Department of Agriculture

Soil Conservation Service

In cooperation with Montana Agricultural Experiment Station and United States Department of the Interior, Bureau of Land Management and United States Fish and Wildlife Service

Soil Survey of Petroleum County, Montana

How To Use This Soil Survey

General Soil Map

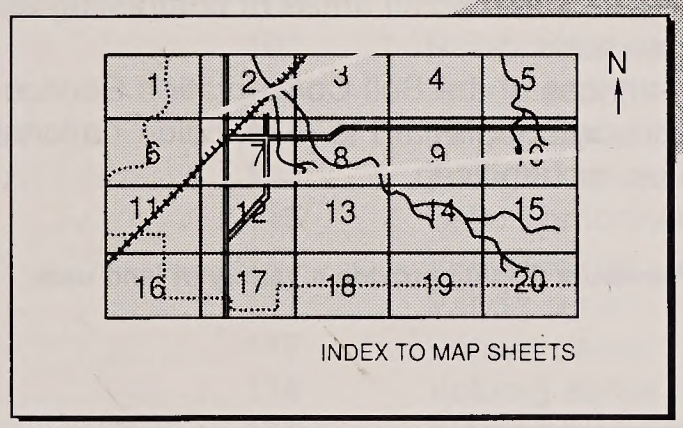
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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

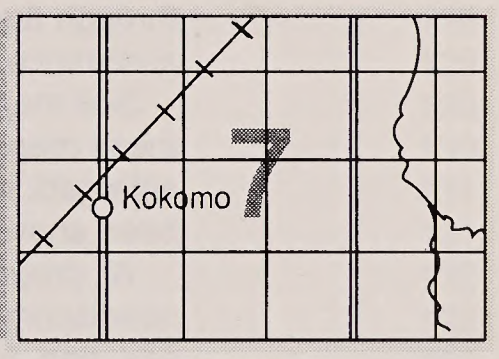
Detailed Soil Maps

The detailed soil maps follow the general soil map. These 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**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



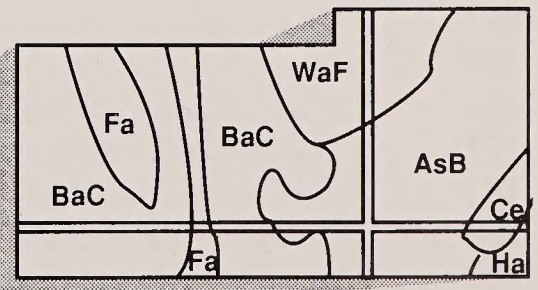
INDEX TO MAP SHEETS



MAP SHEET

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

MAP SHEET



AREA OF INTEREST

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.

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

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1987. Soil names and descriptions were approved in 1988. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1987. This survey was made cooperatively by the Soil Conservation Service, the Montana Agricultural Experiment Station, and the United States Department of the Interior, Bureau of Land Management and United States Fish and Wildlife Service. It is part of the technical assistance furnished to the Petroleum County Conservation District. The State of Montana, Department of Natural Resources and Conservation, through the Petroleum County Conservation District, provided financial assistance for the survey.

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.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: The soils of Petroleum County provide a variety of land uses.

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Issued January 1993

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Foreword

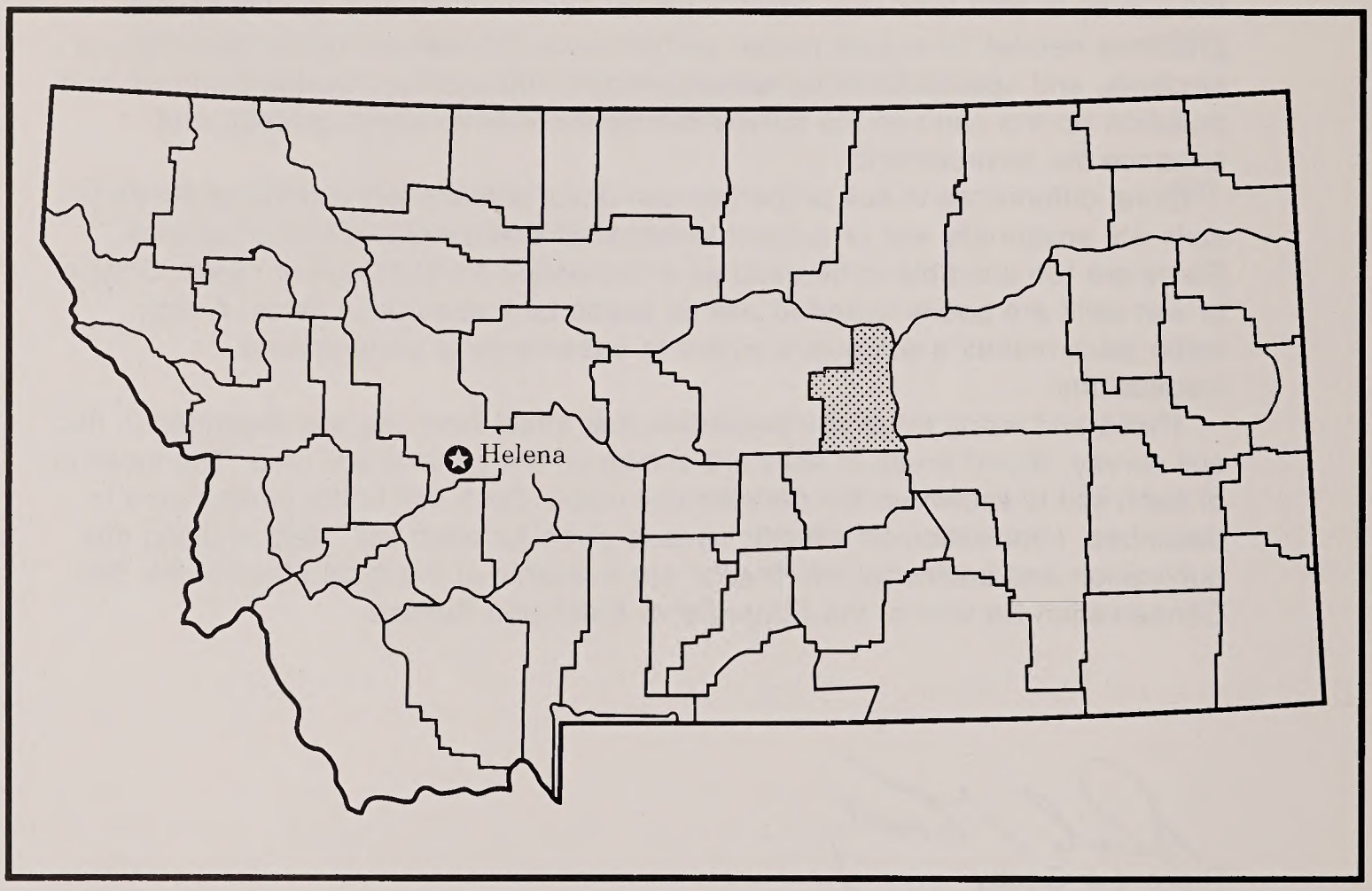
This soil survey contains information that can be used in land-planning programs in Petroleum County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact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

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to 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.

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

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Richard J. Gooby
State Conservationist
Soil Conservation Service



Location of Petroleum County in Montana.

Soil Survey of Petroleum County, Montana

By John A. Lindahl, Soil Conservation Service

Fieldwork by John A. Lindahl, Robert E. Wegmann, Thomas J. Keck, Bradley J. Duncan, David A. Vyain, and Jon K. Melhus, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service,
in cooperation with
the Montana Agricultural Experiment Station and the United States Department of the Interior, Bureau of Land Management and United States Fish and Wildlife Service

Petroleum County, in the central part of Montana, has a land area of about 1,071,600 acres, or 1,675 square miles. The county seat, Winnett, is in the central part of the county.

About 89 percent of the county is rangeland or grazable woodland, 6 percent is woodland, and 5 percent is cropland (fig. 1). The main crops are wheat, barley, alfalfa for hay, and grass hay. Petroleum production and beef operations are the main economic enterprises.

Elevation ranges from 2,250 to 4,000 feet. The mean annual precipitation is about 13 inches, and the mean annual temperature is 42 to 47 degrees F. The frost-free season is 105 to 135 days.

General Nature of the Survey Area

This section discusses the history; industry, transportation, and recreation; physiography, drainage, and geology; and climate of Petroleum County.

An older survey, "Soil Survey (Reconnaissance) of Central Montana," was published in 1953. This earlier survey covers a part of the present survey. The present survey, however, updates the earlier survey and provides additional information and larger maps that show the soils in greater detail.

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

History

On May 20, 1805, members of the Lewis and Clark expedition discovered the Musselshell River, the present eastern boundary of Petroleum County. The Crow, Blackfoot, Nez Perce, and Sioux Indian tribes were then hunting in the area that this soil survey comprises. A trading post built at the mouth of the Musselshell River in the spring of 1868 became the settlement known as Musselshell, which reached its peak activity by the following spring.

Winnett, a town near the center of the county, dates to 1879. Its founder, Walter Winnett, was one of the area's earliest settlers. Winnett, the largest town in Petroleum County, is the county seat.

Stockgrowers began moving into the area along the Musselshell River soon after the establishment of Fort Maginnis in 1880. The discovery of gold in what is now the adjoining Fergus County helped to spur this influx. From 1911 to 1915, squatters and homesteaders set up on practically every 320-acre parcel in the area. The land on many of these homesteads that were abandoned during the 1930's subsequently reverted to property of the U.S. Government.

Petroleum County was named after its principal industry, the production of petroleum, or crude oil. On February 18, 1920, high grade oil was struck at the Cat Creek field in the southeast corner of the county. The field produced more than 2,200,000 barrels of oil in 1922.

Petroleum County was established on February 22, 1925, from part of Fergus County. As the last county

Figure 1.—A typical area of intermixed rangeland and grazable woodland in the northern part of Petroleum County.

established in Montana, in 1944 it adopted the county manager form of government still in use today. The 1980 census showed that Petroleum County had one of the lowest populations of a county in the country, 655.

Industry, Transportation, and Recreation

Raising livestock, growing crops, and producing crude oil are the principal industries in Petroleum County. Livestock in mainly cow/calf operations makes up nearly 85 percent of farm income. In dryland farming, which predominates, winter wheat is the principal crop. Spring wheat, barley, alfalfa, and grass hay also are grown. Some alfalfa and grass hay are grown under irrigation along the Musselshell River and Flatwillow, Box Elder, and McDonald Creeks.

Ranchers market livestock at public stockyards in Billings and Lewistown. They sell some cattle directly off the ranch to feeder buyers. The small grain produced is nearly all marketed through elevators in Billings and Lewistown.

The Cat Creek area, the first major oil discovery in Montana, and the Rattlesnake Butte area are important oil fields in Petroleum County. The oil that these fields produce is piped to refineries in the Billings area.

State Highway 200 runs east and west through the central part of Petroleum County. State Highway 244 runs southwest from Winnett to the county line. U.S. Highway 87 runs through the southwest corner of the county. Numerous secondary roads allow vehicle traffic throughout the rest of the county.

Opportunities for outdoor recreation are plentiful in Petroleum County. Hunting for elk, white-tailed deer, mule deer, and antelope is excellent. Fishing, camping, and water recreation activities are available at Petrolia Reservoir. Fishing is also available at numerous smaller ponds throughout the county.

Hunting, fishing, boating, camping, and backpacking

are excellent opportunities at the Charles M. Russell National Wildlife Refuge in the northern part of the county.

Physiography, Drainage, and Geology

This section was prepared by Clifford A. Balster, consulting geologist.

The survey area takes in all of Petroleum County. In the Missouri Plateau section of the Great Plains physiographic province, the county varies in topography from nearly level uplands and valleys to very steeply sloping hillsides. The surface features most common to the area are rolling hills of low to moderate relief, but characteristically deeply incised valleys with steep side slopes are along the margins of the Missouri and Musselshell Rivers.

An area encompassing about the southern two-thirds of the county is typically a composite of low hills and intervening nearly level or low-relief valleys. Occasional sharp, steep slopes break this otherwise moderate topography.

A prominent ridge of steeply dipping sandstone beds cuts across the central part of the county from the Musselshell River northwestward to the westernmost boundary. This topographic feature, which is geologically controlled, is widely known as Cat Creek Anticline. This feature has interested the petroleum industry since the discovery of Cat Creek Field in 1922. It also divides the county into two distinct natural geologic provinces. North of the anticline the bedrock is either Bearpaw Shale or the Hell Creek Formation; south of the anticline it consists of older Cretaceous rocks.

The Breaks comprise an area where erosion has cut into shales and sandstones bordering the Missouri River along the northern boundary of the county. A similar area borders the Musselshell River along the eastern edge of the county. These shales and sandstones are the local bedrock of the Missouri and Musselshell Valleys, which have been incised far below the surrounding countryside. Also, erosion has been actively cutting tributary valleys headward and downward to match the elevation of the major streams of the area. The Breaks characteristically have steep and sometimes unstable side slopes and narrow incised stream channels. Erosion near the valley heads is generally very rapid, and the lower reaches of the valleys are generally clogged when the overloaded streams deposit sediments. Locally, this deposition tends to widen the lower valley segments, and subsequent downcutting in many places cuts deep new channels into the earlier alluvium. The geomorphic processes that formed the Breaks reflect such minor events as a single torrential thunderstorm or an exceptionally heavy spring runoff.

Small remnants of old pediments that developed off the flanks of the Judith Mountains in Fergus County can be identified in the central part of the county. Poorly sorted pebbles made up mainly of a variety of igneous rock fragments cap these remnants. Of uncertain age, these pediments and their gravels likely belong to Late Pleistocene time.

Sizable remnants of old terraces or pediments that were most certainly associated with the Big Snowy Mountains remain in the southern part of the county. Poorly sorted pebbles composed predominantly of limestone fragments cap these remnants. Although somewhat questionable in age, these remnants are most likely of Middle or Late Pleistocene time. They are certainly older than the small remnants of pediments derived from the Judith Mountains, and the composition of pebbles on them is distinctly different.

Tributaries of the Musselshell River drain nearly the entire survey area. Drainage of the northernmost part of the county is through small, northward-flowing tributaries of the Missouri River. Soda Creek flows eastward into the Missouri River (Fort Peck Reservoir) along the west side of U L Bend. Crooked Creek, just south of Soda Creek, flows into the part of Fort Peck Reservoir that was formerly the Musselshell River Valley. On some maps Crooked Creek also is called the Sacagawea River. The major drainage southward from Crooked Creek consists of Dovetail, Blood, and Box Elder Creeks. McDonald and Flat Willow Creeks are tributaries to Box Elder Creek. Yellow Water Creek joins Flat Willow Creek several miles above its confluence with Box Elder Creek.

None of the streams of the county carry large amounts of water, and most of the minor streams do not flow except during spring runoff or after intensive rainfall or extended rainy periods. The minor streams in the county are, from north to south, Soda, Drag, Cat, Mud Spring, and North Willow Creeks. Sage and Dry Blood Creeks are tributaries to Blood Creek. Bear, South Fork Bear, Fords, and Buffalo Creeks are lesser tributaries of Box Elder Creek. All of the above streams drain eastward on a relatively low gradient.

All the larger creeks of the survey area have flood plains along their courses. Low alluvial terraces are not uncommon. The alluvium on these flood plains and terraces consists of sand, pebbles, and cobbles, but mainly of silt and clay.

Wild Horse Lake, which is natural, lies in an undrained depression west of Box Elder Creek between South Fork Bear and Fords Creeks. Of the several

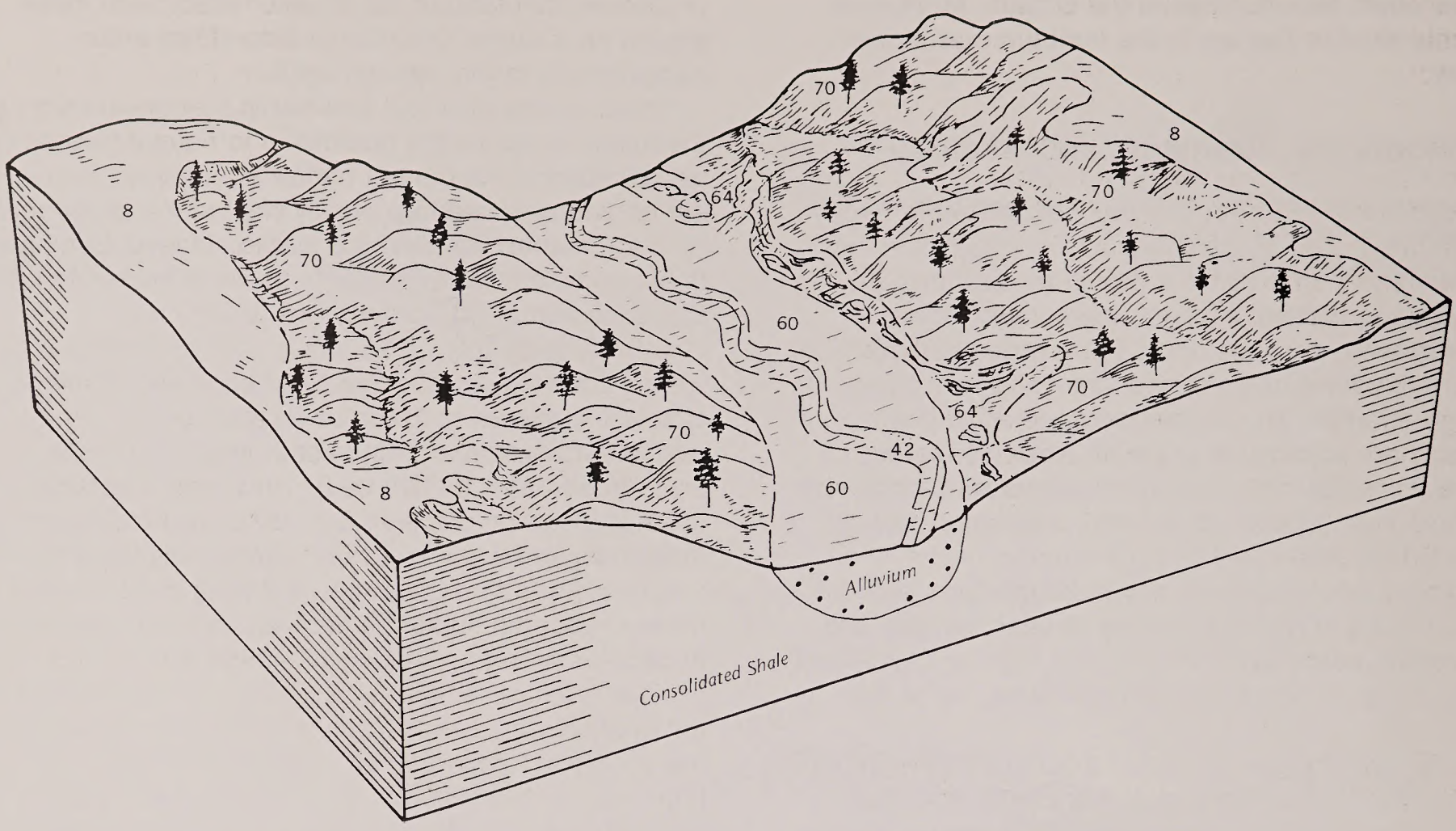


Figure 2.—Typical area in Petroleum County showing the relationships among the detailed soil map units, topography, and geology of the Bearpaw Shale Formation. This area comprises (8) Bascovy-Neldore silty clays, 2 to 15 percent slopes; (42) Harlem silty clay, 0 to 2 percent slopes; (60) Marvan-Vanda silty clays, 0 to 8 percent slopes; (64) Neldore-Bascovy-Rock outcrop complex, 6 to 60 percent slopes; and (70) Neldore, moist-Bascovy-Neldore, south, silty clays, 6 to 60 percent slopes. These numbers are the same as those for the detailed soil map units.

other impounded bodies of water in the county, the largest, which is fed by an irrigation canal, is War Horse Lake.

Marine shales of the Colorado Group, which is of Cretaceous age, are the oldest rock outcrops in the survey area. Typically dark gray to almost black, they vary from very strongly acid to moderately alkaline. They are also soft and fissile, which means they are easily mechanically weathered. Thin, hard, calcareous sandstone is a common lithology in the next part of Colorado Shale. In places this sandstone grades into very sandy, very shaly limestone. Fossils, though not common, occur in some localities.

Buff to tan, fine grained sandstones of the Eagle Formation overlie the Colorado beds. These sandstones, deposited as offshore bars, vary in thickness and character. Shale partings are common in some places, but massive bedding is more common. Wherever the sandstone is sufficiently resistant to weathering and erosion, it forms ridges, but in the shalier lithologies topography is typically quite subdued.

Claggett shales and thin sandstones overlie the Eagle Formation. These marine shales and sandstones are typically dark gray and fissile. Sandstone beds are generally thin, fine grained, and shaly. Although calcareous in places, they are not particularly resistant to weathering and erosion. Typically, Claggett terrain consists of subdued landscapes that have gradual slopes, small ridges, and broad valleys.

The Judith River Formation overlies the Claggett beds. Sandstone and shale alternate in sequence, but sandstone is generally predominant. Deposition occurred in a delta complex, and the sandstone bodies are typically somewhat discontinuous and vary in lithology. Shales of the Judith River range from massive to fissile, are generally sandy, and range in color from shades of gray to pale greens and browns. Carbonaceous beds are not uncommon. Sandstone is sufficiently predominant, and in places where it is resistant to erosion, the Judith River Formation forms ridges.

Dark gray to black marine shales of the Bearpaw Formation overlie the Judith River Formation (fig. 2). Bentonite beds are common in the formation and vary

in color from white to pale yellow or buff. Large concretions made up of a complex of iron and calcium carbonates form conspicuous bands in the Bearpaw Formation, which commonly contains abundant fossils. The shales of the Bearpaw Formation are soft and offer little resistance to weathering and erosion.

Sandstones and shales of the Hell Creek Formation overlie the shales of the Bearpaw Formation and are the youngest consolidated rocks in the county (fig. 3). Sandstones, generally fine grained, vary from calcareous to noncalcareous. Shales, generally soft and fissile to massive, vary in color from shades of gray to pale green or brown. Sandstone generally is the predominant lithology of the Hell Creek Formation. Where it is sufficiently resistant to erosion, sandstone can form conspicuous ridges and cliffs of very steep relief. Rocks of the Hell Creek Formation represent the deposits at the margin of the Cretaceous sea, which inundated the region for millions of years as it made its final retreat eastward.

Occasional glacial erratics occur in some places in the northern part of the survey area. They probably were rafted into the area on ice from the glacier that lay just north of the Missouri River or were carried in as outwash. The glacier is not known to have extended past the present course of the Missouri River.

The youngest geological materials of the area are alluvial sediments that fill the stream valleys. Both flood plain deposits and low terraces occur throughout the country. Without exception, these sediments are of Holocene age.

