassel	D								
		Jan-Dec	---	---	---	---	None	---	None
7324:									
Tripp	B								
		Jan-Dec	---	---	---	---	None	---	None
7325:									
Tripp	B								
		Jan-Dec	---	---	---	---	None	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
9900. Arents, earthen dam									
9970. Borrow pits									
9975. Sanitary landfill									
9985: Pits	A	Jan-Dec	---	---	---	---	None	---	None
9998. Water									

Table 21.--Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series.)

Soil name	Family or higher taxonomic class
Albinas	Fine-loamy, mixed, superactive, mesic Pachic Argiustolls
Alliance	Fine-silty, mixed, superactive, mesic Aridic Argiustolls
Altvan	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Aridic Argiustolls
Ashollow	Coarse-loamy, mixed, calcareous, superactive, mesic Aridic Ustorthents
Bayard	Coarse-loamy, mixed, superactive, mesic Torriorthentic Haplustolls
Blanche	Coarse-loamy, mixed, superactive, mesic Aridic Haplustolls
Broadwater	Sandy, mixed, mesic Aridic Ustifluvents
Brownson	Clayey, mixed, superactive, mesic, shallow Aridic Argiustolls
Busher	Coarse-loamy, mixed, superactive, mesic Aridic Haplustolls
Canyon	Loamy, mixed, calcareous, superactive, mesic, shallow Ustic Torriorthents
Chappell	Coarse-loamy, mixed, superactive, mesic Aridic Haplustolls
Cheyenne	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Aridic Haplustolls
Dankworth	Mixed, mesic Aridic Ustipsamments
Dix	Sandy-skeletal, mixed, mesic Torriorthentic Haplustolls
Duroc	Fine-silty, mixed, superactive, mesic Pachic Haplustolls
Dwyer	Mixed, mesic Ustic Torripsamments
*Eckley	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Aridic Argiustolls
Glenberg	Coarse-loamy, mixed, calcareous, superactive, mesic Ustic Torrifluvents
Hemingford	Fine-loamy, mixed, superactive, mesic Aridic Argiustolls
Jayem	Coarse-loamy, mixed, superactive, mesic Aridic Haplustolls
Keith	Fine-silty, mixed, superactive, mesic Aridic Argiustolls
Kuma	Fine-silty, mixed, superactive, mesic Pachic Argiustolls
Las Animas	Coarse-loamy, mixed, calcareous, superactive, mesic Typic Fluvaquents
Lodgepole	Fine, smectitic, mesic Vertic Argiaquolls
Paoli	Coarse-loamy, mixed, superactive, mesic Pachic Haplustolls
Rosebud	Fine-loamy, mixed, superactive, mesic Aridic Argiustolls
Satanta	Fine-loamy, mixed, superactive, mesic Aridic Argiustolls
Sidney	Coarse-loamy, mixed, superactive, mesic Aridic Calciustolls
Tassel	Loamy, mixed, calcareous, superactive, mesic, shallow Ustic Torriorthents
Treon	Loamy, mixed, superactive, mesic, shallow Torriorthentic Haplustolls
Tripp	Coarse-silty, mixed, superactive, mesic Aridic Haplustolls
Ulysses	Fine-silty, mixed, superactive, mesic Aridic Haplustolls

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