Cat Creek Anticline is the most prominent geologic structure in the area. Made up of a series of asymmetrical domes, from east to west it consists of East, Mosby, West, Oiltana, Brush Creek, Kootenai, Boxelder, and Bear Creek Domes. Outward dipping beds ring most of these domes. They incline gently toward the south and very steeply toward the north. Many transverse faults cut the anticline all along its length. East Dome, Mosby Dome, and West Dome have

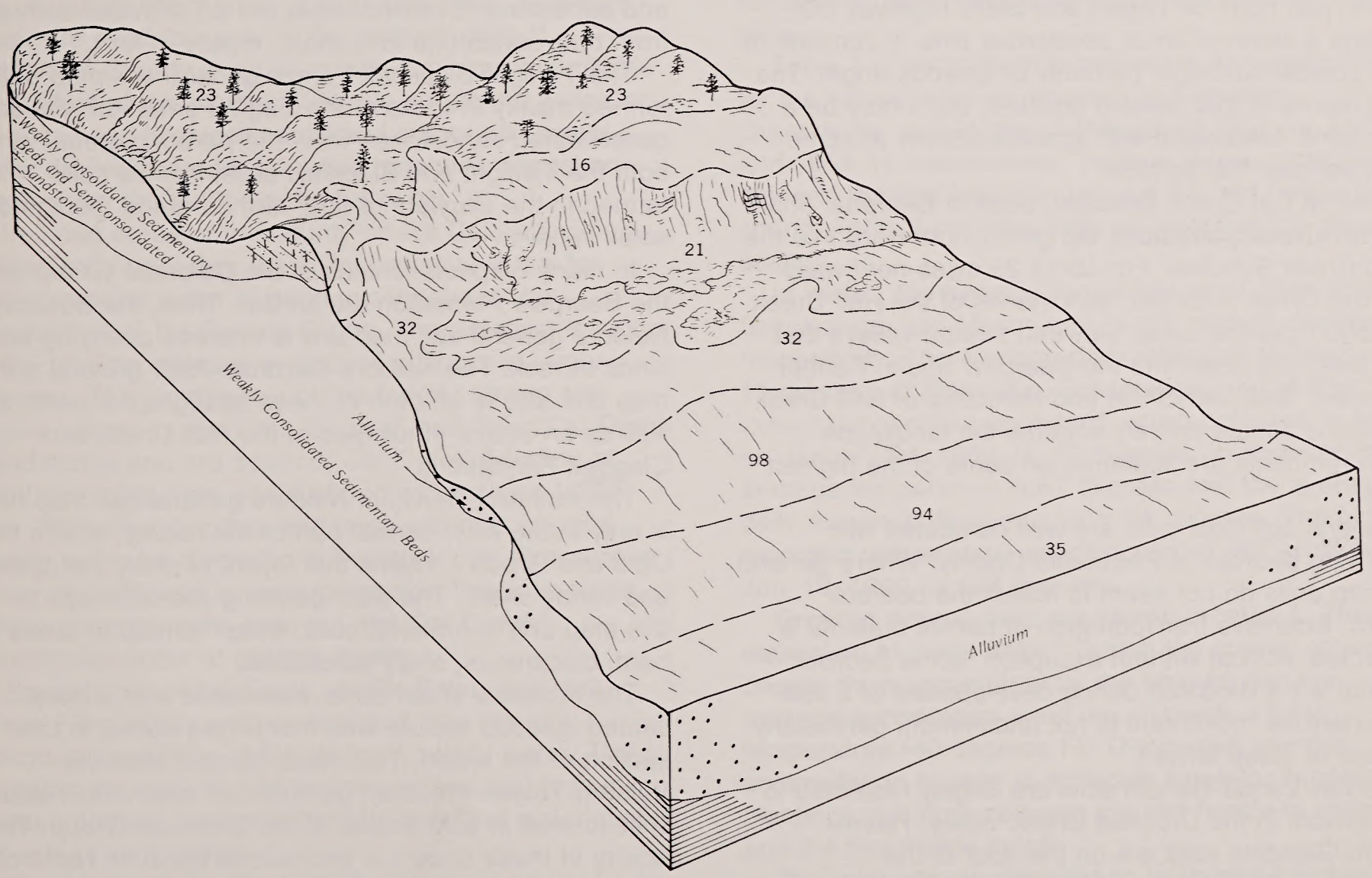


Figure 3.—Typical area in Petroleum County showing the relationships among the detailed soil map units, topography, and geology of the Hell Creek Formation. This area comprises (16) Cabbart-Delpoint loams, 4 to 15 percent slopes; (21) Cabbart-Yawdim-Rock outcrop complex, 4 to 35 percent slopes; (23) Cabbart, moist-Blackhall-Delpoint complex, 6 to 60 percent slopes; (32) Delpoint-Cabbart-Yamac loams, 4 to 15 percent slopes; (35) Evanston loam, 0 to 2 percent slopes; (94) Yamac loam, 2 to 8 percent slopes; and (98) Yamac-Delpoint loams, 2 to 8 percent slopes. These numbers are the same as those for the detailed soil map units.

produced high quality crude oil since 1922. Steeply dipping beds, in places nearly vertical, of Eagle Sandstone, Claggett Shale, and Judith River Sandstone define the northern edge of Cat Creek Anticline. The hogback along this edge is visible for many miles. Beds of the same formations express the south flank of the anticline. These dip at an angle of 3 to 5 degrees southward.

Geologic structure south of Cat Creek Anticline is obscure at the land surface in the southwestern part of the area. Shales of the Colorado Group of Cretaceous age underlie the landscape, and rock outcrops are not abundant. The rocks indicate that the area has rather gently southeastward-dipping beds and no prominent structure. Further east, sandstones of the Eagle Formation define a gently eastward-plunging nose known as the Flat Willow Anticline. Flat Willow Creek flows approximately along the crest of the nose. Beds of the Claggett Formation, Judith River Formation, and Bearpaw Shale crop out in sequence eastward from the Eagle Sandstone outcrop. A westward trending linear feature, just north of Teigen and State Highway 200, supports a stand of small ponderosa pine. It consists of small conical outcrops, probably of igneous origin. The exact nature of this trend is obscure, but it may be a shear zone associated with igneous activity at some depth beneath the surface.

North of Cat Creek Anticline, beds of Bearpaw Shale and Hell Creek Sandstone dip gently northward into the Blood Creek Syncline. For about 25 miles northward from Cat Creek Anticline, sandstones of the Hell Creek Formation cap the areas between stream valleys that have been cut down into the Bearpaw Shale. Farther northward, Bearpaw Shale and remnants of Hell Creek Sandstone almost entirely underlie the landscape. These remnants are scattered on some of the highest points.

General soil map units are well correlated with underlying bedrock in Petroleum County. Where general soil map units do not seem to match the bedrock pattern, extensive transportation of parent material is suspected. Almost without exception, some bedrock material is translocated during development of a soil and extensive movement is not uncommon, particularly in areas of steep terrain.

Marvan-Vanda-Harlem soils are largely restricted to the alluvium in the Crooked Creek Valley. Havre-Harlem-Glendive soils are on the floor of the Musselshell River Valley and in the alluvial deposits of Box Elder Creek and its tributaries. Gerdrum-Ethridge-Marvan soils are on alluvial fans and on terraces of streams in the southern part of the county.

A single area of the Bascovy-Gerdrum-Neldore general soil map unit is on the drainage divide between the Missouri River and Crooked Creek. This area of relatively low relief overlies Bearpaw Shale. More rugged topography bounds the area on the north, east, and south, where erosion is reducing the landscape to the level of the major streams. These dissected areas are the site of the Bascovy-Neldore soils.

The Crago-Musselshell-Attewan general soil map unit formed in the gravel deposits of the Pleistocene terraces and pediments in the central and southern parts of the survey area. These landscape features are probably different in age, but all three of these soils are gravelly.

The Cabbart-Delpoint-Rock outcrop general soil map unit is in areas overlying the Hell Creek Formation. The weakly consolidated sandstones and shales of the Hell Creek Formation are the parent material for these soils.

The Twilight-Evanston-Cabbart general soil map unit is on both Eagle Sandstone and the Judith River Formation. Twilight soils formed in weakly consolidated sandstone. Cabbart soils formed in interbedded shale and sandstone. Evanston soils are on alluvium derived from both sandstone and shale, mostly in fans.

The Twilight-Blackhall-Yamac general soil map unit formed mainly in rocks of the Eagle Formation. Weakly consolidated sandstones were the parent material for both the Twilight and Blackhall soils. Yamac soils formed in the alluvium of fans formed at the mouths of small valleys.

In many respects, shales of the Colorado Group and the Bearpaw Formation are similar. Thus, the Bascovy-Neldore general soil map unit is in areas overlying both kinds of rock. The Neldore-Gerdrum-Abor general soil map unit also is on both of these stratigraphic units, as well as on similar lithologies of the Hell Creek and Claggett Formations.

The Amherst-Gerdrum-Neldore general soil map unit is only in the west-central part of the county, where the Colorado Group contains thin layers of shaly sandstone and sandy shale. The distinguishing characteristic of this map unit is Amherst soils, which formed in areas of hard, calcareous, shaly sandstone.

The probable shear zone associated with a deep-seated igneous feature was mentioned earlier in this section of the report. This linear feature sites the Volborg-Teigen-Weingart general soil map unit. Volborg soils formed in acid shales of the Colorado Group. The acidity of these shales is anomalous because rocks of the Colorado Group are typically alkaline in reaction. Not only weathering of sulfide minerals but also igneous emanations from below acidified the shales. Oxidation of sulfides produces sulfates that form soluble salts and most cations, such as sodium, potassium, or

magnesium. Calcium sulfate, the least soluble of the common salts formed, appears in the weathered outcrops as gypsum crystals. Leaching of soluble salts from the acidic shales and transportation of these shales downslope were factors in the formation of Weingart soils. Teigen soils formed on alluvial fans derived from weathered shales of the Colorado Group.

Oil production began in Petroleum County in 1922, when Cat Creek Field was discovered, and continues today. Several exploratory wells have been drilled in the vicinity within the past few years. Exploration will almost certainly continue, for additional discoveries are probable.

Exploration for metallic or nonmetallic resources has not been appreciable. Finding resources of metallic minerals is only slightly probable. High-quality bentonite, a possible nonmetallic resource, is in reserve in the surrounding areas. But the abundance of its known deposits may render remote the potential for any exploration and development.

In any area with low precipitation, water resources are of utmost importance. Large quantities of surface water are available only in the northern part of Petroleum County in an area with a minimum of tillable land. Most of the county must rely on ground water for domestic and livestock supplies. Little or no ground water development for irrigation purposes has taken place, even though the potential exists.

In those areas of the county where Colorado Shale immediately underlies the soils, potential is low for finding ground water of good quality above the sandstones of the Dakota Group. The potential is higher in the shallow alluvium in the valley floors of larger streams. The sandstones of the Dakota Group are locally known as the First, Second, and Third Cat Creek Sandstones and are south of Cat Creek Anticline at depths ranging from about 400 to as much as 1,200 feet. These sandstones hold large volumes of good quality water for domestic or livestock use. Pressure is generally sufficient to produce sizable flows. In areas where younger rocks crop out, the Cat Creek sandstones occur at greater depths.

Sandstones of the Eagle, Judith River, and Hell Creek Formations are aquifers and may provide adequate quantities of fair to good quality water. The Cretaceous aquifers, which are very few and high in sodium content, are considered a potential water supply for extensive irrigation.

The Madison Group of Mississippian age is a potential source of large quantities of good quality water for irrigation. Several wells drilled during exploration for oil or gas have revealed large flows of good quality water. Water in the Madison Group is at a depth of about 3,000 to 5,000 feet. The great cost of drilling water wells deters the development of irrigation water supplies in this group.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

Petroleum County is usually warm in summer and has frequent hot days. In winter, periods of very cold weather occur when arctic air moves in from the north or northeast. Cold periods alternate with milder periods that occur often when westerly winds are warmed as they move downslope. Most precipitation falls as rain during the warmer part of the year. It is normally heaviest in late spring and early summer. Winter snowfalls are frequent, but snow cover usually disappears during mild periods. During winter in some years, a heavy blizzard with high winds and drifting snow strikes the area. The snow can remain on the ground for many weeks. During summer in some years, hailstorms cause severe local damage to crops in the area.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Flatwillow, Grassrange, and Mosby in the period 1951-84, 1951-84, and 1959-84, respectively. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperatures at Flatwillow, Grassrange, and Mosby are 24, 25, and 23 degrees F, respectively. The average daily minimum temperature is 11 degrees at Flatwillow, Grassrange, and Mosby. The lowest temperature on record, which occurred at Mosby on January 24, 1969, is -43 degrees. In summer, the average temperature is 67 degrees and the average daily maximum temperature is 84 degrees. The highest recorded temperature, which occurred at Flatwillow on July 19, 1960, is 108 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 total annual precipitation is about 13 inches at Flatwillow, 16 inches at Grassrange, and 13 inches at Mosby. Of this, 75 percent usually falls in April through September, which includes the growing season for most crops. The heaviest 1-day rainfall during the period of

record was 3.15 inches at Flatwillow on May 13, 1962. Thunderstorms occur on about 28 days each year.

The average seasonal snowfall is 40 inches at Flatwillow, 63 inches at Grassrange, and 36 inches at Mosby. The greatest snow depth at any one time during the period of record was 25 inches at Flatwillow, 20 inches at Grassrange, and 27 inches at Mosby. On the average, 15 days of the year at Flatwillow, 14 days at Grassrange, and 61 days at Mosby have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 50 percent. Humidity is higher at night, and the average at dawn is about 65 percent. The sun shines 70 percent of the time in summer and 45 percent of the time in winter. The prevailing wind is from the southwest. Average windspeed is highest, 13 miles per hour, in winter.

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 or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, 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.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate 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 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 the soil survey is in progress, samples of some of the soils in the area 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.

General Soil Map Units

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

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

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

The general map units in this survey have been grouped into general kinds of landscape for broad interpretive purposes. Each of the broad groups and the map units in each group are described in the following pages.

Map Unit Descriptions

The State Soil Geographic Data Base (STATSGO) for Montana is the base for the general soil map of Petroleum County. Map symbols are the same as for the STATSGO map units. In each major soil group only two or three of the major soils in the map unit are listed for the map symbol. For more information about the general soil map units, refer to the STATSGO map for Montana.

Dominantly Nearly Level and Gently Sloping, Deep, Moderately Coarse, Medium, and Fine Textured Soils on Flood Plains, Terraces, and Adjacent Fans

Unit 247

This map unit in Petroleum County is dominantly Marvan, Vanda, and Harlem soils. These soils are deep, well drained, and fine textured. They range from slightly to strongly saline, have low to high amounts of expanding clay, are nonsodic to sodic, and are calcareous. Marvan soils are sodic and have high amounts of expanding clay. Harlem soils are subject to flooding. These soils are used mainly as range, but some areas are used as dry and irrigated cropland.

Unit 256

This map unit in Petroleum County is dominantly Havre, Harlem, and Glendive soils. These soils are deep, well drained, and moderately coarse, medium, and fine textured. Havre soils are medium textured, Harlem soils are fine textured, and Glendive soils are moderately coarse textured. Havre, Harlem, and Glendive soils are mainly free of salt and sodium and are subject to rare to occasional flooding. These soils are used mainly as irrigated cropland, but some areas are used for range.

Dominantly Nearly Level to Strongly Sloping, Deep to Shallow, Fine Textured Soils on Fans, Terraces, Foot Slopes, and Uplands

Unit 225

This map unit in Petroleum County is dominantly Gerdrum, Ethridge, and Marvan soils. These soils are deep, well drained, and fine textured. They range from nonsodic to sodic and have low to high amounts of expanding clay. Marvan and Gerdrum soils are sodic, and Marvan soils have high amounts of expanding clay. These soils are used mainly for range.

Unit 621

This map unit in Petroleum County is dominantly Bascovy, Gerdrum, and Neldore soils. These soils are shallow to deep and fine textured. They are calcareous to nonacid and have high amounts of expanding clay. Bascovy soils are moderately deep. Neldore soils are shallow. Bascovy and Neldore soils overlie consolidated shale. Bascovy soils have high amounts of expanding clay. Gerdrum soils are sodic and deep. All these soils are used mainly for range.

Dominantly Nearly Level and Gently Sloping, Deep, Moderately Coarse and Medium Textured Soils on Fans, Terraces, and Uplands

Unit 145

This map unit in Petroleum County is dominantly Crago, Musselshell, and Attewan soils. These soils are deep, well drained, and moderately coarse and medium textured. They are calcareous throughout or in some parts of the soil. They are very gravelly or extremely gravelly between the surface and a depth of 60 inches or between depths of 20 and 60 inches. Crago soils are very gravelly or extremely gravelly and have high amounts of carbonates throughout. Musselshell soils have high amounts of carbonates throughout and are 20 to 40 inches deep over very gravelly or extremely gravelly fine sandy loam. Attewan soils are 20 to 40 inches deep over very gravelly loamy sand. All these soils are used as cropland and range.

Dominantly Rock Outcrop and Gently Sloping to Steep, Deep to Shallow, Moderately Coarse to Moderately Fine Textured Soils on Terraces, Fans, Foot Slopes, and Uplands

Unit 103

This map unit in Petroleum County is dominantly Cabbart and Delpoint soils and Rock outcrop. The soils are moderately deep and shallow, well drained, and medium to moderately fine textured. Cabbart soils are shallow, and Delpoint soils are moderately deep. Both soils overlie weakly consolidated sedimentary bedrock. These soils are used mainly as range.

Unit 164

This map unit in Petroleum County is dominantly Twilight, Evanston, and Cabbart soils. These soils are deep, moderately deep and shallow, well drained, and moderately coarse to moderately fine textured. Twilight soils are moderately deep and overlie semiconsolidated sandstone. Evanston soils are deep. Cabbart soils are shallow and overlie weakly consolidated sedimentary bedrock. Twilight, Evanston, and Cabbart soils are used mainly for range.

Unit 590

This map unit in Petroleum County is dominantly Twilight, Blackhall, and Yamac soils. These soils are deep, moderately deep and shallow, well drained, and moderately coarse to moderately fine textured. Twilight soils are moderately deep, and Blackhall soils are shallow. Both soils overlie semiconsolidated sandstone. Yamac soils are deep. Twilight, Blackhall, and Yamac soils are used mainly for range.

Dominantly Nearly Level to Very Steep, Deep to Shallow, Fine Textured Soils on Fans, Terraces, Foot Slopes, and Uplands

Unit 415

This map unit in Petroleum County is dominantly Amherst, Gerdrum, and Neldore soils. These soils are deep and shallow, well drained, and fine textured. Amherst soils are shallow to hard sandstone. Gerdrum soils are sodic and deep. Neldore soils are nonacid and shallow to consolidated shale. All these soils are used mainly for range.

Unit 429

This map unit in Petroleum County is dominantly Bascovy and Neldore soils. These soils are moderately deep and shallow, well drained, and fine textured. Bascovy soils are moderately deep to consolidated shale and have high amounts of expanding clays. Neldore soils are nonacid and are shallow to consolidated shale. All these soils are used mainly for range.

Unit 560

This map unit in Petroleum County is dominantly Volborg, Teigen, and Weingart soils. These soils are deep to shallow, well drained, and fine textured. Volborg soils are sodic and shallow to consolidated acid shale. Teigen soils are deep. Weingart soils are sodic and moderately deep to consolidated shale. All these soils are used mainly for range.

Unit 568

This map unit in Petroleum County is dominantly Neldore, Gerdrum, and Abor soils. These soils are deep to shallow, are well drained, and are fine textured. Neldore soils are nonacid and shallow to consolidated shale. Gerdrum soils are sodic and deep. Abor soils are moderately deep to consolidated shale and are high in expanding clays. All these soils are used mainly for range.

The textures given for the soils in the groups are for the fraction less than 2 mm (fine earth) of the particle-size class in the control section.

Detailed Soil Map Units

The map units delineated on the detailed maps at the back of 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. More information on each map unit is given under "Use and Management of the Soils."

A map unit delineation on a 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 or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas 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 "included" areas that belong to other taxonomic classes.

Most included 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 similar inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavior divergent enough to affect use or to require different management. These are called contrasting inclusions. 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 included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas 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 included areas 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 segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation to precisely define and locate the soils and miscellaneous areas is needed.

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 or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Havre loam, 0 to 2 percent slopes, is a phase of the Havre series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Havre-Glendive complex, 0 to 2 percent slopes, is an example.

Most map units include small scattered areas of soils

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

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

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The "Glossary" defines many of the terms used in describing the soils.

Map Unit Descriptions

1—Abor silty clay, 1 to 8 percent slopes

Composition

Abor and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range: 1 to 8 percent

Typical Profile

0 to 2 inches—grayish brown silty clay
2 to 32 inches—light brownish gray silty clay
32 to 60 inches—grayish brown consolidated shale

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Very slow
Available water capacity: Mainly 4.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Inclusions

- Soils, on small knolls, that have consolidated shale at a depth of 10 to 20 inches
- Soils on slopes of more than 8 percent
- Slightly to moderately saline soils along small, intermittent drainageways

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland

Cropland

Commonly grown crops:
- Nonirrigated—winter wheat

Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth

Rangeland

Range site:
- Clayey, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 3M

2—Abor-Neldore silty clays, 2 to 8 percent slopes

Composition

Abor and similar soils: 55 percent
Neldore and similar soils: 30 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
- Abor—2 to 8 percent
- Neldore—2 to 8 percent

Typical Profile

Abor
0 to 2 inches—grayish brown silty clay
2 to 32 inches—light brownish gray silty clay
32 to 60 inches—grayish brown consolidated shale
Neldore
0 to 2 inches—grayish brown silty clay
2 to 9 inches—grayish brown silty clay
9 to 17 inches—grayish brown silty clay
17 to 60 inches—grayish brown consolidated shale

Soil Properties and Qualities

Abor
Depth class: Moderately deep (20 to 40 inches)

Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Very slow
Available water capacity: Mainly 4.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Neldore
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium

Inclusions

- Soils on slopes of more than 8 percent
- Slightly to moderately saline soils along small, intermittent drainageways

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Abor and Neldore
Commonly grown crops:
- Nonirrigated—none

Abor
Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth

Neldore
Capability classification:
- Nonirrigated—VIs

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth

Rangeland

Abor
Range site:
- Clayey, 10- to 14-inch precipitation zone

Neldore
Range site:
- Shallow clay, 10- to 14-inch precipitation zone

Windbreaks

Abor
Windbreak suitability group:
- 3M

Neldore
Windbreak suitability group:
- 4

3—Amherst clay loam, 1 to 6 percent slopes

Composition

Amherst and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Mainly southwestern part
Landform: Uplands
Slope range: 1 to 6 percent

Typical Profile

0 to 8 inches—brown clay loam
8 to 12 inches—brown gravelly clay loam
12 to 60 inches—hard platy sandstone

Soil Properties and Qualities

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from hard sandstone
Permeability: Moderately slow
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium

Inclusions

- Soils on slopes of more than 6 percent
- Soils that have a channery surface layer
- Soils, on small knolls, that are 5 to 10 inches deep over hard sandstone

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIs

Main soil limitations and hazards:
- Limited available water capacity
- Depth to hard sandstone

Rangeland

Range site:
• Shallow, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 4

4—Amherst clay loam, 6 to 25 percent slopes

Composition

Amherst and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Mainly southwestern part
Landform: Uplands
Slope range: 6 to 25 percent

Typical Profile

0 to 8 inches—brown clay loam
8 to 12 inches—brown gravelly clay loam
12 to 60 inches—hard platy sandstone

Soil Properties and Qualities

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from hard sandstone
Permeability: Moderately slow
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid

Inclusions

• Soils on slopes of more than 25 percent
• Soils that have a channery surface layer
• Soils, on small knolls, that are 5 to 10 inches deep to hard sandstone

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Commonly grown crops:
• Nonirrigated—none
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Water erosion
• Limited available water capacity
• Depth to hard sandstone

Rangeland

Range site:
• Shallow, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 4

5—Amherst-Delplain complex, 2 to 15 percent slopes

Composition

Amherst and similar soils: 55 percent
Delplain and similar soils: 30 percent
Inclusions: 15 percent

Setting

Location in survey area: Mainly central part
Landform: Uplands
Slope range:
• Amherst—2 to 15 percent
• Delplain—2 to 15 percent

Typical Profile

Amherst
0 to 8 inches—brown clay loam
8 to 12 inches—brown gravelly clay loam
12 to 60 inches—hard platy sandstone
Delplain
0 to 3 inches—light brownish gray channery clay loam
3 to 7 inches—light brownish gray very channery clay loam
7 to 12 inches—light brownish gray extremely channery clay loam
12 to 60 inches—hard platy shale

Soil Properties and Qualities

Amherst
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from hard sandstone
Permeability: Moderately slow
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium or rapid
Delplain
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—residuum or colluvium derived from hard shale and sandstone
Permeability: Moderately slow
Available water capacity: Mainly 1 inch

Potential rooting depth: 10 to 20 inches
Runoff: Medium or rapid

Inclusions

- Soils on slopes of more than 15 percent
- Soils, on small knolls, that are 5 to 10 inches deep to hard sandstone
- Soils that have an extremely channery surface layer

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Amherst and Delplain
Commonly grown crops:
- Nonirrigated—none

Amherst
Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Water erosion
- Limited available water capacity
- Depth to hard sandstone

Delplain
Capability classification:
- Nonirrigated—VIIs

Main soil limitations and hazards:
- Water erosion
- Limited available water capacity
- Depth to hard sandstone and shale

Rangeland

Amherst and Delplain
Range site:
- Shallow, 10- to 14-inch precipitation zone

Windbreaks

Amherst and Delplain
Windbreak suitability group:
- 4

6—Attewan loam, 0 to 4 percent slopes

Composition

Attewan and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Mainly southwestern part
Landform: Terraces
Slope range: 0 to 4 percent

Typical Profile

0 to 3 inches—dark brown loam
3 to 12 inches—dark brown clay loam
12 to 30 inches—grayish brown and light brownish gray clay loam
30 to 60 inches—light yellowish brown, very gravelly loamy sand

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: In the upper 30 inches—moderate; below this depth—rapid
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 4 percent
- Soils that are very gravelly loam at a depth of 5 to 60 inches
- Soils that have a surface layer of gravelly loam

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland (prime farmland if irrigated)

Cropland

Commonly grown crops:
- Nonirrigated—winter wheat, grass for hay

Capability classification:
- Nonirrigated and irrigated—IIIe

Main soil limitations and hazards:
- Soil blowing
- Limited available water capacity

Rangeland

Range site:
- Silty, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 3M

7—Badland

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range: 8 to 75 percent

Properties and Qualities

- Badland is nearly barren or completely barren of vegetation. It has numerous, deeply entrenched, intermittent drainageways. Active geologic erosion formed badland from soft, multicolored beds of mainly

sandstone, siltstone, and shale. Runoff is very rapid.

Inclusions

- Soils on slopes of less than 8 percent
- Soils that have a surface layer of silty clay
- Moderately saline and moderately sodic soils

Uses of the Unit

Major current uses:
- Recreation
- Wildlife habitat

Cropland

Capability classification:
- VIII

8—Bascovy-Neldore silty clays, 2 to 15 percent slopes

Composition

Bascovy and similar soils: 55 percent
Neldore and similar soils: 35 percent
Inclusions: 10 percent

Setting

Location in survey area: Mainly central and northern parts
Landform: Uplands
Slope range:
- Bascovy—2 to 15 percent
- Neldore—2 to 15 percent

Typical Profile

Bascovy
0 to 2 inches—grayish brown silty clay
2 to 10 inches—grayish brown silty clay
10 to 20 inches—grayish brown silty clay
20 to 34 inches—grayish brown silty clay
34 to 60 inches—gray consolidated shale
Neldore
0 to 2 inches—grayish brown silty clay
2 to 9 inches—grayish brown silty clay
9 to 17 inches—grayish brown silty clay
17 to 60 inches—grayish brown consolidated shale

Soil Properties and Qualities

Bascovy
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Very slow
Available water capacity: Mainly 5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Slow to rapid
Neldore
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Slow to rapid

Inclusions

- Moderately saline and moderately sodic soils along small, intermittent drainageways
- Soils, on knolls and ridgetops, that have consolidated shale within a depth of 10 inches
- Soils on slopes of more than 15 percent
- Soils that have scattered stones and boulders on the surface (northern part of the county)

Uses of the Unit

Major current uses:
- Rangeland that in some areas supports scattered ponderosa pine and Rocky Mountain juniper

Cropland

Bascovy and Neldore
Commonly grown crops:
- Nonirrigated—none

Bascovy
Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Depth to consolidated shale
- Poor tilth

Neldore
Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Depth to consolidated shale
- Poor tilth

Rangeland

Bascovy
Range site:
- Clayey, 10- to 14-inch precipitation zone

Neldore
Range site:
• Shallow Clay, 10- to 14-inch precipitation zone

Windbreaks

Bascovy
Windbreak suitability group:
• 3M
Neldore
Windbreak suitability group:
• 4

9—Bascovy-Neldore-Neldore, moist, silty clays, 6 to 60 percent slopes

Composition

Bascovy and similar soils: 40 percent
Neldore and similar soils: 25 percent
Neldore, moist, and similar soils: 25 percent
Inclusions: 10 percent

Setting

Location in survey area: Mainly northern part of county
Landform: Uplands
Landscape position:
• Bascovy—foot slopes, swales, along ridges
• Neldore—side slopes that have mainly southern aspects
• Neldore, moist—side slopes that have mainly northern aspects
Slope range:
• Bascovy—6 to 15 percent
• Neldore—6 to 60 percent
• Neldore, moist—6 to 60 percent

Typical Profile

Bascovy
0 to 2 inches—grayish brown silty clay
2 to 10 inches—grayish brown silty clay
10 to 20 inches—grayish brown silty clay
20 to 34 inches—grayish brown silty clay
34 to 60 inches—gray consolidated shale
Neldore
0 to 2 inches—light brownish gray silty clay
2 to 13 inches—light brownish gray silty clay
13 to 60 inches—light brownish gray consolidated shale
Neldore, moist
1 inch to 0—organic mat
0 to 2 inches—grayish brown silty clay
2 to 15 inches—grayish brown silty clay
15 to 60 inches—light brownish gray consolidated shale

Soil Properties and Qualities

Bascovy
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Very slow
Available water capacity: Mainly 5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium or rapid
Neldore
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid
Neldore, moist
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid

Inclusions

• Deep soils in narrow drainageways
• Soils, on ridgetops, that are 10 inches deep to consolidated shale
• Rock outcrops

Uses of the Unit

Major current uses:
• Rangeland
• Wildlife habitat

Cropland

Bascovy, Neldore, and Neldore, moist
Commonly grown crops:
• Nonirrigated—none
Bascovy
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Restrictive permeability

• Depth to consolidated shale
• Poor tilth

Neldore and Neldore, moist

Capability classification:
• Nonirrigated—VIIe

Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth

Rangeland

Bascovy

Range site:
• Clayey, 10- to 14-inch precipitation zone

Neldore

Range site:
• Shallow Clay, 10- to 14-inch precipitation zone

Grazable Understory

Neldore, moist

Potential native forest understory plants: Bluebunch wheatgrass, Rocky Mountain juniper, western wheatgrass, threadleaf sedge

Range in production of air-dry vegetation (pounds per acre): Years of above average precipitation—750; years of below average precipitation—550

Woodland

Neldore, moist

Woodland suitability subclass:
• 1D

Estimated average annual production (CMAI):
• Cubic feet per acre—15
• Board feet per acre (Scribner rule)—35

Windbreaks

Bascovy

Windbreak suitability group:
• 3M

Neldore

Windbreak suitability group:
• 4

10—Blackhall-Rock outcrop-Twilight complex, 8 to 45 percent slopes

Composition

Blackhall and similar soils: 45 percent
Rock outcrop: 25 percent (semiconsolidated sandstone)
Twilight and similar soils: 20 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Landscape position:
• Blackhall and Rock outcrop—upper side slopes, tops of ridges
• Twilight—lower side slopes

Slope range:
• Blackhall—8 to 45 percent
• Rock outcrop—variable
• Twilight—8 to 15 percent

Typical Profile

Blackhall

0 to 2 inches—light olive brown fine sandy loam
2 to 13 inches—yellowish brown fine sandy loam
13 to 60 inches—light yellowish brown semiconsolidated sandstone

Twilight

0 to 3 inches—light olive brown sandy loam
3 to 11 inches—light olive brown sandy loam
11 to 29 inches—light yellowish brown fine sandy loam
29 to 60 inches—light olive brown semiconsolidated sandstone

Soil Properties and Qualities

Blackhall

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from semiconsolidated sandstone
Permeability: Moderately rapid
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium or rapid

Twilight

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from semiconsolidated sandstone
Permeability: Moderately rapid
Available water capacity: Mainly 4 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Inclusions

• Soils on slopes of more than 45 percent
• Soils, on ridgetops, that are 5 to 10 inches deep to sedimentary beds

Uses of the Unit

Major current uses:
• Rangeland that in some areas supports scattered Ponderosa pine and Rocky Mountain juniper

Cropland

Blackhall, Rock outcrop, and Twilight
Commonly grown crops:
• Nonirrigated—none
Blackhall
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Depth to semiconsolidated sandstone
Rock outcrop
Capability classification:
• VIII
Twilight
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Depth to semiconsolidated sandstone

Rangeland

Blackhall
Range site:
• Shallow, 10- to 14-inch precipitation zone
Twilight
Range site:
• Sandy, 10- to 14-inch precipitation zone

Windbreaks

Blackhall
Windbreak suitability group:
• 4
Twilight
Windbreak suitability group:
• 3M

11—Busby fine sandy loam, 8 to 15 percent slopes

Composition

Busby and similar soils: 95 percent
Inclusions: 5 percent

Setting

Location in survey area: Throughout
Landform: Fans
Slope range: 8 to 15 percent

Typical Profile

0 to 3 inches—light brownish gray fine sandy loam
3 to 14 inches—grayish brown fine sandy loam
14 to 60 inches—grayish brown and light brownish gray fine sandy loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Moderately rapid
Available water capacity: Mainly 7 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

• Soils on slopes of more than 15 percent

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland

Cropland

Commonly grown crops:
• Nonirrigated—winter wheat
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Water erosion

Rangeland

Range site:
• Sandy, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 2M

12—Busby-Blackhall fine sandy loams, 8 to 15 percent slopes

Composition

Busby and similar soils: 55 percent
Blackhall and similar soils: 35 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout

Landform: Uplands
Landscape position:
• Busby—side slopes
• Blackhall—ridgetops
Slope range:
• Busby—8 to 15 percent
• Blackhall—8 to 15 percent

Typical Profile

Busby
0 to 3 inches—light brownish gray fine sandy loam
3 to 14 inches—grayish brown fine sandy loam
14 to 60 inches—grayish brown and light brownish gray fine sandy loam
Blackhall
0 to 2 inches—light olive brown fine sandy loam
2 to 13 inches—yellowish brown fine sandy loam
13 to 60 inches—light yellowish brown semiconsolidated sandstone

Soil Properties and Qualities

Busby
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Moderately rapid
Available water capacity: Mainly 7 inches
Potential rooting depth: 40 inches or more
Runoff: Medium
Blackhall
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from semiconsolidated sandstone
Permeability: Moderately rapid
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium

Inclusions

• Soils on slopes of more than 15 percent
• Rock outcrops
• Soils, on ridgetops, that are about 12 inches deep to hard sandstone

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland

Cropland

Busby and Blackhall
Commonly grown crops:
• Nonirrigated—winter wheat, spring wheat, barley

Busby
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
Blackhall
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Depth to sandstone

Rangeland

Busby
Range site:
• Sandy, 10- to 14-inch precipitation zone
Blackhall
Range site:
• Shallow, 10- to 14-inch precipitation zone

Windbreaks

Busby
Windbreak suitability group:
• 2M
Blackhall
Windbreak suitability group:
• 4

13—Busby-Twilight complex, 2 to 8 percent slopes

Composition

Busby and similar soils: 45 percent
Twilight and similar soils: 40 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Fans, uplands
Slope range:
• Busby—2 to 8 percent
• Twilight—2 to 8 percent

Typical Profile

Busby
0 to 3 inches—light brownish gray fine sandy loam
3 to 14 inches—grayish brown fine sandy loam
14 to 60 inches—grayish brown and light brownish gray fine sandy loam

Twilight
0 to 3 inches—light olive brown sandy loam
3 to 11 inches—light olive brown sandy loam
11 to 29 inches—light yellowish brown fine sandy loam
29 to 60 inches—light olive brown semiconsolidated sandstone

Soil Properties and Qualities

Busby
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Moderately rapid
Available water capacity: Mainly 7 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Twilight
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from semiconsolidated sandstone
Permeability: Moderately rapid
Available water capacity: Mainly 4 inches
Potential rooting depth: 20 to 40 inches
Runoff: Slow

Inclusions

- Soils on slopes of more than 8 percent
- Soils, on small knolls, that are 10 to 20 inches deep to semiconsolidated sandstone

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland

Cropland

Busby and Twilight
Commonly grown crops:
- Nonirrigated—winter wheat, spring wheat, barley

Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Limited available water capacity
- Depth to semiconsolidated sandstone

Rangeland

Busby and Twilight
Range site:
- Sandy, 10- to 14-inch precipitation zone

Windbreaks

Busby
Windbreak suitability group:
- 2M

Twilight
Windbreak suitability group:
- 3M

14—Cabbart loam, 8 to 15 percent slopes

Composition

Cabbart and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range: 8 to 15 percent

Typical Profile

0 to 3 inches—light olive brown loam
3 to 17 inches—light gray and light yellowish brown loam
17 to 60 inches—light brownish gray weakly consolidated sedimentary beds

Soil Properties and Qualities

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid

Inclusions

- Soils on slopes of more than 15 percent
- Soils that are silty clay loam between depths of 10 to 20 inches

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Depth to weakly consolidated sedimentary beds

Rangeland

Range site:
- Shallow, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 4

15—Cabbart-Crago-Delpoint complex, 8 to 35 percent slopes

Composition

Cabbart and similar soils: 40 percent
Crago and similar soils: 30 percent
Delpoint and similar soils: 20 percent
Inclusions: 10 percent

Setting

Location in survey area: Mainly southwestern part
Landform: Terraces, uplands
Landscape position:
• Cabbart—upper side slopes
• Crago—upper part of terraces
• Delpoint—lower side slopes
Slope range:
• Cabbart—8 to 35 percent
• Crago—15 to 35 percent
• Delpoint—8 to 15 percent

Typical Profile

Cabbart
0 to 3 inches—light olive brown loam
3 to 15 inches—light gray and light yellowish brown loam
15 to 60 inches—light brownish gray weakly consolidated sedimentary beds
Crago
0 to 6 inches—brown gravelly loam
6 to 18 inches—light yellowish brown gravelly loam
18 to 40 inches—very pale brown extremely gravelly sandy loam
40 to 60 inches—very pale brown extremely gravelly loamy sand
Delpoint
0 to 3 inches—dark brown loam
3 to 12 inches—dark brown loam
12 to 28 inches—light yellowish brown loam
28 to 60 inches—light gray weakly consolidated sedimentary beds

Soil Properties and Qualities

Cabbart
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid
Crago
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: In the upper 18 inches—moderate; below this depth—rapid
Available water capacity: Mainly 3.5 inches
Potential rooting depth: 40 inches or more
Runoff: Rapid
Delpoint
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 5.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Inclusions

• Soils on slopes of more than 35 percent
• Soils that are silty clay or silty clay loam throughout the profile

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Cabbart, Crago, and Delpoint
Commonly grown crops:
• Nonirrigated—none
Cabbart
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Depth to weakly consolidated sedimentary beds
Crago
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Surface coarse fragments

Delpoint
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Depth to weakly consolidated sedimentary beds

Rangeland

Cabbart
Range site:
• Shallow, 10- to 14-inch precipitation zone
Crago
Range site:
• Gravel, 10- to 14-inch precipitation zone
Delpoint
Range site:
• Silty, 10- to 14-inch precipitation zone

Windbreaks

Cabbart and Crago
Windbreak suitability group:
• 4
Delpoint
Windbreak suitability group:
• 2M

16—Cabbart-Delpoint loams, 4 to 15 percent slopes

Composition

Cabbart and similar soils: 50 percent
Delpoint and similar soils: 40 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Landscape position:
• Cabbart—upper side slopes, tops of knolls
• Delpoint—lower side slopes
Slope range:
• Cabbart—8 to 15 percent
• Delpoint—4 to 8 percent

Typical Profile

Cabbart
0 to 3 inches—light olive brown loam
3 to 17 inches—light gray and light yellowish brown loam
17 to 60 inches—light brownish gray weakly consolidated sedimentary beds
Delpoint
0 to 3 inches—pale brown loam
3 to 12 inches—brown loam
12 to 28 inches—yellowish brown loam
28 to 60 inches—light gray weakly consolidated sedimentary beds

Soil Properties and Qualities

Cabbart
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium
Delpoint
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 5.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Inclusions

• Soils on slopes of more than 15 percent
• Soils, on ridgetops, that are sandy loam throughout the profile
• Soils that are silty clay loam and silty clay throughout the profile
• Rock outcrops

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland

Cropland

Cabbart and Delpoint
Commonly grown crops:
• Nonirrigated—none
Cabbart
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Depth to weakly consolidated sedimentary beds

Delpoint
Capability classification:
• Nonirrigated—IIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Depth to weakly consolidated sedimentary beds

Rangeland

Cabbart
Range site:
• Shallow, 10- to 14-inch precipitation zone
Delpoint
Range site:
• Silty, 10- to 14-inch precipitation zone

Windbreaks

Cabbart
Windbreak suitability group:
• 4
Delpoint
Windbreak suitability group:
• 2M

17—Cabbart-Delpoint-Cabbart, moist, loams, 4 to 35 percent slopes

Composition

Cabbart and similar soils: 35 percent
Delpoint and similar soils: 30 percent
Cabbart, moist, and similar soils: 20 percent
Inclusions: 15 percent

Setting

Location in survey area: Mainly northern part of the county
Landform: Uplands
Landscape position:
• Cabbart and Cabbart, moist—side slopes, ridgetops
• Delpoint—foot slopes
Slope range:
• Cabbart—4 to 35 percent
• Delpoint—4 to 15 percent
• Cabbart, moist—4 to 35 percent

Typical Profile

Cabbart
0 to 3 inches—light brownish gray loam
3 to 13 inches—light gray loam
13 to 60 inches—light gray weakly consolidated sedimentary beds
Delpoint
0 to 3 inches—pale brown loam
3 to 12 inches—brown loam
12 to 28 inches—light yellowish brown loam
28 to 60 inches—light gray weakly consolidated sedimentary beds
Cabbart, moist
1 inch to 0—organic mat
0 to 3 inches—light brownish gray loam
3 to 13 inches—light gray loam
13 to 60 inches—light gray weakly consolidated sedimentary beds

Soil Properties and Qualities

Cabbart
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid or very rapid
Delpoint
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium
Cabbart, moist
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid or very rapid

Inclusions

• Soils on slopes of more than 35 percent
• Soils, on ridgetops, that are 5 to 10 inches deep to weakly consolidated sedimentary beds
• Rock outcrops

Uses of the Unit

Major current uses:
• Rangeland
• Wildlife habitat

Cropland

Cabbart, Delpoint, and Cabbart, moist
Commonly grown crops:
• Nonirrigated—none
Cabbart and Cabbart, moist
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Depth to sedimentary beds
Delpoint
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Depth to sedimentary beds

Rangeland

Cabbart
Range site:
• Shallow, 10- to 14-inch precipitation zone
Delpoint
Range site:
• Silty, 10- to 14-inch precipitation zone

Grazable Understory

Cabbart, moist
Potential native forest understory plants: Bluebunch wheatgrass, little bluestem, ponderosa pine, Rocky Mountain juniper
Range in production of air-dry vegetation (pounds per acre): Years of above average precipitation—700; years of below average precipitation—500

Woodland

Cabbart, moist
Woodland suitability subclass:
• 1D
Estimated average annual production (CMAI):
• Cubic feet per acre—15
• Board feet per acre (Scribner rule)—30

Windbreaks

Cabbart
Windbreak suitability group:
• 4
Delpoint
Windbreak suitability group:
• 2M

18—Cabbart-Delpoint-Rock outcrop complex, 8 to 45 percent slopes

Composition

Cabbart and similar soils: 40 percent
Delpoint and similar soils: 25 percent
Rock outcrop: 25 percent (weakly consolidated sedimentary beds, semiconsolidated sandstone)
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Landscape position:
• Cabbart and Rock outcrop—side slopes, tops of ridges
• Delpoint—foot slopes
Slope range:
• Cabbart—8 to 45 percent
• Delpoint—8 to 15 percent
• Rock outcrop—variable

Typical Profile

Cabbart
0 to 3 inches—light olive brown loam
3 to 15 inches—light gray and light yellowish brown loam
15 to 60 inches—light brownish gray weakly consolidated sedimentary beds
Delpoint
0 to 3 inches—pale brown loam
3 to 11 inches—brown loam
11 to 28 inches—light yellowish brown loam
28 to 60 inches—light gray weakly consolidated sedimentary beds

Soil Properties and Qualities

Cabbart
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid or very rapid
Delpoint
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 5 inches

Potential rooting depth: 20 to 40 inches
Runoff: Medium

Inclusions

- Soils on slopes of more than 45 percent
- Soils, on ridgetops, that are silty clay throughout the profile

Uses of the Unit

Major current uses:
- Rangeland
- Wildlife habitat

Cropland

Cabbart, Delpoint, and Rock outcrop
Commonly grown crops:
- Nonirrigated—none

Cabbart
Capability classification:
- Nonirrigated—VIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Slope
- Limited available water capacity
- Depth to weakly consolidated sedimentary beds

Delpoint
Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Depth to weakly consolidated sedimentary beds

Rock outcrop
Capability classification:
- VIII

Rangeland

Cabbart
Range site:
- Shallow, 10- to 14-inch precipitation zone

Delpoint
Range site:
- Silty, 10- to 14-inch precipitation zone

Windbreaks

Cabbart
Windbreak suitability group:
- 4

Delpoint
Windbreak suitability group:
- 2M

19—Cabbart-Rock outcrop-Blackhall complex, 8 to 45 percent slopes

Composition

Cabbart and similar soils: 45 percent
Rock outcrop: 25 percent (weakly consolidated sedimentary beds, semiconsolidated sandstone, hard sandstone)
Blackhall and similar soils: 20 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
- Cabbart—8 to 45 percent
- Rock outcrop—variable
- Blackhall—8 to 25 percent

Typical Profile

Cabbart
0 to 3 inches—light olive brown loam
3 to 15 inches—light gray and light yellowish brown loam
15 to 60 inches—light brownish gray weakly consolidated sedimentary beds

Blackhall
0 to 2 inches—light olive brown sandy loam
2 to 13 inches—yellowish brown sandy loam
13 to 60 inches—light yellowish brown semiconsolidated sandstone

Soil Properties and Qualities

Cabbart
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid or very rapid

Blackhall
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from semiconsolidated sandstone
Permeability: Moderately rapid
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium

Inclusions

- Soils on slopes of more than 45 percent

• Soils that are silty clay loam throughout the profile
• Soils, on ridgetops, that are 5 to 10 inches deep to semiconsolidated sandstone

Uses of the Unit

Major current uses:
• Rangeland
• Wildlife habitat

Cropland

Cabbart, Rock outcrop, and Blackhall
Commonly grown crops:
• Nonirrigated—none
Cabbart and Blackhall
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Depth to sedimentary beds and sandstone
Rock outcrop
Capability classification:
• VIII

Rangeland

Cabbart and Blackhall
Range site:
• Shallow, 10- to 14-inch precipitation zone

Windbreaks

Cabbart and Blackhall
Windbreak suitability group:
• 4

20—Cabbart-Yawdim-Delpoint complex, 15 to 35 percent slopes

Composition

Cabbart and similar soils: 40 percent
Yawdim and similar soils: 25 percent
Delpoint and similar soils: 20 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Landscape position:
• Cabbart and Yawdim—side slopes, ridgetops
• Delpoint—foot slopes
Slope range:
• Cabbart—15 to 35 percent
• Yawdim—15 to 35 percent
• Delpoint—15 to 25 percent

Typical Profile

Cabbart
0 to 3 inches—light olive brown loam
3 to 15 inches—light gray and light yellowish brown loam
15 to 60 inches—light brownish gray weakly consolidated sedimentary beds
Yawdim
0 to 2 inches—light brownish gray silty clay
2 to 16 inches—light brownish gray silty clay
16 to 60 inches—gray consolidated shale
Delpoint
0 to 3 inches—pale brown loam
3 to 11 inches—brown loam
11 to 28 inches—light yellowish brown loam
28 to 60 inches—light gray weakly consolidated sedimentary beds

Soil Properties and Qualities

Cabbart
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid or very rapid
Yawdim
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Very rapid
Delpoint
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Rapid

Inclusions

• Soils on slopes of more than 35 percent
• Rock outcrops

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Cabbart, Yawdim, and Delpoint
Commonly grown crops:
- Nonirrigated—none

Cabbart and Yawdim
Capability classification:
- Nonirrigated—VIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Slope
- Limited available water capacity
- Depth to sedimentary beds

Delpoint
Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Slope
- Limited available water capacity
- Depth to sedimentary beds

Rangeland

Cabbart
Range site:
- Shallow, 10- to 14-inch precipitation zone

Yawdim
Range site:
- Shallow Clay, 10- to 14-inch precipitation zone

Delpoint
Range site:
- Thin Silty, 10- to 14-inch precipitation zone

Windbreaks

Cabbart, Yawdim, and Delpoint
Windbreak suitability group:
- 4

21—Cabbart-Yawdim-Rock outcrop complex, 4 to 35 percent slopes

Composition

Cabbart and similar soils: 45 percent
Yawdim and similar soils: 25 percent
Rock outcrop: 15 percent (weakly consolidated sedimentary beds, consolidated shale)
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
- Cabbart—4 to 35 percent
- Yawdim—4 to 35 percent
- Rock outcrop—variable

Typical Profile

Cabbart
0 to 3 inches—light olive brown loam
3 to 15 inches—light gray and light yellowish brown loam
15 to 60 inches—light brownish gray weakly consolidated sedimentary beds

Yawdim
0 to 2 inches—light brownish gray silty clay
2 to 16 inches—light brownish gray silty clay
16 to 60 inches—light gray consolidated shale

Soil Properties and Qualities

Cabbart
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid

Yawdim
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid or very rapid

Inclusions

- Soils on slopes of more than 35 percent
- Soils, on ridgetops, that have weakly consolidated sedimentary beds, or have consolidated shale at a depth of 5 to 10 inches
- Soils, on ridgetops, that are shallow and sandy loam throughout the profile

Uses of the Unit

Major current uses:
- Rangeland that in some areas supports scattered ponderosa pine and Rocky Mountain juniper

Cropland

Cabbart, Yawdim, and Rock outcrop
Commonly grown crops:
• Nonirrigated—none
Cabbart and Yawdim
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Depth to weakly consolidated sedimentary beds and consolidated shale
Rock outcrop
Capability classification:
• VIII

Rangeland

Cabbart
Range site:
• Shallow, 10- to 14-inch precipitation zone
Yawdim
Range site:
• Shallow Clay, 10- to 14-inch precipitation zone

Windbreaks

Cabbart and Yawdim
Windbreak suitability group:
• 4

22—Cabbart, high precipitation-Cabbart, moist, complex, 15 to 60 percent slopes

Composition

Cabbart, high precipitation, and similar soils: 45 percent
Cabbart, moist, and similar soils: 40 percent
Inclusions: 15 percent

Setting

Location in survey area: Mainly northern part
Landform: Uplands
Landscape position:
• Cabbart, high precipitation—north aspects
• Cabbart, moist—other aspects
Slope range:
• Cabbart, high precipitation—15 to 60 percent
• Cabbart, moist—15 to 60 percent

Typical Profile

Cabbart, high precipitation
1 inch to 0—organic mat
0 to 3 inches—yellowish brown fine sandy loam
3 to 16 inches—yellowish brown and light yellowish brown loam
16 to 60 inches—very pale brown weakly consolidated sedimentary beds
Cabbart, moist
1 inch to 0—organic mat
0 to 4 inches—grayish brown loam
4 to 16 inches—light brownish gray loam
16 to 60 inches—light gray weakly consolidated sedimentary beds

Soil Properties and Qualities

Cabbart, high precipitation
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid or very rapid
Cabbart, moist
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid or very rapid

Inclusions

• Soils, on ridgetops, that are 5 to 10 inches deep to weakly consolidated sedimentary beds
• Rock outcrops

Uses of the Unit

Major current uses:
• Rangeland
• Wildlife habitat

Cropland

Cabbart, high precipitation, and Cabbart, moist
Commonly grown crops:
• Nonirrigated—none
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity

Grazable Understory

Cabbart, high precipitation

Potential native forest understory plants: Bluebunch wheatgrass, Rocky Mountain juniper, ponderosa pine, common snowberry

Range in production of air-dry vegetation (pounds per acre): Years of above average precipitation—400; years of below average precipitation—300

Cabbart, moist

Potential native forest understory plants: Bluebunch wheatgrass, little bluestem, ponderosa pine, Rocky Mountain juniper

Range in production of air-dry vegetation (pounds per acre): Years of above average precipitation—700; years of below average precipitation—500

Woodland

Cabbart, high precipitation

Woodland suitability subclass:

• 2D

Estimated average annual production (CMAI):

• Cubic feet per acre—25

• Board feet per acre (Scribner rule)—60

Cabbart, moist

Woodland suitability subclass:

• 1D

Estimated average annual production (CMAI):

• Cubic feet per acre—15

• Board feet per acre (Scribner rule)—30

Windbreaks

Cabbart, high precipitation, and Cabbart, moist

Windbreak suitability group:

• 4

23—Cabbart, moist-Blackhall-Delpoint complex, 6 to 60 percent slopes

Composition

Cabbart, moist, and similar soils: 40 percent
Blackhall and similar soils: 25 percent
Delpoint and similar soils: 20 percent
Inclusions: 15 percent

Setting

Location in survey area: Mainly northern part
Landform: Uplands
Landscape position:

• Cabbart, moist, and Blackhall—mainly on side slopes

• Delpoint—foot slopes, small upland meadows

Slope range:

• Cabbart, moist—15 to 60 percent

• Blackhall—6 to 60 percent

• Delpoint—6 to 15 percent

Typical Profile

Cabbart, moist

1 inch to 0—organic mat
0 to 2 inches—light brownish gray loam
2 to 12 inches—light gray loam
12 to 60 inches—light gray weakly consolidated sedimentary beds

Blackhall

0 to 2 inches—light olive brown fine sandy loam
2 to 13 inches—yellowish brown fine sandy loam
13 to 60 inches—light yellowish brown semiconsolidated sandstone

Delpoint

0 to 3 inches—pale brown loam
3 to 12 inches—brown loam
12 to 28 inches—light yellowish brown loam
28 to 60 inches—light gray weakly consolidated sedimentary beds

Soil Properties and Qualities

Cabbart, moist

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid or very rapid

Blackhall

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from semiconsolidated sandstone
Permeability: Moderately rapid
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium or rapid

Delpoint

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Inclusions

• Soils, on ridgetops, that have sedimentary beds at a depth of 5 to 10 inches

• Rock outcrops

Uses of the Unit

Major current uses:
• Rangeland
• Wildlife habitat

Cropland

Cabbart, moist, Blackhall, and Delpoint
Commonly grown crops:
• Nonirrigated—none
Cabbart, moist, and Blackhall
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Depth to sedimentary beds
Delpoint
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Depth to sedimentary beds

Rangeland

Blackhall
Range site:
• Shallow, 10- to 14-inch precipitation zone
Delpoint
Range site:
• Silty, 10- to 14-inch precipitation zone

Grazable Understory

Cabbart, moist
Potential native forest understory plants: Bluebunch wheatgrass, little bluestem, ponderosa pine, Rocky Mountain juniper
Range in production of air-dry vegetation (pounds per acre): Years of above average precipitation—700; years of below average precipitation—500

Woodland

Cabbart, moist
Woodland suitability subclass:
• 1D
Estimated average annual production (CMAI):
• Cubic feet per acre—15
• Board feet per acre (Scribner rule)—30

Windbreaks

Cabbart, moist
Windbreak suitability group:
• 4
Blackhall
Windbreak suitability group:
• 4
Delpoint
Windbreak suitability group:
• 2M

24—Chinook fine sandy loam, 2 to 8 percent slopes

Composition

Chinook and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces, uplands
Slope range: 2 to 8 percent

Typical Profile

0 to 4 inches—grayish brown fine sandy loam
4 to 60 inches—dark grayish brown and light brownish gray fine sandy loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium or eolian material
Permeability: Moderately rapid
Available water capacity: Mainly 7 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

• Soils on slopes of more than 8 percent
• Soils, on small knolls, that are 20 to 40 inches deep over semiconsolidated sandstone

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland

Cropland

Commonly grown crops:
• Nonirrigated—winter wheat, spring wheat, barley
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing

Rangeland

Range site:
• Sandy, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 2M

25—Crago gravelly loam, 0 to 8 percent slopes

Composition

Crago and similar soils: 95 percent
Inclusions: 5 percent

Setting

Location in survey area: Mainly southwestern part
Landform: Fans, terraces
Slope range: 0 to 8 percent

Typical Profile

0 to 6 inches—brown gravelly loam
6 to 18 inches—light yellowish brown gravelly loam
18 to 40 inches—very pale brown extremely gravelly sandy loam
40 to 60 inches—very pale brown extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium; source—limestone
Permeability: In the upper 18 inches—moderate; below this depth—rapid
Available water capacity: Mainly 3.5 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

• Soils that have a cobbly loam surface layer

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Commonly grown crops:
• Nonirrigated—none
Capability classification:
• Nonirrigated—VIs
Main soil limitations and hazards:
• Soil blowing
• Limited available water capacity
• Surface coarse fragments
• Lime content

Rangeland

Range site:
• Gravel, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 3L

26—Crago gravelly loam, 8 to 35 percent slopes

Composition

Crago and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Mainly southwestern part
Landform: Terraces
Slope range: 8 to 35 percent

Typical Profile

0 to 6 inches—brown gravelly loam
6 to 18 inches—light yellowish brown gravelly loam
18 to 40 inches—very pale brown extremely gravelly sandy loam
40 to 60 inches—very pale brown extremely gravelly loamy sand

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium; source—limestone
Permeability: In the upper 18 inches—moderate; below this depth—rapid
Available water capacity: Mainly 3.5 inches
Potential rooting depth: 40 inches or more
Runoff: Medium to very rapid

Inclusions

• Soils on slopes of more than 35 percent
• Soils that have a surface layer of cobbly loam

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Commonly grown crops:
• Nonirrigated—none
Capability classification:
• Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Slope
- Limited available water capacity
- Surface coarse fragments
- Lime content

Rangeland

Range site:
- Gravel, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 4

27—Crago-Musselshell-Crago complex, 0 to 4 percent slopes

Composition

Crago loam and similar soils: 45 percent
Musselshell and similar soils: 30 percent
Crago gravelly loam and similar soils: 20 percent
Inclusions: 5 percent

Setting

Location in survey area: Mainly southwestern part
Landform: Fans, terraces
Slope range:
- Crago loam—0 to 4 percent
- Musselshell—0 to 2 percent
- Crago gravelly loam—0 to 4 percent

Typical Profile

Crago loam
0 to 7 inches—brown loam
7 to 19 inches—very pale brown extremely gravelly loam
19 to 60 inches—brownish yellow extremely gravelly sandy loam
Musselshell
0 to 4 inches—dark grayish brown loam
4 to 13 inches—pale brown loam
13 to 25 inches—very pale brown loam
25 to 60 inches—very pale brown very gravelly fine sandy loam
Crago gravelly loam
0 to 6 inches—brown gravelly loam
6 to 18 inches—light yellowish brown gravelly loam
18 to 40 inches—very pale brown extremely gravelly sandy loam
40 to 60 inches—very pale brown extremely gravelly loamy sand

Soil Properties and Qualities

Crago loam
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium; source—limestone
Permeability: In the upper 19 inches—moderate; below this depth—rapid
Available water capacity: Mainly 3.5 inches
Potential rooting depth: 40 inches or more
Runoff: Slow
Musselshell
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium; source—limestone
Permeability: In the upper 25 inches—moderate; below this depth—moderately rapid
Available water capacity: Mainly 7 inches
Potential rooting depth: 40 inches or more
Runoff: Slow
Crago gravelly loam
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium; source—limestone
Permeability: In the upper 18 inches—moderate; below this depth—rapid
Available water capacity: Mainly 3.5 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 4 percent
- Soils that have a surface layer of very gravelly loam
- Soils that have a surface layer of cobbly loam

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Crago loam, Musselshell, and Crago gravelly loam
Commonly grown crops:
- Nonirrigated—none

Crago loam and Crago gravelly loam
Capability classification:
- Nonirrigated—VIs

Main soil limitations and hazards:
- Soil blowing
- Limited available water capacity
- Surface coarse fragments
- Lime content

Musselshell
Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Limited available water capacity
- Lime content

Rangeland

Crago loam and Crago gravelly loam
Range site:
- Gravel, 10- to 14-inch precipitation zone

Musselshell
Range site:
- Silty-limy, 10- to 14-inch precipitation zone

Windbreaks

Crago loam and Crago gravelly loam
Windbreak suitability group:
- 3L

Musselshell
Windbreak suitability group:
- 2L

28—Crago-Musselshell-Attewan complex, 0 to 2 percent slopes

Composition

Crago and similar soils: 40 percent
Musselshell and similar soils: 30 percent
Attewan and similar soils: 20 percent
Inclusions: 10 percent

Setting

Location in survey area: Mainly southwestern part
Landform: Fans, terraces
Slope range:
- Crago—0 to 2 percent
- Musselshell—0 to 2 percent
- Attewan—0 to 2 percent

Typical Profile

Crago
0 to 6 inches—brown gravelly loam
6 to 18 inches—light yellowish brown gravelly loam
18 to 40 inches—very pale brown extremely gravelly sandy loam
40 to 60 inches—very pale brown extremely gravelly loamy sand

Musselshell
0 to 4 inches—dark grayish brown loam
4 to 13 inches—pale brown loam
13 to 25 inches—very pale brown loam
25 to 60 inches—very pale brown very gravelly fine sandy loam

Attewan
0 to 3 inches—brown loam
3 to 12 inches—brown clay loam
12 to 30 inches—grayish brown and light brownish gray clay loam
30 to 60 inches—light yellowish brown very gravelly loamy sand

Soil Properties and Qualities

Crago
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium; source—limestone
Permeability: In the upper 18 inches—moderate; below this depth—rapid
Available water capacity: Mainly 3.5 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Musselshell
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium; source—limestone
Permeability: In the upper 25 inches—moderate; below this depth—moderately rapid
Available water capacity: Mainly 7 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Attewan
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: In the upper 30 inches—moderate; below this depth—rapid
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 2 percent
- Soils that have a surface layer of very gravelly loam

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Crago, Musselshell, and Attewan
Commonly grown crops:
- Nonirrigated—none

Crago
Capability classification:
- Nonirrigated—VIs

Main soil limitations and hazards:
- Soil blowing
- Limited available water capacity
- Surface coarse fragments
- Lime content

Musselshell
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Limited available water capacity
• Lime content
Attewan
Capability classification:
• Nonirrigated—IIIe
Main soil limitations and hazards:
• Soil blowing
• Limited available water capacity

Rangeland

Crago
Range site:
• Gravel, 10- to 14-inch precipitation zone
Musselshell
Range site:
• Silty-limy, 10- to 14-inch precipitation zone
Attewan
Range site:
• Silty, 10- to 14-inch precipitation zone

Windbreaks

Crago
Windbreak suitability group:
• 3L
Musselshell
Windbreak suitability group:
• 2L
Attewan
Windbreak suitability group:
• 2M

29—Creed-Gerdrum complex, 1 to 6 percent slopes

Composition

Creed and similar soils: 60 percent
Gerdrum and similar soils: 30 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Fans
Slope range:
• Creed—1 to 6 percent
• Gerdrum—1 to 6 percent

Typical Profile

Creed
0 to 6 inches—light brownish gray and light gray loam
6 to 20 inches—brown and grayish brown silty clay
20 to 31 inches—grayish brown silty clay
31 to 60 inches—dark grayish brown silty clay
Gerdrum
0 to 6 inches—light brownish gray clay loam (mixed)
6 to 15 inches—brown and light brownish gray silty clay
15 to 60 inches—grayish brown and gray silty clay

Soil Properties and Qualities

Creed
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 31 and 60 inches—moderately saline
Sodicity: Between depths of 6 and 20 inches—moderately sodic
Permeability: Slow
Available water capacity: Mainly 7 inches
Potential rooting depth: 40 inches or more
Runoff: Medium
Gerdrum
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 15 and 60 inches—moderately saline
Sodicity: Between depths of 4 and 12 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

• Soils on slopes of more than 6 percent
• Moderately well drained soils in small, intermittent drainageways
• Soils that have a crusted surface and that are strongly saline throughout

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland

Cropland

Creed and Gerdrum
Commonly grown crops:
• Nonirrigated—winter wheat
Creed
Capability classification:
• Nonirrigated and irrigated—IVe
Main soil limitations and hazards:
• Soil blowing

• Water erosion
• Restrictive permeability
• Poor tilth
• Sodium content
• Salt content

Gerdrum

Capability classification:
• Nonirrigated and irrigated—VIe

Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Restrictive permeability
• Poor tilth
• Sodium content
• Salt content

Rangeland

Creed

Range site:
• Claypan, 10- to 14-inch precipitation zone

Gerdrum

Range site:
• Claypan, 10- to 14-inch precipitation zone

Windbreaks

Creed and Gerdrum

Windbreak suitability group:
• 3S

30—Delpoint loam, 2 to 8 percent slopes

Composition

Delpoint and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range: 2 to 8 percent

Typical Profile

0 to 3 inches—pale brown loam
3 to 12 inches—brown loam
12 to 30 inches—light yellowish brown loam
30 to 60 inches—light gray weakly consolidated sedimentary beds

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 5.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Inclusions

• Soils on slopes of more than 8 percent
• Soils that have a surface layer of sandy loam
• Soils, on small knolls, that are 10 to 20 inches deep to consolidated sedimentary beds

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland

Cropland

Commonly grown crops:
• Nonirrigated—winter wheat, spring wheat, barley

Capability classification:
• Nonirrigated—IIIe

Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Depth to weakly consolidated sedimentary beds

Rangeland

Range site:
• Silty, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 2M

31—Delpoint-Cabbart loams, 2 to 8 percent slopes

Composition

Delpoint and similar soils: 65 percent
Cabbart and similar soils: 25 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
• Delpoint—2 to 8 percent
• Cabbart—2 to 8 percent

Typical Profile

Delpoint

0 to 3 inches—pale brown loam
3 to 12 inches—brown loam

12 to 30 inches—light yellowish brown loam
30 to 60 inches—light gray weakly consolidated sedimentary beds

Cabbart
0 to 3 inches—light olive brown loam
3 to 17 inches—light gray and light yellowish brown loam
17 to 60 inches—light brownish gray weakly consolidated sedimentary beds

Soil Properties and Qualities

Delpoint
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 5.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Cabbart
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium

Inclusions

- Soils on slopes of more than 8 percent
- Soils that are silty clay throughout the profile
- Soils, on small knolls, that are sandy loam throughout
- Soils that are moderately saline and are along small, intermittent drainageways
- Rock outcrops

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland

Cropland

Delpoint and Cabbart
Commonly grown crops:
- Nonirrigated—winter wheat, spring wheat, barley

Delpoint
Capability classification:
- Nonirrigated—IIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Depth to weakly consolidated sedimentary beds

Cabbart
Capability classification:
- Nonirrigated—VIs

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Depth to weakly consolidated sedimentary beds
- Lime content

Rangeland

Delpoint
Range site:
- Silty, 10- to 14-inch precipitation zone

Cabbart
Range site:
- Shallow, 10- to 14-inch precipitation zone

Windbreaks

Delpoint
Windbreak suitability group:
- 2M

Cabbart
Windbreak suitability group:
- 4

32—Delpoint-Cabbart-Yamac loams, 4 to 15 percent slopes

Composition

Delpoint and similar soils: 50 percent
Cabbart and similar soils: 25 percent
Yamac and similar soils: 15 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
- Delpoint—4 to 15 percent
- Cabbart—8 to 15 percent
- Yamac—4 to 8 percent

Typical Profile

Delpoint
0 to 3 inches—pale brown loam
3 to 12 inches—brown loam
12 to 28 inches—light yellowish brown loam
28 to 60 inches—light gray weakly consolidated sedimentary beds

Cabbart
0 to 3 inches—light olive brown loam

3 to 16 inches—light gray and light yellowish brown loam
16 to 60 inches—light brownish gray weakly consolidated sedimentary beds

Yamac

0 to 3 inches—brown loam
3 to 12 inches—yellowish brown clay loam
12 to 60 inches—light brownish gray clay loam

Soil Properties and Qualities

Delpoint

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 5.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Cabbart

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium

Yamac

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Moderate
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils on slopes of more than 15 percent
- Rock outcrops

Uses of the Unit

Major current uses:
- Rangeland that in some areas supports scattered ponderosa pine and Rocky Mountain juniper
- Nonirrigated cropland

Cropland

Delpoint, Cabbart, and Yamac

Commonly grown crops:
- Nonirrigated—winter wheat, spring wheat, barley

Delpoint and Yamac

Capability classification:
- Nonirrigated—IIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Depth to weakly consolidated sedimentary beds

Cabbart

Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Depth to weakly consolidated sedimentary beds
- Lime content

Rangeland

Delpoint and Yamac

Range site:
- Silty, 10- to 14-inch precipitation zone

Cabbart

Range site:
- Shallow, 10- to 14-inch precipitation zone

Windbreaks

Delpoint

Windbreak suitability group:
- 2M

Cabbart

Windbreak suitability group:
- 4

Yamac

Windbreak suitability group:
- 1

33—Ethridge clay loam, 0 to 2 percent slopes

Composition

Ethridge and similar soils: 95 percent
Inclusions: 5 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces
Slope range: 0 to 2 percent

Typical Profile

0 to 4 inches—grayish brown clay loam
4 to 27 inches—dark grayish brown and light brownish gray silty clay loam
27 to 60 inches—light brownish gray silty clay loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)

Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Slow
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

• Soils on slopes of more than 2 percent
• Soils that are moderately saline and are along small, intermittent drainageways

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland
• Irrigated cropland (prime farmland if irrigated)

Cropland

Commonly grown crops:
• Nonirrigated—winter wheat, spring wheat, barley
• Irrigated—alfalfa for hay
Capability classification:
• Nonirrigated and irrigated—IIIe
Main soil limitations and hazards:
• Soil blowing
• Restrictive permeability

Rangeland

Range site:
• Clayey, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 1

34—Ethridge clay loam, 2 to 8 percent slopes

Composition

Ethridge and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces
Slope range: 2 to 8 percent

Typical Profile

0 to 4 inches—grayish brown clay loam
4 to 27 inches—dark grayish brown and light brownish gray silty clay loam
27 to 60 inches—light brownish gray silty clay loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Slow
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

• Soils on slopes of more than 8 percent
• Soils that are moderately saline and are along small, intermittent drainageways

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland

Cropland

Commonly grown crops:
• Nonirrigated—winter wheat, spring wheat, barley
Capability classification:
• Nonirrigated—IIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion

Rangeland

Range site:
• Clayey, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 1

35—Evanston loam, 0 to 2 percent slopes

Composition

Evanston and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces
Slope range: 0 to 2 percent

Typical Profile

0 to 4 inches—brown loam
4 to 16 inches—pale brown clay loam
16 to 60 inches—light gray clay loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained

Parent material: Kind—alluvium
Permeability: Moderate
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 2 percent
- Soils that have a surface layer of fine sandy loam
- Soils that have gravelly sandy loam at a depth of 30 to 60 inches
- Soils that are fine textured throughout the profile and are along small, intermittent drainageways

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland
- Irrigated cropland: This unit is prime farmland if irrigated

Cropland

Commonly grown crops:
- Nonirrigated—winter wheat, spring wheat, barley
- Irrigated—alfalfa for hay

Capability classification:
- Nonirrigated—IIIe
- Irrigated—IIe

Main soil limitations and hazards:
- Soil blowing

Rangeland

Range site:
- Silty, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 1

36—Evanston loam, 2 to 8 percent slopes

Composition

Evanston and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces
Slope range: 2 to 8 percent

Typical Profile

0 to 4 inches—brown loam
4 to 16 inches—pale brown clay loam
16 to 60 inches—light gray clay loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Moderate
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils on slopes of more than 8 percent
- Soils that have a surface layer of fine sandy loam
- Soils that are fine-textured throughout the profile and are along small, intermittent drainageways
- Soils that have gravelly sandy loam at a depth of 30 to 60 inches

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland

Cropland

Commonly grown crops:
- Nonirrigated—winter wheat, spring wheat, barley

Capability classification:
- Nonirrigated—IIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion

Rangeland

Range site:
- Silty, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 1

37—Evanston-Attewan loams, 0 to 2 percent slopes

Composition

Evanston and similar soils: 45 percent
Attewan and similar soils: 40 percent
Inclusions: 15 percent

Setting

Location in survey area: Mainly southwestern part
Landform: Terraces
Slope range:
- Evanston—0 to 2 percent
- Attewan—0 to 2 percent

Typical Profile

Evanston
0 to 4 inches—brown loam
4 to 16 inches—pale brown clay loam
16 to 60 inches—light gray clay loam
Attewan
0 to 3 inches—brown loam
3 to 12 inches—brown clay loam
12 to 30 inches—grayish brown and light brownish gray clay loam
30 to 60 inches—light yellowish brown very gravelly loamy sand

Soil Properties and Qualities

Evanston
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Moderate
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Slow
Attewan
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: In the upper 30 inches—moderate; below this depth—rapid
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 2 percent
- Soils that have a gravelly surface layer
- Soils that have very gravelly loamy sand at a depth of about 15 inches

Uses of the Unit

Major current uses:
- Rangeland
- Irrigated cropland (prime farmland if irrigated)

Cropland

Evanston and Attewan
Commonly grown crops:
- Nonirrigated—none
- Irrigated—alfalfa for hay

Evanston
Capability classification:
- Nonirrigated—IIIe
- Irrigated—IIe

Main soil limitations and hazards:
- Soil blowing

Attewan
Capability classification:
- Nonirrigated—IIIe
- Irrigated—IIe

Main soil limitations and hazards:
- Soil blowing
- Limited available water capacity

Rangeland

Evanston and Attewan
Range site:
- Silty, 10- to 14-inch precipitation zone

Windbreaks

Evanston
Windbreak suitability group:
- 1

Attewan
Windbreak suitability group:
- 2M

38—Gerdrum-Bascovy clays, 2 to 15 percent slopes

Composition

Gerdrum and similar soils: 60 percent
Bascovy and similar soils: 30 percent
Inclusions: 10 percent

Setting

Location in survey area: Mainly northern part
Landform: Uplands
Slope range:
- Gerdrum—2 to 15 percent
- Bascovy—2 to 15 percent

Typical Profile

Gerdrum
0 to 5 inches—light brownish gray clay (mixed)
5 to 15 inches—brown and light brownish gray silty clay
15 to 60 inches—grayish brown and gray silty clay
Bascovy
0 to 2 inches—grayish brown silty clay
2 to 10 inches—grayish brown silty clay
10 to 20 inches—grayish brown silty clay
20 to 34 inches—grayish brown silty clay
34 to 60 inches—gray consolidated shale

Soil Properties and Qualities

Gerdrum
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium

Salinity: Between depths of 15 and 60 inches—moderately saline
Sodicity: Between depths of 5 and 15 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Medium or rapid

Bascovy
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Very slow
Available water capacity: Mainly 5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium or rapid

Inclusions

- Soils on slopes of more than 15 percent
- Soils, along small, intermittent drainageways, that are strongly saline throughout the profile
- Soils, on small knolls and ridges, that are 10 to 20 inches deep to consolidated shale
- Soils that have scattered stones and boulders on the surface (northern part of the county)

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Gerdrum and Bascovy
Commonly grown crops:
- Nonirrigated—none

Gerdrum
Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Sodium content
- Salt content

Bascovy
Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Depth to consolidated shale

Rangeland

Gerdrum
Range site:
- Claypan, 10- to 14-inch precipitation zone

Bascovy
Range site:
- Clayey, 10- to 14-inch precipitation zone

Windbreaks

Gerdrum
Windbreak suitability group:
- 3S

Bascovy
Windbreak suitability group:
- 3M

39—Gerdrum-Creed complex, 1 to 6 percent slopes

Composition

Gerdrum and similar soils: 50 percent
Creed and similar soils: 40 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces
Slope range:
- Gerdrum—1 to 6 percent
- Creed—1 to 6 percent

Typical Profile

Gerdrum
0 to 6 inches—light brownish gray clay loam (mixed)
6 to 15 inches—brown and light brownish gray silty clay
15 to 60 inches—grayish brown and gray silty clay

Creed
0 to 7 inches—light brownish gray and light gray loam
7 to 20 inches—brown and grayish brown silty clay
20 to 31 inches—grayish brown silty clay
31 to 60 inches—dark grayish brown silty clay

Soil Properties and Qualities

Gerdrum
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 15 and 60 inches—moderately saline
Sodicity: Between depths of 6 and 15 inches—moderately sodic

Permeability: Very slow
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Creed
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 31 and 60 inches—slightly saline
Sodicity: Between depths of 7 and 20 inches—moderately sodic
Permeability: Slow
Available water capacity: Mainly 7 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils on slopes of more than 6 percent
- Soils, along small, intermittent drainageways, that are strongly saline throughout the profile
- Moderately well drained soils in and along small, intermittent drainageways

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Gerdrum and Creed
Commonly grown crops:
- Nonirrigated—none

Gerdrum
Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Sodium content
- Salt content

Creed
Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Sodium content
- Salt content

Rangeland

Gerdrum and Creed
Range site:
- Claypan, 10- to 14-inch precipitation zone

Windbreaks

Gerdrum and Creed
Windbreak suitability group:
- 3S

40—Gerdrum-Vanda complex, 1 to 6 percent slopes

Composition

Gerdrum and similar soils: 55 percent
Vanda and similar soils: 30 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces
Slope range:
- Gerdrum—1 to 6 percent
- Vanda—1 to 6 percent

Typical Profile

Gerdrum
0 to 6 inches—light brownish gray clay loam (mixed)
6 to 15 inches—brown and light brownish gray silty clay
15 to 60 inches—grayish brown and gray silty clay

Vanda
0 to 7 inches—dark brown silty clay (mixed)
7 to 60 inches—brown, grayish brown, and dark grayish brown silty clay

Soil Properties and Qualities

Gerdrum
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 15 and 60 inches—moderately saline
Sodicity: Between depths of 6 and 15 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Vanda
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Throughout the profile—moderately or strongly saline

Sodicity: Between depths of 12 and 60 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils on slopes of more than 6 percent
- Moderately well drained soils in and along small, intermittent drainageways

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Gerdrum and Vanda
Commonly grown crops:
- Nonirrigated—none

Gerdrum
Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Sodium content
- Salt content

Vanda
Capability classification:
- Nonirrigated—VIIs

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Sodium content
- Salt content

Rangeland

Gerdrum
Range site:
- Claypan, 10- to 14-inch precipitation zone

Vanda
Range site:
- Saline Upland, 10- to 14-inch precipitation zone

Windbreaks

Gerdrum
Windbreak suitability group:
- 3S

Vanda
Windbreak suitability group:
- 4

41—Gerdrum-Vanda-Creed complex, 0 to 8 percent slopes

Composition

Gerdrum and similar soils: 50 percent
Vanda and similar soils: 25 percent
Creed and similar soils: 20 percent
Inclusions: 5 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces
Slope range:
- Gerdrum—0 to 8 percent
- Vanda—0 to 8 percent
- Creed—0 to 8 percent

Typical Profile

Gerdrum
0 to 6 inches—light brownish gray clay loam (mixed)
6 to 15 inches—brown and light brownish gray silty clay
15 to 60 inches—grayish brown and gray silty clay

Vanda
0 to 7 inches—dark brown silty clay (mixed)
7 to 60 inches—brown, grayish brown, and dark grayish brown silty clay

Creed
0 to 6 inches—light brownish gray and gray loam
6 to 20 inches—brown and grayish brown silty clay
20 to 31 inches—grayish brown silty clay
31 to 60 inches—dark grayish brown silty clay

Soil Properties and Qualities

Gerdrum
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 15 and 60 inches—moderately saline
Sodicity: Between depths of 6 and 15 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Vanda
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium

Salinity: Throughout the profile—moderately or strongly saline
Sodicity: Between depths of 12 and 60 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Creed

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 31 and 60 inches—slightly saline
Sodicity: Between depths of 6 and 20 inches—moderately sodic
Permeability: Slow
Available water capacity: Mainly 7 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils on slopes of more than 8 percent
- Moderately well drained soils in and along small, intermittent drainageways

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Gerdrum, Vanda, and Creed

Commonly grown crops:
- Nonirrigated—none

Gerdrum

Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Sodium content
- Salt content

Vanda

Capability classification:
- Nonirrigated—VIIs

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Sodium content
- Salt content

Creed

Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Sodium content
- Salt content

Rangeland

Gerdrum and Creed

Range site:
- Claypan, 10- to 14-inch precipitation zone

Vanda

Range site:
- Saline Upland, 10- to 14-inch precipitation zone

Windbreaks

Gerdrum and Creed

Windbreak suitability group:
- 3S

Vanda

Windbreak suitability group:
- 4

42—Harlem silty clay, 0 to 2 percent slopes

Composition

Harlem and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Along major drainageways
Landform: Flood plains, stream terraces
Slope range: 0 to 2 percent

Typical Profile

0 to 3 inches—light brownish gray silty clay
3 to 60 inches—pale brown silty clay and silty clay loam that has thin strata of loam and silt loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—rare; time of year—April through June
Permeability: Slow
Available water capacity: Mainly 9 inches

Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 2 percent
- Soils that are moderately saline

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland
- Irrigated cropland

Cropland

Commonly grown crops:
- Nonirrigated—spring wheat, winter wheat, barley, alfalfa for hay
- Irrigated—spring wheat, barley, alfalfa for hay, grasses and legumes for hay

Capability classification:
- Nonirrigated and irrigated—IVs

Main soil limitations and hazards:
- Soil blowing
- Restrictive permeability
- Poor tilth

Rangeland

Range site:
- Clayey, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 1

43—Harlem silty clay, 0 to 2 percent slopes, occasionally flooded

Composition

Harlem and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Along major drainageways
Landform: Flood plains
Slope range: 0 to 2 percent

Typical Profile

0 to 3 inches—light brownish gray silty clay
3 to 60 inches—pale brown silty clay and silty clay loam that has thin strata of silt loam and loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—occasional; time of year—April through June
Permeability: Slow
Available water capacity: Mainly 9 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 2 percent
- Moderately saline soils
- Moderately well drained soils

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland

Cropland

Commonly grown crops:
- Nonirrigated—grass for hay

Capability classification:
- Nonirrigated—IVw

Main soil limitations and hazards:
- Flooding
- Soil blowing
- Restrictive permeability
- Poor tilth

Rangeland

Range site:
- Overflow, 10- to 14-inch precipitation zone
- Periodic flooding increases the amount of moisture available for plants and thus increases the amount of forage produced
- Cottonwood trees grow naturally in places on this site

Windbreaks

Windbreak suitability group:
- 1

44—Harlem silty clay, saline, 0 to 2 percent slopes

Composition

Harlem and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Along major drainageways
Landform: Flood plains, stream terraces
Slope range: 0 to 2 percent

Typical Profile

0 to 10 inches—light brownish gray silty clay

10 to 60 inches—light gray and light brownish gray silty clay

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—rare; time of year—April through June
Salinity: In the upper 10 inches—slightly saline; between depths of 10 and 60 inches—moderately saline
Permeability: Slow
Available water capacity: Mainly 7 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 2 percent
- Somewhat poorly drained soils
- Soils that are clay throughout the profile

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIs

Main soil limitations and hazards:
- Limited available water capacity
- Restrictive permeability
- Salt content
- Soil blowing
- Poor tilth

Rangeland

Range site:
- Saline Lowland, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 3S

45—Harlem-Havre complex, 0 to 2 percent slopes

Composition

Harlem and similar soils: 45 percent
Havre and similar soils: 40 percent
Inclusions: 15 percent

Setting

Location in survey area: Along major drainageways
Landform: Flood plains, stream terraces
Slope range:
- Harlem—0 to 2 percent
- Havre—0 to 2 percent

Typical Profile

Harlem
0 to 3 inches—light brownish gray silty clay
3 to 60 inches—pale brown silty clay and silty clay loam that has thin strata of loam and silt loam

Havre
0 to 6 inches—grayish brown loam
6 to 60 inches—light brownish gray loam that has thin strata of sandy loam, silt loam, and clay loam

Soil Properties and Qualities

Harlem
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—rare; time of year—April through June
Permeability: Slow
Available water capacity: Mainly 9 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Havre
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—rare; time of year—April through June
Permeability: Moderate
Available water capacity: Mainly 9.5 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 2 percent
- Moderately saline soils

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland
- Irrigated cropland

Cropland

Harlem and Havre
Commonly grown crops:
- Nonirrigated—spring wheat, winter wheat, barley, alfalfa for hay

• Irrigated—alfalfa for hay, grasses and legumes for hay
Harlem
Capability classification:
• Nonirrigated and irrigated—IVs
Main soil limitations and hazards:
• Restrictive permeability
• Poor tilth
• Soil blowing
Havre
Capability classification:
• Nonirrigated—IIIe
• Irrigated—IIe
Main soil limitations and hazards:
• Soil blowing

Rangeland

Harlem
Range site:
• Clayey, 10- to 14-inch precipitation zone
Havre
Range site:
• Silty, 10- to 14-inch precipitation zone

Windbreaks

Harlem and Havre
Windbreak suitability group:
• 1

46—Harlem-Havre complex, 0 to 2 percent slopes, occasionally flooded

Composition

Harlem and similar soils: 45 percent
Havre and similar soils: 40 percent
Inclusions: 15 percent

Setting

Location in survey area: Along major drainageways
Landform: Flood plains
Slope range:
• Harlem—0 to 2 percent
• Havre—0 to 2 percent

Typical Profile

Harlem
0 to 3 inches—light brownish gray silty clay
3 to 60 inches—pale brown silty clay and silty clay loam that has thin strata of silt loam and loam
Havre
0 to 6 inches—grayish brown loam
6 to 60 inches—light brownish gray loam that has thin strata of sandy loam, silt loam, and clay loam

Soil Properties and Qualities

Harlem
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—occasional; time of year—April through June
Permeability: Slow
Available water capacity: Mainly 9 inches
Potential rooting depth: 40 inches or more
Runoff: Slow
Havre
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—occasional; time of year—April through June
Permeability: Moderate
Available water capacity: Mainly 9.5 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

• Soils on slopes of more than 2 percent
• Moderately saline soils

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland

Cropland

Harlem and Havre
Commonly grown crops:
• Nonirrigated—grass for hay
Harlem
Capability classification:
• Nonirrigated—IVw
Main soil limitations and hazards:
• Flooding
• Restrictive permeability
• Poor tilth
• Soil blowing
Havre
Capability classification:
• Nonirrigated—IIIw
Main soil limitations and hazards:
• Flooding
• Soil blowing

Rangeland

Harlem and Havre
Range site:
• Overflow, 10- to 14-inch precipitation zone

Windbreaks

Harlem and Havre
Windbreak suitability group:
• 1

47—Harlem-Havre complex, saline, 0 to 2 percent slopes

Composition

Harlem and similar soils: 45 percent
Havre and similar soils: 40 percent
Inclusions: 15 percent

Setting

Location in survey area: Along major drainageways
Landform: Flood plains, stream terraces
Slope range:
• Harlem—0 to 2 percent slopes
• Havre—0 to 2 percent slopes

Typical Profile

Harlem
0 to 10 inches—light brownish gray silty clay
10 to 60 inches—light gray and light brownish gray silty clay
Havre
0 to 3 inches—brown loam
3 to 10 inches—dark grayish brown clay loam
10 to 60 inches—dark grayish brown clay loam

Soil Properties and Qualities

Harlem
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—rare; time of year—April through June
Salinity: In the upper 10 inches—slightly saline; below this depth—moderately saline
Permeability: Slow
Available water capacity: Mainly 7 inches
Potential rooting depth: 40 inches or more
Runoff: Slow
Havre
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—rare; time of year—April through June
Salinity: Between depths of 10 and 60 inches—moderately saline
Permeability: Moderate
Available water capacity: Mainly 7 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

• Soils on slopes of more than 2 percent
• Soils that are strongly saline

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Harlem and Havre
Commonly grown crops:
• Nonirrigated—none
Harlem
Capability classification:
• Nonirrigated—VIs
Main soil limitations and hazards:
• Salt content
• Limited available water capacity
• Restrictive permeability
• Poor tilth
• Soil blowing
Havre
Capability classification:
• Nonirrigated—VIs
Main soil limitations and hazards:
• Salt content
• Limited available water capacity
• Soil blowing

Rangeland

Harlem and Havre
Range site:
• Saline Lowland, 10- to 14-inch precipitation zone

Windbreaks

Harlem and Havre
Windbreak suitability group:
• 3S

48—Havre loam, 0 to 2 percent slopes

Composition

Havre and similar soils: 85 percent
Inclusions: 15 percent

Setting

Location in survey area: Along major drainageways
Landform: Flood plains, stream terraces
Slope range: 0 to 2 percent

Typical Profile

0 to 6 inches—grayish brown loam

6 to 60 inches—light brownish gray loam that has thin strata of sandy loam, silt loam, and clay loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—rare; time of year—April through June
Permeability: Moderate
Available water capacity: Mainly 9.5 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 2 percent
- Soils that are silty clay throughout the profile
- Soils that are sandy loam throughout the profile
- Moderately saline soils

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland
- Irrigated cropland (prime farmland if irrigated)

Cropland

Commonly grown crops:
- Nonirrigated—spring wheat, winter wheat, barley, grass for hay
- Irrigated—alfalfa for hay, grass for hay

Capability classification:
- Nonirrigated—IIIe
- Irrigated—IIe

Main soil limitations and hazards:
- Soil blowing

Rangeland

Range site:
- Silty, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 1

49—Havre loam, 0 to 2 percent slopes, occasionally flooded

Composition

Havre and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Along major drainageways
Landform: Flood plains
Slope range: 0 to 2 percent

Typical Profile

0 to 7 inches—light brownish gray loam
7 to 38 inches—light brownish gray loam that has thin strata of sandy loam
38 to 60 inches—light brownish gray loam that has thin strata of silt loam and silty clay loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—occasional; time of year—April through June
Permeability: Moderate
Available water capacity: Mainly 9.5 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 2 percent
- Soils that are silty clay throughout the profile
- Soils that are sandy loam throughout the profile

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland (prime farmland if irrigated)

Cropland

Commonly grown crops:
- Nonirrigated—spring wheat, winter wheat, barley, alfalfa for hay, grass for hay

Capability classification:
- Nonirrigated—IIIw
- Irrigated—IIw

Main soil limitations and hazards:
- Soil blowing
- Flooding

Rangeland

Range site:
- Overflow, 10- to 14-inch precipitation zone
- Periodic flooding increases the amount of moisture available for plants, and thus increases the amount of forage produced
- Cottonwood trees grow naturally in places on this site

Windbreaks

Windbreak suitability group:
- 1

50—Havre-Glendive complex, 0 to 2 percent slopes

Composition

Havre and similar soils: 45 percent
Glendive and similar soils: 40 percent
Inclusions: 15 percent

Setting

Location in survey area: Along major drainageways
Landform: Flood plains, stream terraces
Slope range:
• Havre—0 to 2 percent
• Glendive—0 to 2 percent

Typical Profile

Havre
0 to 6 inches—grayish brown loam
6 to 60 inches—light brownish gray loam that has thin strata of sandy loam, silt loam, and clay loam
Glendive
0 to 4 inches—grayish brown fine sandy loam
4 to 45 inches—grayish brown fine sandy loam
45 to 60 inches—brown fine sandy loam

Soil Properties and Qualities

Havre
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—rare; time of year—April through June
Permeability: Moderate
Available water capacity: Mainly 9.5 inches
Potential rooting depth: 40 inches or more
Runoff: Slow
Glendive
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—rare; time of year—April through June
Permeability: Moderately rapid
Available water capacity: Mainly 8.5 inches
Potential rooting depth: 40 inches or more
Runoff: Very slow

Inclusions

• Soils on slopes of more than 2 percent
• Soils that are silty clay throughout the profile
• Soils that are loamy sand throughout the profile
• Moderately saline soils

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland
• Irrigated cropland

Cropland

Havre and Glendive
Commonly grown crops:
• Nonirrigated—spring wheat, winter wheat, barley, grass for hay
• Irrigated—alfalfa for hay, grass for hay
Havre
Capability classification:
• Nonirrigated—IIIe
• Irrigated—IIe
Main soil limitations and hazards:
• Soil blowing
Glendive
Capability classification:
• Nonirrigated and irrigated—IVe
Main soil limitations and hazards:
• Soil blowing

Rangeland

Havre
Range site:
• Silty, 10- to 14-inch precipitation zone
Glendive
Range site:
• Sandy, 10- to 14-inch precipitation zone

Windbreaks

Havre
Windbreak suitability group:
• 1
Glendive
Windbreak suitability group:
• 2M

51—Havre-Glendive complex, 0 to 2 percent slopes, occasionally flooded

Composition

Havre and similar soils: 45 percent
Glendive and similar soils: 40 percent
Inclusions: 15 percent

Setting

Location in survey area: Along major drainageways
Landform: Flood plains

Slope range:
• Havre—0 to 2 percent
• Glendive—0 to 2 percent

Typical Profile

Havre
0 to 7 inches—light brownish gray loam
7 to 38 inches—light brownish gray loam that has thin strata of sandy loam
38 to 60 inches—light brownish gray loam that has thin strata of silt loam and silty clay loam
Glendive
0 to 4 inches—grayish brown fine sandy loam
4 to 45 inches—grayish brown fine sandy loam
45 to 60 inches—brown fine sandy loam

Soil Properties and Qualities

Havre
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—occasional; time of year—April through June
Permeability: Moderate
Available water capacity: Mainly 9.5 inches
Potential rooting depth: 40 inches or more
Runoff: Slow
Glendive
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—occasional; time of year—April through June
Permeability: Moderately rapid
Available water capacity: Mainly 8.5 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

• Soils that are silty clay throughout the profile
• Moderately saline soils
• Riverwash

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland

Cropland

Havre and Glendive
Commonly grown crops:
• Nonirrigated—spring wheat, winter wheat, barley, grass for hay

Havre
Capability classification:
• Nonirrigated—IIIw
Main soil limitations and hazards:
• Soil blowing
• Flooding
Glendive
Capability classification:
• Nonirrigated—IVw
Main soil limitations and hazards:
• Soil blowing
• Flooding

Rangeland

Havre and Glendive
Range site:
• Overflow, 10- to 14-inch precipitation zone

Windbreaks

Havre
Windbreak suitability group:
• 1
Glendive
Windbreak suitability group:
• 2M

52—Havre-Harlem complex, 0 to 2 percent slopes, occasionally flooded, channeled

Composition

Havre and similar soils: 50 percent
Harlem and similar soils: 40 percent
Inclusions: 10 percent

Setting

Location in survey area: Along drainageways
Landform: Flood plains
Slope range:
• Havre—0 to 2 percent
• Harlem—0 to 2 percent

Typical Profile

Havre
0 to 6 inches—grayish brown loam
6 to 60 inches—light brownish gray loam that has thin strata of sandy loam, silt loam, and clay loam
Harlem
0 to 3 inches—light brownish gray silty clay
3 to 60 inches—pale brown silty clay and silty clay loam that has thin strata of silt loam

Soil Properties and Qualities

Havre
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—occasional; time of year—April through June
Permeability: Moderate
Available water capacity: Mainly 9.5 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Harlem
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—occasional; time of year—April through June
Permeability: Slow
Available water capacity: Mainly 9 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 2 percent
- Moderately saline soils

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Havre and Harlem
Commonly grown crops:
- Nonirrigated—none

Havre
Capability classification:
- Nonirrigated—VIw

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Flooding
- Inaccessible to machinery because of channeling

Harlem
Capability classification:
- Nonirrigated—VIw

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Flooding
- Inaccessible to machinery because of channeling
- Restrictive permeability
- Poor tilth

Rangeland

Havre and Harlem
Range site:
- Overflow, 10- to 14-inch precipitation zone

Windbreaks

Havre and Harlem
Windbreak suitability group:
- 1

53—Havre-Yamac loams, 0 to 4 percent slopes

Composition

Havre and similar soils: 60 percent
Yamac and similar soils: 30 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Flood plains, fans, foot slopes
Landscape position:
- Havre—flood plains
- Yamac—fans, foot slopes

Slope range:
- Havre—0 to 2 percent
- Yamac—2 to 4 percent

Typical Profile

Havre
0 to 6 inches—grayish brown loam
6 to 60 inches—light brownish gray loam that has thin strata of sandy loam, silt loam, and silty clay loam

Yamac
0 to 3 inches—brown loam
3 to 12 inches—yellowish brown clay loam
12 to 60 inches—light brownish gray clay loam

Soil Properties and Qualities

Havre
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—occasional; time of year—April through June
Permeability: Moderate
Available water capacity: Mainly 9.5 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Yamac
Depth class: Deep (40 inches or more)
Drainage class: Well drained

Parent material: Kind—alluvium
Hazard of flooding: Frequency—none
Permeability: Moderate
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Moderately saline soils
- Soils that are silty clay throughout the profile
- Moderately well drained soils
- Soils on slopes of more than 4 percent

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland (prime farmland if irrigated)

Cropland

Havre and Yamac
Commonly grown crops:
- Nonirrigated—none

Havre
Capability classification:
- Nonirrigated—IIIw
- Irrigated—IIw

Main soil limitations and hazards:
- Flooding
- Soil blowing

Yamac
Capability classification:
- Nonirrigated—IIIe
- Irrigated—IIe

Main soil limitations and hazards:
- Soil blowing

Rangeland

Havre
Range site:
- Overflow, 10- to 14-inch precipitation zone

Yamac
Range site:
- Silty, 10- to 14-inch precipitation zone

Windbreaks

Havre and Yamac
Windbreak suitability group:
- 1

54—Kobar-Zatoville silty clay loams, 1 to 6 percent slopes

Composition

Kobar and similar soils: 60 percent
Zatoville and similar soils: 25 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces
Slope range:
- Kobar—1 to 6 percent
- Zatoville—1 to 6 percent

Typical Profile

Kobar
0 to 5 inches—grayish brown silty clay loam
5 to 16 inches—grayish brown silty clay loam
16 to 60 inches—light brownish gray silty clay loam

Zatoville
0 to 3 inches—light brownish gray silty clay loam
3 to 17 inches—light brownish gray and pale brown silty clay
17 to 23 inches—light brownish gray silty clay
23 to 60 inches—light brownish gray silty clay

Soil Properties and Qualities

Kobar
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Slow
Available water capacity: Mainly 9 inches
Potential rooting depth: 40 inches or more
Runoff: Slow or medium

Zatoville
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 17 and 60 inches—moderately saline
Sodicity: Between depths of 17 and 60 inches—moderately sodic
Permeability: Slow
Available water capacity: Mainly 8 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils on slopes of more than 6 percent
- Soils, on small knolls, that have consolidated shale at a depth of 30 to 40 inches

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland

Cropland

Kobar and Zatoville
Commonly grown crops:
• Nonirrigated—spring wheat, winter wheat, barley, grass for hay
Kobar
Capability classification:
• Nonirrigated—IIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Restrictive permeability
Zatoville
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Restrictive permeability
• Salt content
• Sodium content

Rangeland

Kobar
Range site:
• Clayey, 10- to 14-inch precipitation zone
Zatoville
Range site:
• Clayey Saline, 10- to 14-inch precipitation zone

Windbreaks

Kobar
Windbreak suitability group:
• 2M
Zatoville
Windbreak suitability group:
• 3S

55—Kremlin loam, 0 to 2 percent slopes

Composition

Kremlin and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range: 0 to 2 percent

Typical Profile

0 to 6 inches—dark grayish brown loam
6 to 14 inches—brown loam
14 to 60 inches—pale brown and light brownish gray loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Moderate
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

• Soils on slopes of more than 2 percent
• Soils that are sandy loam throughout the profile

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland (prime farmland if irrigated)

Cropland

Commonly grown crops:
• Nonirrigated—spring wheat, winter wheat
Capability classification:
• Nonirrigated—IIIe
• Irrigated—IIe
Main soil limitations and hazards:
• Soil blowing

Rangeland

Range site:
• Silty, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 1

56—Kremlin loam, 2 to 8 percent slopes

Composition

Kremlin and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range: 2 to 8 percent

Typical Profile

0 to 6 inches—dark grayish brown loam
6 to 14 inches—brown loam
14 to 60 inches—pale brown and light brownish gray loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained

Parent material: Kind—alluvium
Permeability: Moderate
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils on slopes of more than 8 percent
- Soils that are sandy loam throughout the profile

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland

Cropland

Commonly grown crops:
- Nonirrigated—spring wheat, winter wheat

Capability classification:
- Nonirrigated—IIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion

Rangeland

Range site:
- Silty, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 1

57—Marias silty clay, 0 to 4 percent slopes

Composition

Marias and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces
Slope range: 0 to 4 percent

Typical Profile

0 to 2 inches—brown silty clay
2 to 28 inches—brown and light brownish gray silty clay
28 to 60 inches—light brownish gray silty clay

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 28 and 60 inches—slightly saline
Permeability: Very slow
Available water capacity: Mainly 8.5 inches
Potential rooting depth: 40 inches or more
Runoff: Slow or medium

Inclusions

- Soils on slopes of more than 4 percent
- Moderately saline soils along small, intermittent drainageways

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland

Cropland

Commonly grown crops:
- Nonirrigated— winter wheat, grass for hay

Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Restrictive permeability
- Poor tilth

Rangeland

Range site:
- Clayey, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 2S

58—Marmarth fine sandy loam, 1 to 8 percent slopes

Composition

Marmarth and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range: 1 to 8 percent

Typical Profile

0 to 6 inches—grayish brown fine sandy loam
6 to 16 inches—brown sandy clay loam
16 to 27 inches—light brownish gray fine sandy loam
27 to 60 inches—weakly consolidated stratified sandstone

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sandstone

Permeability: Moderate
Available water capacity: Mainly 4.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Slow or medium

Inclusions

- Soils on slopes of more than 8 percent
- Slightly saline soils

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland

Cropland

Commonly grown crops:
- Nonirrigated—winter wheat, grass for hay

Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Limited available water capacity
- Depth to weakly consolidated sandstone
- Water erosion

Rangeland

Range site:
- Sandy, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 3M

59—Marvan silty clay, 1 to 8 percent slopes

Composition

Marvan and similar soils: 85 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces, foot slopes
Slope range: 1 to 8 percent

Typical Profile

0 to 3 inches—grayish brown silty clay
3 to 35 inches—grayish brown silty clay
35 to 60 inches—grayish brown silty clay

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 35 and 60 inches—moderately saline
Sodicity: Between depths of 35 and 60 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 6.5 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils on slopes of more than 8 percent
- Soils that have a moderately saline surface layer
- Strongly sodic soils along small, intermittent drainageways

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland
- Irrigated cropland

Cropland

Commonly grown crops:
- Nonirrigated—spring wheat, barley, grass for hay
- Irrigated—alfalfa for hay

Capability classification:
- Nonirrigated and irrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Salt content
- Sodium content

Rangeland

Range site:
- Clayey Saline, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 3S

60—Marvan-Vanda silty clays, 0 to 8 percent slopes

Composition

Marvan and similar soils: 50 percent
Vanda and similar soils: 35 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces
Slope range:
- Marvan—0 to 8 percent

• Vanda—0 to 8 percent

Typical Profile

Marvan
0 to 3 inches—grayish brown silty clay
3 to 35 inches—grayish brown silty clay
35 to 60 inches—grayish brown silty clay
Vanda
0 to 7 inches—light brownish gray silty clay (mixed)
7 to 60 inches—brown, grayish brown, and dark grayish brown silty clay

Soil Properties and Qualities

Marvan
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 35 and 60 inches—moderately saline
Sodicity: Between depths of 35 and 60 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 6.5 inches
Potential rooting depth: 40 inches or more
Runoff: Medium
Vanda
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Throughout the profile—moderately or strongly saline
Sodicity: Between depths of 12 and 60 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

• Soils on slopes of more than 8 percent
• Soils, along drainageways, that are strongly saline and sodic throughout the profile

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Marvan and Vanda
Commonly grown crops:
• Nonirrigated—none
Marvan
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Restrictive permeability
• Poor tilth
• Sodium content
• Salt content
Vanda
Capability classification:
• Nonirrigated—VIIs
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Restrictive permeability
• Poor tilth
• Sodium content
• Salt content

Rangeland

Marvan
Range site:
• Clayey Saline, 10- to 14-inch precipitation zone
Vanda
Range site:
• Saline Upland, 10- to 14-inch precipitation zone

Windbreaks

Marvan
Windbreak suitability group:
• 3S
Vanda
Windbreak suitability group:
• 4

61—Neldore silty clay, 4 to 25 percent slopes

Composition

Neldore and similar soils: 85 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range: 4 to 25 percent

Typical Profile

0 to 2 inches—grayish brown silty clay
2 to 9 inches—grayish brown silty clay
9 to 17 inches—grayish brown silty clay
17 to 60 inches—grayish brown consolidated shale

Soil Properties and Qualities

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid

Inclusions

- Moderately saline soils along small, intermittent drainageways
- Soils on slopes of more than 25 percent
- Soils, on ridgetops, that are 5 to 10 inches deep to consolidated shale
- Rock outcrops

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Slope
- Limited available water capacity
- Restrictive permeability
- Depth to consolidated shale
- Poor tilth

Rangeland

Range site:
- Shallow Clay, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 4

62—Neldore-Abor silty clays, 4 to 15 percent slopes

Composition

Neldore and similar soils: 50 percent
Abor and similar soils: 35 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
- Neldore—4 to 15 percent
- Abor—4 to 15 percent

Typical Profile

Neldore
0 to 2 inches—grayish brown silty clay
2 to 9 inches—grayish brown silty clay
9 to 17 inches—grayish brown silty clay
17 to 60 inches—grayish brown consolidated shale

Abor
0 to 2 inches—grayish brown silty clay
2 to 32 inches—light brownish gray silty clay
32 to 60 inches—grayish brown consolidated shale

Soil Properties and Qualities

Neldore
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium or rapid

Abor
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Very slow
Available water capacity: Mainly 4.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium or rapid

Inclusions

- Soils on slopes of more than 15 percent
- Moderately saline soils along small, intermittent drainageways
- Soils, on ridgetops, that are 5 to 10 inches deep to consolidated shale
- Rock outcrops

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Neldore and Abor
Commonly grown crops:
- Nonirrigated—none

Neldore
Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Depth to consolidated shale
- Poor tilth

Abor
Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Depth to consolidated shale
- Poor tilth

Rangeland

Neldore
Range site:
- Shallow Clay, 10- to 14-inch precipitation zone

Abor
Range site:
- Clayey, 10- to 14-inch precipitation zone

Windbreaks

Neldore
Windbreak suitability group:
- 4

Abor
Windbreak suitability group:
- 3M

63—Neldore-Abor silty clays, 15 to 45 percent slopes

Composition

Neldore and similar soils: 55 percent
Abor and similar soils: 30 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Landscape position:
- Neldore—upper side slopes, tops of ridges
- Abor—lower side slopes

Slope range:
- Neldore—15 to 45 percent
- Abor—15 to 25 percent

Typical Profile

Neldore
0 to 2 inches—grayish brown silty clay
2 to 9 inches—grayish brown silty clay
9 to 17 inches—grayish brown silty clay
17 to 60 inches—grayish brown consolidated shale

Abor
0 to 2 inches—grayish brown silty clay
2 to 24 inches—light brownish gray silty clay
24 to 60 inches—grayish brown consolidated shale

Soil Properties and Qualities

Neldore
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Very rapid

Abor
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Very slow
Available water capacity: Mainly 4.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Very rapid

Inclusions

- Moderately saline soils along small, intermittent drainageways
- Soils, on ridgetops, that are 5 to 10 inches deep to consolidated shale
- Rock outcrops

Uses of the Unit

Major current uses:
- Rangeland that in some areas supports scattered ponderosa pine and Rocky Mountain juniper

Cropland

Neldore and Abor
Commonly grown crops:
- Nonirrigated—none

Neldore
Capability classification:
- Nonirrigated—VIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion

• Slope
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth

Abor

Capability classification:
• Nonirrigated—VIe

Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth

Rangeland

Neldore

Range site:
• Shallow Clay, 10- to 14-inch precipitation zone

Abor

Range site:
• Thin Clayey, 10- to 14-inch precipitation zone

Windbreaks

Neldore and Abor

Windbreak suitability group:
• 4

64—Neldore-Bascovy-Rock outcrop complex, 6 to 60 percent slopes

Composition

Neldore and similar soils: 50 percent
Bascovy and similar soils: 20 percent
Rock outcrop: 20 percent (barren or nearly barren exposures of consolidated shale)
Inclusions: 10 percent

Setting

Location in survey area: Mainly central and northern part
Landform: Uplands
Landscape position:
• Neldore—side slopes, ridgetops
• Bascovy—foot slopes
Slope range:
• Neldore—6 to 60 percent
• Bascovy—6 to 15 percent
• Rock outcrop—variable

Typical Profile

Neldore

0 to 2 inches—grayish brown silty clay
2 to 9 inches—grayish brown silty clay
9 to 17 inches—grayish brown silty clay
17 to 60 inches—grayish brown consolidated shale

Bascovy

0 to 2 inches—grayish brown silty clay
2 to 10 inches—grayish brown silty clay
10 to 20 inches—grayish brown silty clay
20 to 34 inches—grayish brown silty clay
34 to 60 inches—gray consolidated shale

Soil Properties and Qualities

Neldore

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid

Bascovy

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Very slow
Available water capacity: Mainly 5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium or rapid

Inclusions

• Soils, on ridgetops, that are 5 to 10 inches deep to consolidated shale
• Deep soils in narrow drainageways

Uses of the Unit

Major current uses:
• Rangeland that in some areas supports scattered ponderosa pine and Rocky Mountain juniper

Cropland

Neldore, Bascovy, and Rock outcrop

Commonly grown crops:
• Nonirrigated—none

Neldore

Capability classification:
• Nonirrigated—VIIe

Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth
• Slope

Bascovy
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth
Rock outcrop
Capability classification:
• VIII

Rangeland

Neldore
Range site:
• Shallow Clay, 10- to 14-inch precipitation zone
Bascovy
Range site:
• Clayey, 10- to 14-inch precipitation zone

Windbreaks

Neldore
Windbreak suitability group:
• 4
Bascovy
Windbreak suitability group:
• 3M

65—Neldore-Neldore, saline, silty clays, 4 to 25 percent slopes

Composition

Neldore and similar soils: 45 percent
Neldore, saline, and similar soils: 40 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
• Neldore—4 to 25 percent
• Neldore, saline—4 to 25 percent

Typical Profile

Neldore
0 to 2 inches—grayish brown silty clay
2 to 9 inches—grayish brown silty clay
9 to 17 inches—grayish brown silty clay
17 to 60 inches—grayish brown consolidated shale
Neldore, saline
0 to 4 inches—light brownish gray silty clay
4 to 18 inches—light brownish gray silty clay
18 to 60 inches—light brownish gray consolidated shale

Soil Properties and Qualities

Neldore
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid
Neldore, saline
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Salinity: Between depths of 4 and 18 inches—slightly saline
Sodicity: Between depths of 4 and 18 inches—slightly sodic
Permeability: Slow
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid

Inclusions

• Soils on slopes of more than 25 percent
• Soils, on ridgetops, that are 5 to 10 inches deep to consolidated shale
• Rock outcrops

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Neldore and Neldore, saline
Commonly grown crops:
• Nonirrigated—none
Neldore
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Restrictive permeability
• Poor tilth
• Depth to consolidated shale
• Slope
Neldore, saline
Capability classification:
• Nonirrigated—VIIe

Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth
• Salt content
• Slope

Rangeland

Neldore
Range site:
• Shallow Clay, 10- to 14-inch precipitation zone
Neldore, saline
Range site:
• Dense Clay, 10- to 14-inch precipitation zone

Windbreaks

Neldore and Neldore, saline
Windbreak suitability group:
• 4

66—Neldore-Rock outcrop complex, 15 to 45 percent slopes

Composition

Neldore and similar soils: 55 percent
Rock outcrop: 30 percent (barren or nearly barren exposures of consolidated shale)
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
• Neldore—15 to 45 percent
• Rock outcrop—variable

Typical Profile

Neldore
0 to 2 inches—grayish brown silty clay
2 to 9 inches—grayish brown silty clay
9 to 15 inches—grayish brown silty clay
15 to 60 inches—grayish brown consolidated shale

Soil Properties and Qualities

Neldore
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Very rapid

Inclusions

• Moderately saline soils
• Soils, on ridgetops, that are 5 to 10 inches deep to consolidated shale

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Neldore and Rock outcrop
Commonly grown crops:
• Nonirrigated—none
Neldore
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth
Rock outcrop
Capability classification:
• VIII

Rangeland

Neldore
Range site:
• Shallow Clay, 10- to 14-inch precipitation zone

Windbreaks

Neldore
Windbreak suitability group:
• 4

67—Neldore-Volborg silty clays, 4 to 25 percent slopes

Composition

Neldore and similar soils: 55 percent
Volborg and similar soils: 30 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
• Neldore—4 to 25 percent
• Volborg—8 to 25 percent

Typical Profile

Neldore
0 to 2 inches—grayish brown silty clay
2 to 9 inches—grayish brown silty clay
9 to 17 inches—grayish brown silty clay
17 to 60 inches—grayish brown consolidated shale
Volborg
0 to 3 inches—light brownish gray silty clay
3 to 14 inches—light brownish gray and gray silty clay
14 to 60 inches—gray consolidated shale

Soil Properties and Qualities

Neldore
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid
Volborg
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated acid shale
Permeability: Slow
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid or very rapid

Inclusions

- Soils on slopes of more than 25 percent
- Soils, on ridgetops, that are 5 to 10 inches deep to consolidated shale
- Moderately saline soils along small, intermittent drainageways
- Rock outcrops

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Neldore and Volborg
Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Depth to consolidated shale
- Poor tilth
- Slope

Rangeland

Neldore
Range site:
- Shallow Clay, 10- to 14-inch precipitation zone

Volborg
Range site:
- Coarse Clay, 10- to 14-inch precipitation zone

Windbreaks

Neldore and Volborg
Windbreak suitability group:
- 4

68—Neldore-Weingart complex, 2 to 15 percent slopes

Composition

Neldore and similar soils: 50 percent
Weingart and similar soils: 35 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
- Neldore—4 to 15 percent
- Weingart—2 to 10 percent

Typical Profile

Neldore
0 to 2 inches—grayish brown silty clay
2 to 9 inches—grayish brown silty clay
9 to 17 inches—grayish brown silty clay
17 to 60 inches—grayish brown consolidated shale
Weingart
0 to 7 inches—light brownish gray silty clay loam (mixed)
7 to 11 inches—grayish brown silty clay
11 to 18 inches—grayish brown silty clay
18 to 29 inches—light brownish gray silty clay
29 to 60 inches—gray consolidated shale

Soil Properties and Qualities

Neldore
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches

Potential rooting depth: 10 to 20 inches
Runoff: Medium or rapid

Weingart

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Salinity: Between depths of 18 and 29 inches—moderately saline
Sodicity: Between depths of 7 and 29 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 4.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium or rapid

Inclusions

- Strongly saline soils along small, intermittent drainageways
- Soils, on ridgetops, that are 5 to 10 inches deep to consolidated shale
- Rock outcrops

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Neldore and Weingart

Commonly grown crops:
- Nonirrigated—none

Neldore

Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Depth to consolidated shale
- Poor tilth

Weingart

Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Depth to consolidated shale
- Poor tilth
- Sodium content
- Salt content

Rangeland

Neldore

Range site:
- Shallow Clay, 10- to 14-inch precipitation zone

Weingart

Range site:
- Claypan, 10- to 14-inch precipitation zone

Windbreaks

Neldore

Windbreak suitability group:
- 4

Weingart

Windbreak suitability group:
- 3S

69—Neldore-Yawdim complex, 4 to 25 percent slopes

Composition

Neldore and similar soils: 50 percent
Yawdim and similar soils: 40 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
- Neldore—4 to 25 percent
- Yawdim—4 to 25 percent

Typical Profile

Neldore

0 to 2 inches—grayish brown silty clay
2 to 9 inches—grayish brown silty clay
9 to 17 inches—grayish brown silty clay
17 to 60 inches—grayish brown consolidated shale

Yawdim

0 to 2 inches—light brownish gray silty clay loam
2 to 16 inches—light brownish gray silty clay
16 to 60 inches—gray consolidated shale

Soil Properties and Qualities

Neldore

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid

Yawdim
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid

Inclusions

- Soils, on ridgetops, that are 5 to 10 inches deep to consolidated shale
- Rock outcrops
- Moderately saline soils along small, intermittent drainageways

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Neldore and Yawdim
Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Slope
- Limited available water capacity
- Restrictive permeability
- Depth to consolidated shale
- Poor tilth

Rangeland

Neldore and Yawdim
Range site:
- Shallow Clay, 10- to 14-inch precipitation zone

Windbreaks

Neldore and Yawdim
Windbreak suitability group:
- 4

70—Neldore, moist-Bascovy-Neldore, south, silty clays, 6 to 60 percent slopes

Composition

Neldore, moist, and similar soils: 50 percent
Bascovy and similar soils: 20 percent
Neldore, south, and similar soils: 15 percent
Inclusions: 15 percent

Setting

Location in survey area: Mainly the central and northern parts
Landform: Uplands
Landscape position:
- Neldore, moist—side slopes, ridgetops
- Bascovy—foot slopes, swales, along ridges
- Neldore, south—south aspects

Slope range:
- Neldore, moist—6 to 60 percent
- Bascovy—6 to 15 percent
- Neldore, south—6 to 60 percent

Typical Profile

Neldore, moist
1 inch to 0—organic matter
0 to 2 inches—grayish brown silty clay
2 to 15 inches—grayish brown silty clay
15 to 60 inches—light brownish gray consolidated shale

Bascovy
0 to 2 inches—grayish brown silty clay
2 to 10 inches—grayish brown silty clay
10 to 20 inches—grayish brown silty clay
20 to 34 inches—grayish brown silty clay
34 to 60 inches—gray consolidated shale

Neldore, south
1 inch to 0—organic matter
0 to 2 inches—grayish brown silty clay
2 to 15 inches—grayish brown silty clay
15 to 60 inches—light brownish gray consolidated shale

Soil Properties and Qualities

Neldore, moist
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid

Bascovy
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Very slow
Available water capacity: Mainly 5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium or rapid

Neldore, south
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained

Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid

Inclusions

- Rock outcrops
- Deep soils in narrow drainageways
- Soils, on ridgetops, that are 5 to 10 inches deep to consolidated shale

Uses of the Unit

Major current uses:
- Rangeland
- Wildlife habitat

Cropland

Neldore, moist, Bascovy, and Neldore, south
Commonly grown crops:
- Nonirrigated—none

Neldore, moist, and Neldore, south
Capability classification:
- Nonirrigated—VIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Slope
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Depth to consolidated shale

Bascovy
Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Depth to consolidated shale

Rangeland

Bascovy
Range site:
- Clayey, 10- to 14-inch precipitation zone

Grazable Understory

Neldore, moist
Potential native forest understory plants: Bluebunch wheatgrass, Rocky Mountain juniper, western wheatgrass, threadleaf sedge
Range in production of air-dry vegetation (pounds per acre): Years of above average precipitation—750; years of below average precipitation—550

Neldore, south
Potential native forest understory plants: Western wheatgrass, bluebunch wheatgrass, Rocky Mountain juniper, obtuse sedge, Montana pea
Range in production of air-dry vegetation (pounds per acre): Years of above average precipitation—250; years of below average precipitation—150

Woodland

Neldore, moist, and Neldore, south
Woodland suitability subclass:
- 1D

Estimated average annual production (CMAI):
- Cubic feet per acre—15
- Board feet per acre (Scribner rule)—35

Windbreaks

Bascovy
Windbreak suitability group:
- 3M

Neldore, moist, and Neldore, south
Windbreak suitability group:
- 4

71—Nobe-Absher silty clays, 0 to 4 percent slopes

Composition

Nobe and similar soils: 45 percent
Absher and similar soils: 40 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Fans, foot slopes
Slope range:
- Nobe—0 to 4 percent
- Absher—0 to 4 percent

Typical Profile

Nobe
0 to 4 inches—pale brown and brown silty clay
4 to 60 inches—brown silty clay

Absher
0 to 6 inches—light brownish gray silty clay
6 to 12 inches—pale brown silty clay
12 to 60 inches—pale brown silty clay

Soil Properties and Qualities

Nobe
Depth class: Deep (40 inches or more)

Drainage class: Moderately well drained
Parent material: Kind—alluvium
Salinity: In the upper 4 inches—slightly saline; below this depth—strongly saline
Sodicity: In the upper 4 inches—moderately sodic; below this depth—strongly sodic
Permeability: Very slow
Available water capacity: Mainly 4 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Absher

Depth class: Deep (40 inches or more)
Drainage class: Moderately well drained
Parent material: Kind—alluvium
Salinity: Between depths of 12 and 60 inches—strongly saline
Sodicity: Between depths of 2 and 12 inches—moderately or strongly sodic
Permeability: Very slow
Available water capacity: Mainly 4.5 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils that have a crusted surface layer
- Soils on slopes of more than 4 percent

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Nobe and Absher

Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIIs

Main soil limitations and hazards:
- Soil blowing
- Limited available water capacity
- Restrictive permeability
- Sodium content
- Salt content
- Poor tilth
- Water erosion

Rangeland

Nobe and Absher

Range site:
- Saline Upland, 10- to 14-inch precipitation zone

Windbreaks

Nobe and Absher

Windbreak suitability group:
- 4

72—Pinebreaks-Neldore, moist, silty clays, 15 to 60 percent slopes

Composition

Pinebreaks and similar soils: 50 percent
Neldore, moist, and similar soils: 40 percent
Inclusions: 10 percent

Setting

Location in survey area: Mainly northern part
Landform: Uplands
Landscape position:
- Pinebreaks—north aspects
- Neldore, moist—other aspects

Slope range:
- Pinebreaks—15 to 60 percent
- Neldore, moist—15 to 60 percent

Typical Profile

Pinebreaks

2 inches to 0—organic matter
0 to 18 inches—grayish brown and light brownish gray silty clay
18 to 60 inches—grayish brown consolidated acid shale

Neldore, moist

1 inch to 0—organic matter
0 to 2 inches—grayish brown silty clay
2 to 15 inches—grayish brown silty clay
15 to 60 inches—light brownish gray consolidated shale

Soil Properties and Qualities

Pinebreaks

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated acid shale
Permeability: Slow
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Very rapid

Neldore, moist

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Very rapid

Inclusions

- Deep soils in narrow drainageways
- Soils, on steep or very steep side slopes and ridgetops, that have consolidated shale at a depth of 5 to 10 inches

Uses of the Unit

Major current uses:
- Rangeland
- Wildlife habitat

Cropland

Pinebreaks and Neldore, moist
Commonly grown crops:
- Nonirrigated—none

Pinebreaks and Neldore, moist
Capability classification:
- Nonirrigated—VIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Slope
- Limited available water capacity
- Restrictive permeability
- Depth to consolidated shale
- Poor tilth

Grazable Understory

Pinebreaks
Potential native forest understory plants: Bluebunch wheatgrass, Rocky Mountain juniper, threadleaf sedge, hawksbeard
Range in production of air-dry vegetation (pounds per acre): Years of above average precipitation—600; years of below average precipitation—400

Neldore, moist
Potential native forest understory plants: Bluebunch wheatgrass, Rocky Mountain juniper, western wheatgrass, threadleaf sedge
Range in production of air-dry vegetation (pounds per acre): Years of above average precipitation—750; years of below average precipitation—550

Woodland

Pinebreaks
Woodland suitability subclass:
- 2D

Estimated average annual production (CMAI):
- Cubic feet per acre—25
- Board feet per acre (Scribner rule)—60

Neldore, moist
Woodland suitability subclass:
- 1D

Estimated average annual production (CMAI):
- Cubic feet per acre—15
- Board feet per acre (Scribner rule)—35

Windbreaks

Pinebreaks and Neldore, moist
Windbreak suitability group:
- 4

73—Riverwash

Setting

Location in survey area: Mainly along the Missouri and Musselshell Rivers
Landform: Flood plains
Slope range: 0 to 1 percent

Typical Profile

0 to 60 inches—light gray or very pale brown sand, pebbles, and cobbles frequently flooded, washed, and reworked (supports little or no vegetation)

Properties and Qualities

Depth class: Deep (40 inches or more)
Parent material: Kind—unstabilized alluvium
Hazard of flooding: Frequency—frequent; time of year—April through June
Runoff: Rapid

Inclusions

- Soils that are sandy loam and loamy fine sand throughout the profile

Uses of the Unit

Major current uses:
- Recreation
- Wildlife habitat

Cropland

Capability classification:
- VIII

74—Rock outcrop

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range: Variable

Typical Profile

- Barren or nearly barren exposures of sedimentary bedrock

Properties and Qualities

Runoff: Very rapid

Inclusions

- Soils that have sedimentary bedrock at a depth of 5 to 15 inches

Uses of the Unit

Major current uses:
- Recreation
- Wildlife habitat
- Watershed

Cropland

Capability classification:
• VIII

75—Tanna clay loam, 1 to 6 percent slopes

Composition

Tanna and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range: 1 to 6 percent

Typical Profile

0 to 7 inches—brown clay loam
7 to 24 inches—brown and light brownish gray clay
24 to 32 inches—pale brown clay loam
32 to 60 inches—light yellowish brown interbedded shale and sandstone

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from interbedded shale and sandstone
Permeability: Slow
Available water capacity: Mainly 5.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Slow or medium

Inclusions

• Soils on slopes of more than 6 percent
• Soils, on small knolls, that have weakly consolidated sedimentary beds at a depth of 10 to 20 inches
• Slightly saline soils along small, intermittent drainageways

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland (prime farmland if irrigated)

Cropland

Commonly grown crops:
• Nonirrigated—spring wheat, winter wheat, grass for hay
Capability classification:
• Nonirrigated and irrigated—IIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Restrictive permeability
• Depth to interbedded shale and sandstone

Rangeland

Range site:
• Clayey, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 2M

76—Tanna-Weingart complex, 2 to 8 percent slopes

Composition

Tanna and similar soils: 60 percent
Weingart and similar soils: 25 percent
Inclusions: 15 percent

Setting

Location in survey area: Mainly central part
Landform: Uplands
Slope range:
• Tanna—2 to 8 percent
• Weingart—2 to 8 percent

Typical Profile

Tanna
0 to 7 inches—brown loam
7 to 24 inches—brown and light brownish gray clay
24 to 32 inches—pale brown clay loam
32 to 60 inches—light yellowish brown interbedded shale and sandstone
Weingart
0 to 7 inches—light brownish gray silty clay loam (mixed)
7 to 11 inches—grayish brown silty clay
11 to 18 inches—grayish brown silty clay
18 to 29 inches—light brownish gray silty clay
29 to 60 inches—gray consolidated shale

Soil Properties and Qualities

Tanna
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from interbedded shale and sandstone
Permeability: Slow
Available water capacity: Mainly 5.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Slow or medium
Weingart
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained

Parent material: Kind—material derived from consolidated shale
Salinity: Between depths of 18 and 29 inches—moderately saline
Sodicity: Between depths of 7 and 29 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 4.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Inclusions

- Soils on slopes of more than 8 percent
- Soils, on small knolls, that are 10 to 20 inches deep to sedimentary beds
- Strongly saline soils that have a crusted surface layer

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland

Cropland

Tanna and Weingart
Commonly grown crops:
- Nonirrigated—spring wheat, winter wheat

Tanna
Capability classification:
- Nonirrigated and irrigated—IIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Depth to interbedded shale and sandstone

Weingart
Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Sodium content
- Salt content
- Depth to consolidated shale
- Poor tilth

Rangeland

Tanna
Range site:
- Silty, 10- to 14-inch precipitation zone

Weingart
Range site:
- Claypan, 10- to 14-inch precipitation zone

Windbreaks

Tanna
Windbreak suitability group:
- 2M

Weingart
Windbreak suitability group:
- 3S

77—Teigen silty clay loam, 1 to 6 percent slopes

Composition

Teigen and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Fans
Slope range: 1 to 6 percent

Typical Profile

0 to 3 inches—light brownish gray silty clay loam
3 to 35 inches—grayish brown and light brownish gray silty clay loam
35 to 60 inches—grayish brown and light brownish gray silty clay loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium; source—acid shale
Permeability: Slow
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils, on small knolls, that have acid shale at a depth of 20 to 40 inches
- Soils on slopes of more than 6 percent

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Restrictive permeability
- Poor tilth

Rangeland

Range site:
• Clayey, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 1

78—Twilight sandy loam, 2 to 8 percent slopes

Composition

Twilight and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range: 2 to 8 percent

Typical Profile

0 to 3 inches—light olive brown sandy loam
3 to 11 inches—light olive brown sandy loam
11 to 29 inches—light yellowish brown fine sandy loam
29 to 60 inches—light olive brown semiconsolidated sandstone

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from semiconsolidated sandstone
Permeability: Moderately rapid
Available water capacity: Mainly 4 inches
Potential rooting depth: 20 to 40 inches
Runoff: Slow

Inclusions

• Soils on slopes of more than 8 percent
• Soils that have semiconsolidated sandstone at a depth of 10 to 20 inches

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland

Cropland

Commonly grown crops:
• Nonirrigated—winter wheat
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Limited available water capacity
• Depth to semiconsolidated sandstone

Rangeland

Range site:
• Sandy, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 3M

79—Twilight-Blackhall sandy loams, 2 to 15 percent slopes

Composition

Twilight and similar soils: 60 percent
Blackhall and similar soils: 25 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
• Twilight—2 to 15 percent
• Blackhall—2 to 15 percent

Typical Profile

Twilight
0 to 3 inches—light olive brown sandy loam
3 to 11 inches—light olive brown sandy loam
11 to 29 inches—light yellowish brown fine sandy loam
29 to 60 inches—light olive brown semiconsolidated sandstone
Blackhall
0 to 2 inches—light brownish gray sandy loam
2 to 16 inches—light brownish gray sandy loam
16 to 60 inches—light gray semiconsolidated sandstone

Soil Properties and Qualities

Twilight
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from semiconsolidated sandstone
Permeability: Moderately rapid
Available water capacity: Mainly 4 inches
Potential rooting depth: 20 to 40 inches
Runoff: Slow or medium
Blackhall
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from semiconsolidated sandstone
Permeability: Moderately rapid

Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Slow or medium

Inclusions

- Soils on slopes of more than 15 percent
- Soils, on ridgetops, that have semiconsolidated sandstone at a depth of 5 to 10 inches
- Rock outcrops

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland

Cropland

Twilight and Blackhall
Commonly grown crops:
- Nonirrigated—winter wheat

Twilight
Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing
- Limited available water capacity
- Depth to semiconsolidated sandstone

Blackhall
Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Limited available water capacity
- Depth to semiconsolidated sandstone

Rangeland

Twilight
Range site:
- Sandy, 10- to 14-inch precipitation zone

Blackhall
Range site:
- Shallow, 10- to 14-inch precipitation zone

Windbreaks

Twilight
Windbreak suitability group:
- 3M

Blackhall
Windbreak suitability group:
- 4

80—Twilight-Blackhall-Rock outcrop complex, 4 to 25 percent slopes

Composition

Twilight and similar soils: 40 percent
Blackhall and similar soils: 25 percent
Rock outcrop: 20 percent (barren exposures of semiconsolidated sandstone)
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
- Twilight—4 to 25 percent
- Blackhall—4 to 25 percent
- Rock outcrop—variable

Typical Profile

Twilight
0 to 3 inches—light olive brown sandy loam
3 to 11 inches—light olive brown sandy loam
11 to 29 inches—light yellowish brown fine sandy loam
29 to 60 inches—light olive brown semiconsolidated sandstone

Blackhall
0 to 2 inches—light brownish gray sandy loam
2 to 16 inches—light brownish gray sandy loam
16 to 60 inches—light gray semiconsolidated sandstone

Soil Properties and Qualities

Twilight
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from semiconsolidated sandstone
Permeability: Moderately rapid
Available water capacity: Mainly 4 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Blackhall
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from semiconsolidated sandstone
Permeability: Moderately rapid
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium

Inclusions

- Soils on slopes of more than 25 percent
- Soils, on ridgetops, that are 5 to 10 inches deep to semiconsolidated sandstone

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Twilight, Blackhall, and Rock outcrop
Commonly grown crops:
• Nonirrigated—none
Twilight
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Depth to semiconsolidated sandstone
Blackhall
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Depth to semiconsolidated sandstone
Rock outcrop
Capability classification:
• VIII

Rangeland

Twilight
Range site:
• Sandy, 10- to 14-inch precipitation zone
Blackhall
Range site:
• Shallow, 10- to 14-inch precipitation zone

Windbreaks

Twilight and Blackhall
Windbreak suitability group:
• 4

81—Ustic Torriorthents, 15 to 45 percent slopes

Composition

Ustic Torriorthents and similar soils: 85 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Along extremely dissected edges of uplands, fans, terraces
Slope range: 15 to 45 percent

Typical Profile

0 to 60 inches—clay loam

Texture of these soils varies from sandy loam to silty clay

Soil Properties and Qualities

Depth class: Shallow to deep (10 to 60 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium or residuum
Permeability: Moderately slow to very rapid
Available water capacity: Mainly 3 to 10 inches
Potential rooting depth: 10 to 60 inches or more
Runoff: Rapid or very rapid

Inclusions

• Soils on slopes of more than 45 percent
• Rock outcrops
• Soils, in narrow drainageways, that are frequently flooded

Uses of the Unit

Major current uses:
• Rangeland
• Wildlife habitat

Cropland

Commonly grown crops:
• Nonirrigated—none
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope

Rangeland

Range site:
• Extremely variable
• Onsite investigations should be made to determine range site, potential plant community, and range in production of air-dry vegetation

82—Ustic Torriorthents, moderately saline, 15 to 45 percent slopes

Composition

Ustic Torriorthents and similar soils: 85 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Along extremely dissected edges of uplands, fans, terraces
Slope range: 15 to 45 percent

Typical Profile

0 to 60 inches—silty clay loam

Texture of these soils varies from loam to silty clay

Soil Properties and Qualities

Depth class: Shallow to deep (10 to 60 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium or residuum
Salinity: Moderately saline
Permeability: Very slow to moderate
Available water capacity: Mainly 2 to 6 inches
Potential rooting depth: 10 to 60 inches or more
Runoff: Rapid or very rapid

Inclusions

- Soils that are strongly saline
- Soils, in narrow drainageways, that are subject to frequent flooding

Uses of the Unit

Major current uses:
- Rangeland
- Wildlife habitat

Cropland

Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIIe

Main soil limitations and hazards:
- Water erosion
- Slope
- Salt content
- Soil blowing
- Limited available water capacity

Rangeland

Range site:
- Extremely variable
- Onsite investigations should be made to determine range site, potential plant community, and range in production of air-dry vegetation

83—Ustic Torriorthents, strongly saline, 0 to 8 percent slopes

Composition

Ustic Torriorthents and similar soils: 85 percent
Inclusions: 15 percent

Setting

Location in survey area: Mainly central part
Landform: Uplands
Slope range: 0 to 8 percent

Typical Profile

0 to 60 inches—silty clay

Texture of these soils varies from silty clay loam to clay

Soil Properties and Qualities

Depth class: Shallow to deep (10 to 60 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium or residuum
Salinity: Strongly saline
Sodicity: Slightly sodic
Permeability: Slow or very slow
Available water capacity: Mainly 2 to 4 inches
Potential rooting depth: 10 to 60 inches or more
Runoff: Slow to rapid

Inclusions

- Rock outcrops
- Moderately saline soils

Uses of the Unit

Major current uses:
- Wildlife habitat

Cropland

Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIIIs

Main soil limitations and hazards:
- Salt content
- Soil blowing
- Water erosion
- Limited available water capacity

Rangeland

Range site:
- Extremely variable
- Onsite investigations should be made to determine range site, potential plant community, and range in production of air-dry vegetation

84—Vaeda silty clay, 0 to 6 percent slopes

Composition

Vaeda and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces
Slope range: 0 to 6 percent

Typical Profile

0 to 3 inches—pale brown silty clay with a ¼-inch vesicular crust
3 to 60 inches—pale brown silty clay

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 3 and 60 inches—moderately saline
Sodicity: Between depths of 3 and 60 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils on slopes of more than 6 percent
- Strongly saline and strongly sodic soils

Uses of the Unit

Major current uses:
- Rangeland
- Wildlife habitat

Cropland

Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIIs

Main soil limitations and hazards:
- Soil blowing
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Sodium content
- Salt content
- Water erosion

Rangeland

Range site:
- Dense Clay, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 3S

85—Vanda silty clay, 0 to 4 percent slopes

Composition

Vanda and similar soils: 95 percent
Inclusions: 5 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces
Slope range: 0 to 4 percent

Typical Profile

0 to 7 inches—brown silty clay
7 to 60 inches—grayish brown and dark grayish brown silty clay

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Throughout the profile—moderately or strongly saline
Sodicity: Between depths of 12 and 60 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils on slopes of more than 4 percent

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIIs

Main soil limitations and hazards:
- Soil blowing
- Limited available water capacity
- Restrictive permeability
- Poor tilth
- Sodium content
- Salt content
- Water erosion

Rangeland

Range site:
- Dense Clay, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 4

86—Vanda-Harlem-Marvan silty clays, 0 to 4 percent slopes

Composition

Vanda and similar soils: 40 percent
Harlem and similar soils: 30 percent
Marvan and similar soils: 20 percent

Inclusions: 10 percent

Setting

Location in survey area: Mainly northern part
Landform: Drainageways, adjacent fans
Slope range:
• Vanda—0 to 4 percent
• Harlem—0 to 4 percent
• Marvan—0 to 4 percent

Typical Profile

Vanda
0 to 7 inches—brown silty clay
7 to 60 inches—grayish brown and dark grayish brown silty clay
Harlem
0 to 3 inches—light brownish gray silty clay
3 to 60 inches—pale brown silty clay and silty clay loam that has thin strata of loam and silt loam
Marvan
0 to 3 inches—grayish brown silty clay
3 to 35 inches—grayish brown silty clay
35 to 60 inches—grayish brown silty clay

Soil Properties and Qualities

Vanda
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: None
Salinity: Throughout the profile—moderately or strongly saline
Sodicity: Between depths of 12 and 60 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Medium
Harlem
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: Frequency—occasional; time of year—April through June
Permeability: Slow
Available water capacity: Mainly 9 inches
Potential rooting depth: 40 inches or more
Runoff: Slow or medium
Marvan
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Hazard of flooding: None
Salinity: Between depths of 45 and 60 inches—moderately saline
Sodicity: Between depths of 45 and 60 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 6.5 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

• Moderately well drained soils in and along intermittent drainageways

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Vanda, Harlem, and Marvan
Commonly grown crops:
• Nonirrigated—none
Vanda
Capability classification:
• Nonirrigated—VIIs
Main soil limitations and hazards:
• Soil blowing
• Restrictive permeability
• Limited available water capacity
• Poor tilth
• Water erosion
• Sodium content
• Salt content
Harlem
Capability classification:
• Nonirrigated—IVw
Main soil limitations and hazards:
• Soil blowing
• Restrictive permeability
• Poor tilth
• Flooding
Marvan
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Restrictive permeability
• Limited available water capacity
• Poor tilth
• Water erosion
• Sodium content
• Salt content

Rangeland

Vanda
Range site:
• Dense Clay, 10- to 14-inch precipitation zone

Harlem
Range site:
• Overflow, 10- to 14-inch precipitation zone
Marvan
Range site:
• Clayey Saline, 10- to 14-inch precipitation zone

Windbreaks

Vanda
Windbreak suitability group:
• 4
Harlem
Windbreak suitability group:
• 1
Marvan
Windbreak suitability group:
• 3S

87—Verson clay loam, 0 to 4 percent slopes

Composition

Verson and similar soils: 95 percent
Inclusions: 5 percent

Setting

Location in survey area: Mainly southwestern part
Landform: Fans, terraces
Slope range: 0 to 4 percent

Typical Profile

0 to 5 inches—grayish brown clay loam
5 to 12 inches—brown silty clay
12 to 28 inches—grayish brown silty clay
28 to 60 inches—yellowish brown extremely gravelly sandy loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: In the upper 28 inches—slow; below this depth—moderately rapid
Available water capacity: Mainly 6 inches
Potential rooting depth: 40 inches or more
Runoff: Slow or medium

Inclusions

• Soils on slopes of more than 4 percent
• Soils that are very gravelly loam throughout the profile

Uses of the Unit

Major current uses:
• Rangeland
• Nonirrigated cropland (prime farmland if irrigated)

Cropland

Commonly grown crops:
• Nonirrigated—winter wheat, grass for hay
Capability classification:
• Nonirrigated and irrigated—IIIe
Main soil limitations and hazards:
• Soil blowing
• Limited available water capacity
• Restrictive permeability

Rangeland

Range site:
• Clayey, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 2M

88—Volborg silty clay, moist, 2 to 25 percent slopes

Composition

Volborg, moist, and similar soils: 85 percent
Inclusions: 15 percent

Setting

Location in survey area: Mainly west-central and southwest part
Landform: Uplands
Slope range: 2 to 25 percent

Typical Profile

1 inch to 0—organic mat
0 to 3 inches—grayish brown silty clay
3 to 18 inches—grayish brown silty clay
18 to 60 inches—gray consolidated acid shale

Soil Properties and Qualities

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—consolidated acid shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid

Inclusions

• Soils on slopes of more than 25 percent
• Soils, on ridgetops, that are 5 to 10 inches deep to consolidated shale
• Rock outcrops

Uses of the Unit

Major current uses:
- Rangeland
- Wildlife habitat

Cropland

Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Slope
- Limited available water capacity
- Restrictive permeability
- Depth to consolidated shale
- Poor tilth

Grazable Understory

Potential native forest understory plants: Obtuse sedge, creeping juniper, big bluegrass, thickspike wheatgrass, bluebunch wheatgrass, western yarrow

Range in production of air-dry vegetation (pounds per acre): Years of above average precipitation—200; years of below average precipitation—100

Woodland

Woodland suitability subclass:
- 1D

Estimated average annual production (CMAI):
- Cubic feet per acre—20
- Board feet per acre (Scribner rule)—40

Windbreaks

Windbreak suitability group:
- 4

89—Volborg-Volborg, eroded-Julin silty clays, 4 to 25 percent slopes

Composition

Volborg and similar soils: 45 percent
Volborg, eroded, and similar soils: 25 percent
Julin and similar soils: 20 percent
Inclusions: 10 percent

Setting

Location in survey area: Mainly western part
Landform: Uplands
Slope range:
- Volborg—4 to 25 percent
- Volborg, eroded—4 to 25 percent
- Julin—4 to 15 percent

Typical Profile

Volborg
0 to 3 inches—light brownish gray silty clay
3 to 14 inches—light brownish gray and gray silty clay
14 to 60 inches—gray consolidated acid shale
Volborg, eroded
0 to 1 inch—light gray silty clay
1 to 11 inches—light brownish gray and gray silty clay
11 to 60 inches—gray consolidated acid shale
Julin
0 to 4 inches—light brownish gray silty clay
4 to 30 inches—grayish brown and light brownish gray silty clay
30 to 60 inches—dark gray consolidated acid shale

Soil Properties and Qualities

Volborg
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated acid shale
Permeability: Slow
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid
Volborg, eroded
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated acid shale
Permeability: Slow
Available water capacity: Mainly 1.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid
Julin
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated acid shale
Permeability: Slow
Available water capacity: Mainly 4 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium or rapid

Inclusions

- Soils on slopes of more than 25 percent
- Rock outcrops

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Volborg, Volborg, eroded, and Julin
Commonly grown crops:
• Nonirrigated—none
Volborg and Volborg, eroded
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth
Julin
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth

Rangeland

Volborg and Julin
Range site:
• Coarse Clay, 10- to 14-inch precipitation zone
Volborg, eroded
Range site:
• Shale, 10- to 14-inch precipitation zone

Windbreaks

Volborg and Volborg, eroded
Windbreak suitability group:
• 4
Julin
Windbreak suitability group:
• 3M

90—Volborg, eroded-Rock outcrop-Julin complex, 4 to 25 percent slopes

Composition

Volborg, eroded, and similar soils: 40 percent
Rock outcrop: 30 percent (barren or nearly barren exposures of consolidated acid shale)
Julin and similar soils: 20 percent
Inclusions: 10 percent

Setting

Location in survey area: Mainly western part
Landform: Uplands
Slope range:
• Volborg, eroded—4 to 25 percent
• Rock outcrop—variable
• Julin—4 to 10 percent

Typical Profile

Volborg, eroded
0 to 1 inch—light gray silty clay
1 to 11 inches—light brownish gray and gray silty clay
11 to 60 inches—consolidated acid shale
Julin
0 to 4 inches—light brownish gray silty clay
4 to 30 inches—grayish brown and light brownish gray silty clay
30 to 60 inches—dark gray consolidated acid shale

Soil Properties and Qualities

Volborg, eroded
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated acid shale
Permeability: Slow
Available water capacity: Mainly 1.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium to very rapid
Julin
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated acid shale
Permeability: Slow
Available water capacity: Mainly 4 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium or rapid

Inclusions

• Soils on slopes of more than 25 percent

Uses of the Unit

Major current uses:
• Rangeland
• Wildlife habitat

Cropland

Volborg, eroded, Rock outcrop, and Julin
Commonly grown crops:
• Nonirrigated—none
Volborg, eroded
Capability classification:
• Nonirrigated—VIIe

Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth

Rock outcrop
Capability classification:
• VIII

Julin
Capability classification:
• Nonirrigated—IVe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth

Rangeland

Volborg, eroded
Range site:
• Shale, 10- to 14-inch precipitation zone

Julin
Range site:
• Coarse Clay, 10- to 14-inch precipitation zone

Windbreaks

Volborg, eroded
Windbreak suitability group:
• 4

Julin
Windbreak suitability group:
• 3M

91—Weingart silty clay loam, 1 to 8 percent slopes

Composition

Weingart and similar soils: 85 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range: 1 to 8 percent

Typical Profile

0 to 7 inches—light brownish gray silty clay loam (mixed)
7 to 11 inches—grayish brown silty clay
11 to 18 inches—grayish brown silty clay
18 to 29 inches—light brownish gray silty clay
29 to 60 inches—gray consolidated shale

Soil Properties and Qualities

Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Salinity: Between depths of 18 and 29 inches—moderately saline
Sodicity: Between depths of 7 and 29 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 4.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Inclusions

• Soils on slopes of more than 8 percent
• Soils that have consolidated shale at a depth of 10 to 20 inches
• Strongly saline soils

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Commonly grown crops:
• Nonirrigated—none
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth
• Sodium content
• Salt content

Rangeland

Range site:
• Claypan, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 3S

92—Weingart-Warhorse complex, 1 to 8 percent slopes

Composition

Weingart and similar soils: 50 percent

Warhorse and similar soils: 35 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
• Weingart—1 to 8 percent
• Warhorse—1 to 8 percent

Typical Profile

Weingart
0 to 7 inches—light brownish gray silty clay loam (mixed)
7 to 11 inches—grayish brown silty clay
11 to 18 inches—grayish brown silty clay
18 to 29 inches—light brownish gray silty clay
29 to 60 inches—gray consolidated shale
Warhorse
0 to 4 inches—pale brown loam
4 to 11 inches—brown silty clay loam
11 to 18 inches—brown silty clay loam
18 to 60 inches—consolidated interbedded shale and sandstone

Soil Properties and Qualities

Weingart
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Salinity: Between depth of 18 and 29 inches—moderately saline
Sodicity: Between depths of 7 and 29 inches—moderately sodic
Permeability: Very slow
Available water capacity: Mainly 4.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium
Warhorse
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated interbedded shale and sandstone
Permeability: Slow
Available water capacity: Mainly 2 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium

Inclusions

• Soils on slopes of more than 8 percent
• Strongly saline soils along small, intermittent drainageways

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Weingart and Warhorse
Commonly grown crops:
• Nonirrigated—none
Weingart
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth
• Sodium content
• Salt content
Warhorse
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated interbedded shale and sandstone

Rangeland

Weingart
Range site:
• Claypan, 10- to 14-inch precipitation zone
Warhorse
Range site:
• Shallow Clay, 10- to 14-inch precipitation zone

Windbreaks

Weingart
Windbreak suitability group:
• 3S
Warhorse
Windbreak suitability group:
• 4

93—Yamac loam, 0 to 2 percent slopes

Composition

Yamac and similar soils: 95 percent
Inclusions: 5 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces, foot slopes
Slope range: 0 to 2 percent

Typical Profile

0 to 3 inches—brown loam
3 to 12 inches—yellowish brown clay loam
12 to 60 inches—light brownish gray clay loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Moderate
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 2 percent
- Soils that have a fine sandy loam surface layer

Uses of the Unit

Major current uses:
- Nonirrigated cropland
- Irrigated cropland (prime farmland if irrigated)
- Rangeland

Cropland

Commonly grown crops:
- Nonirrigated—spring wheat, winter wheat, barley
- Irrigated—alfalfa for hay, grass for hay

Capability classification:
- Nonirrigated—IIIe
- Irrigated—IIe

Main soil limitations and hazards:
- Soil blowing

Rangeland

Range site:
- Silty, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 1

94—Yamac loam, 2 to 8 percent slopes

Composition

Yamac and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces, foot slopes
Slope range: 2 to 8 percent

Typical Profile

0 to 3 inches—brown loam
3 to 12 inches—yellowish brown clay loam
12 to 60 inches—light brownish gray clay loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Moderate
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils on slopes of more than 8 percent
- Soils, on small knolls, that are 20 to 40 inches deep to weakly consolidated sedimentary beds
- Soils that have a fine sandy loam surface layer

Uses of the Unit

Major current uses:
- Nonirrigated cropland
- Irrigated cropland
- Rangeland

Cropland

Commonly grown crops:
- Nonirrigated—spring wheat, winter wheat, barley
- Irrigated—alfalfa for hay, grass for hay

Capability classification:
- Nonirrigated and irrigated—IIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion

Rangeland

Range site:
- Silty, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 1

95—Yamac clay loam, 0 to 2 percent slopes

Composition

Yamac and similar soils: 95 percent
Inclusions: 5 percent

Setting

Location in survey area: Throughout

Landform: Fans, terraces, foot slopes
Slope range: 0 to 2 percent

Typical Profile

0 to 7 inches—grayish brown clay loam
7 to 14 inches—light brownish gray clay loam
14 to 60 inches—light brownish gray loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Moderate
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 2 percent

Uses of the Unit

Major current uses:
- Nonirrigated cropland
- Irrigated cropland (prime farmland if irrigated)
- Rangeland

Cropland

Commonly grown crops:
- Nonirrigated—spring wheat, winter wheat, barley
- Irrigated—alfalfa for hay, grass for hay

Capability classification:
- Nonirrigated—IIIe
- Irrigated—IIe

Main soil limitations and hazards:
- Soil blowing

Rangeland

Range site:
- Clayey, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 1

96—Yamac clay loam, 2 to 8 percent slopes

Composition

Yamac and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Fans, terraces, foot slopes
Slope range: 2 to 8 percent

Typical Profile

0 to 7 inches—grayish brown clay loam
7 to 14 inches—light brownish gray clay loam
14 to 60 inches—light brownish gray loam

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Moderate
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils on slopes of more than 8 percent
- Soils, on small knolls, that have weakly consolidated sedimentary beds at a depth of 20 to 40 inches

Uses of the Unit

Major current uses:
- Nonirrigated cropland
- Irrigated cropland
- Rangeland

Cropland

Commonly grown crops:
- Nonirrigated—spring wheat, winter wheat, barley
- Irrigated—alfalfa for hay, grass for hay

Capability classification:
- Nonirrigated and irrigated—IIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion

Rangeland

Range site:
- Clayey, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 1

97—Yamac-Busby complex, 2 to 8 percent slopes

Composition

Yamac and similar soils: 50 percent
Busby and similar soils: 35 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Fans, foot slopes

Slope range:
- Yamac—2 to 8 percent
- Busby—2 to 8 percent

Typical Profile

Yamac
0 to 3 inches—brown loam
3 to 12 inches—yellowish brown clay loam
12 to 60 inches—light brownish gray clay loam
Busby
0 to 3 inches—light brownish gray fine sandy loam
3 to 14 inches—grayish brown fine sandy loam
14 to 60 inches—grayish brown and light brownish gray fine sandy loam

Soil Properties and Qualities

Yamac
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Moderate
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Medium
Busby
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Permeability: Moderately rapid
Available water capacity: Mainly 7 inches
Potential rooting depth: 40 inches or more
Runoff: Slow

Inclusions

- Soils on slopes of more than 8 percent
- Soils, on small knolls, that are 20 to 40 inches deep to weakly consolidated sedimentary beds

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland

Cropland

Yamac and Busby
Commonly grown crops:
- Nonirrigated—spring wheat, winter wheat, barley

Yamac
Capability classification:
- Nonirrigated—IIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion

Busby
Capability classification:
- Nonirrigated—IVe

Main soil limitations and hazards:
- Soil blowing

Rangeland

Yamac
Range site:
- Silty, 10- to 14-inch precipitation zone

Busby
Range site:
- Sandy, 10- to 14-inch precipitation zone

Windbreaks

Yamac
Windbreak suitability group:
- 1

Busby
Windbreak suitability group:
- 2M

98—Yamac-Delpoint loams, 2 to 8 percent slopes

Composition

Yamac and similar soils: 50 percent
Delpoint and similar soils: 40 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Fans, foot slopes, uplands
Slope range:
- Yamac—2 to 8 percent
- Delpoint—2 to 8 percent

Typical Profile

Yamac
0 to 3 inches—brown loam
3 to 12 inches—yellowish brown clay loam
12 to 60 inches—light brownish gray clay loam
Delpoint
0 to 3 inches—pale brown loam
3 to 12 inches—brown loam
12 to 30 inches—light yellowish brown loam
30 to 60 inches—light gray weakly consolidated sedimentary beds

Soil Properties and Qualities

Yamac
Depth class: Deep (40 inches or more)
Drainage class: Well drained

Parent material: Kind—alluvium
Permeability: Moderate
Available water capacity: Mainly 10 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Delpoint
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from weakly consolidated sedimentary beds
Permeability: Moderate
Available water capacity: Mainly 5.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Inclusions

- Soils on slopes of more than 8 percent
- Soils, on small knolls, that have weakly consolidated sedimentary beds at a depth of 10 to 20 inches
- Soils that are silty clay loam throughout the profile

Uses of the Unit

Major current uses:
- Rangeland
- Nonirrigated cropland

Cropland

Yamac and Delpoint
Commonly grown crops:
- Nonirrigated—spring wheat, winter wheat, barley

Yamac
Capability classification:
- Nonirrigated—IIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion

Delpoint
Capability classification:
- Nonirrigated—IIIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Depth to weakly consolidated sedimentary beds

Rangeland

Yamac and Delpoint
Range site:
- Silty, 10- to 14-inch precipitation zone

Windbreaks

Yamac
Windbreak suitability group:
- 1

Delpoint
Windbreak suitability group:
- 2M

99—Yawdim silty clay, 8 to 15 percent slopes

Composition

Yawdim and similar soils: 85 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range: 8 to 15 percent

Typical Profile

0 to 2 inches—light brownish gray silty clay
2 to 16 inches—light brownish gray silty clay
16 to 60 inches—gray consolidated shale

Soil Properties and Qualities

Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid

Inclusions

- Soils on slopes of more than 15 percent
- Soils, on knolls and ridgetops, that have consolidated shale at a depth of 5 to 10 inches
- Rock outcrops

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Water erosion
- Limited available water capacity
- Restrictive permeability
- Depth to consolidated shale
- Poor tilth

Rangeland

Range site:
• Shallow Clay, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
• 4

100—Yawdim-Crago complex, 4 to 35 percent slopes

Composition

Yawdim and similar soils: 45 percent
Crago and similar soils: 40 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands, foot slopes of uplands
Slope range:
• Yawdim—4 to 35 percent
• Crago—4 to 35 percent

Typical Profile

Yawdim
0 to 2 inches—light brownish gray silty clay
2 to 16 inches—light brownish gray silty clay
16 to 60 inches—gray consolidated shale
Crago
0 to 6 inches—brown gravelly loam
6 to 18 inches—light yellowish brown gravelly loam
18 to 40 inches—very pale brown extremely gravelly sandy loam
40 to 60 inches—very pale brown extremely gravelly loamy sand

Soil Properties and Qualities

Yawdim
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Rapid or very rapid
Crago
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium; source—limestone
Permeability: In the upper 18 inches—moderate; below this depth—rapid
Available water capacity: Mainly 3.5 inches
Potential rooting depth: 40 inches or more
Runoff: Medium to very rapid

Inclusions

• Soils on slopes of more than 35 percent
• Soils, on ridgetops, that are 5 to 10 inches deep to consolidated shale
• Rock outcrops

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Yawdim and Crago
Commonly grown crops:
• Nonirrigated—none
Yawdim
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth
Crago
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Lime content
• Surface coarse fragments

Rangeland

Yawdim
Range site:
• Shallow Clay, 10- to 14-inch precipitation zone
Crago
Range site:
• Gravel, 10- to 14-inch precipitation zone

Windbreaks

Yawdim and Crago
Windbreak suitability group:
• 4

101—Yawdim-Orinoco complex, 4 to 15 percent slopes

Composition

Yawdim and similar soils: 50 percent

Orinoco and similar soils: 35 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
• Yawdim—4 to 15 percent
• Orinoco—4 to 15 percent

Typical Profile

Yawdim
0 to 2 inches—light brownish gray silty clay
2 to 16 inches—light brownish gray silty clay
16 to 60 inches—gray consolidated shale
Orinoco
0 to 4 inches—light brownish gray silty clay loam
4 to 24 inches—light brownish gray and gray silty clay
24 to 34 inches—very pale brown silty clay
34 to 60 inches—gray consolidated shale

Soil Properties and Qualities

Yawdim
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Medium or rapid
Orinoco
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Salinity: Between depths of 16 and 34 inches—moderately saline
Sodicity: Between depths of 24 and 34 inches—moderately sodic
Permeability: Slow
Available water capacity: Mainly 5.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium or rapid

Inclusions

• Soils on slopes of more than 15 percent
• Soils, on knolls and ridgetops, that have consolidated shale at a depth of 5 to 10 inches

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Yawdim and Orinoco
Commonly grown crops:
• Nonirrigated—none
Yawdim
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Poor tilth
Orinoco
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Sodium content
• Salt content

Rangeland

Yawdim
Range site:
• Shallow Clay, 10- to 14-inch precipitation zone
Orinoco
Range site:
• Clayey Saline, 10- to 14-inch precipitation zone

Windbreaks

Yawdim
Windbreak suitability group:
• 4
Orinoco
Windbreak suitability group:
• 3S

102—Yawdim-Orinoco complex, 15 to 35 percent slopes

Composition

Yawdim and similar soils: 55 percent
Orinoco and similar soils: 30 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Uplands
Slope range:
• Yawdim—15 to 35 percent
• Orinoco—15 to 25 percent

Typical Profile

Yawdim
0 to 2 inches—light brownish gray silty clay
2 to 15 inches—light brownish gray silty clay
15 to 60 inches—gray consolidated shale
Orinoco
0 to 3 inches—light brownish gray silty clay loam
3 to 24 inches—light brownish gray and gray silty clay
24 to 28 inches—very pale brown silty clay
28 to 60 inches—gray consolidated shale

Soil Properties and Qualities

Yawdim
Depth class: Shallow (10 to 20 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Permeability: Slow
Available water capacity: Mainly 2.5 inches
Potential rooting depth: 10 to 20 inches
Runoff: Very rapid
Orinoco
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Salinity: Between depths of 16 and 28 inches—moderately saline
Sodicity: Between depths of 24 and 28 inches—moderately sodic
Permeability: Slow
Available water capacity: Mainly 5.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Very rapid

Inclusions

• Soils on slopes of more than 35 percent
• Soils, on ridgetops, that have consolidated shale at a depth of 5 to 10 inches
• Rock outcrops

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Yawdim and Orinoco
Commonly grown crops:
• Nonirrigated—none
Yawdim
Capability classification:
• Nonirrigated—VIIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Poor tilth
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
Orinoco
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Slope
• Limited available water capacity
• Restrictive permeability
• Depth to consolidated shale
• Sodium content
• Salt content

Rangeland

Yawdim
Range site:
• Shallow Clay, 10- to 14-inch precipitation zone
Orinoco
Range site:
• Clayey Saline, 10- to 14-inch precipitation zone

Windbreaks

Yawdim and Orinoco
Windbreak suitability group:
• 4

103—Zatoville silty clay loam, 1 to 6 percent slopes

Composition

Zatoville and similar soils: 90 percent
Inclusions: 10 percent

Setting

Location in survey area: Throughout
Landform: Fans
Slope range: 1 to 6 percent

Typical Profile

0 to 3 inches—light brownish gray silty clay loam
3 to 17 inches—light brownish gray and pale brown silty clay
17 to 23 inches—light brownish gray silty clay
23 to 60 inches—light brownish gray silty clay

Soil Properties and Qualities

Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 17 and 60 inches—moderately saline
Sodicity: Between depths of 17 and 60 inches—moderately sodic
Permeability: Slow
Available water capacity: Mainly 8 inches
Potential rooting depth: 40 inches or more
Runoff: Medium

Inclusions

- Soils on slopes of more than 6 percent
- Soils, on small knolls, that are 20 to 40 inches deep to consolidated shale

Uses of the Unit

Major current uses:
- Rangeland

Cropland

Commonly grown crops:
- Nonirrigated—none

Capability classification:
- Nonirrigated—VIe

Main soil limitations and hazards:
- Soil blowing
- Restrictive permeability
- Sodium content
- Salt content
- Water erosion

Rangeland

Range site:
- Clayey Saline, 10- to 14-inch precipitation zone

Windbreaks

Windbreak suitability group:
- 3S

104—Zatoville-Orinoco silty clay loams, 2 to 8 percent slopes

Composition

Zatoville and similar soils: 45 percent
Orinoco and similar soils: 40 percent
Inclusions: 15 percent

Setting

Location in survey area: Throughout
Landform: Fans, uplands
Slope range:
- Zatoville—2 to 8 percent
- Orinoco—2 to 8 percent

Typical Profile

Zatoville
0 to 3 inches—light brownish gray silty clay loam
3 to 17 inches—light brownish gray and pale brown silty clay
17 to 23 inches—light brownish gray silty clay
23 to 60 inches—light brownish gray silty clay
Orinoco
0 to 4 inches—light brownish gray silty clay loam
4 to 24 inches—light brownish gray and gray silty clay
24 to 34 inches—very pale brown silty clay
34 to 60 inches—gray consolidated shale

Soil Properties and Qualities

Zatoville
Depth class: Deep (40 inches or more)
Drainage class: Well drained
Parent material: Kind—alluvium
Salinity: Between depths of 17 and 60 inches—moderately saline
Sodicity: Between depths of 17 and 60 inches—moderately sodic
Permeability: Slow
Available water capacity: Mainly 8 inches
Potential rooting depth: 40 inches or more
Runoff: Medium
Orinoco
Depth class: Moderately deep (20 to 40 inches)
Drainage class: Well drained
Parent material: Kind—material derived from consolidated shale
Salinity: Between depths of 16 and 34 inches—moderately saline
Sodicity: Between depths of 24 and 34 inches—moderately sodic
Permeability: Slow
Available water capacity: Mainly 5.5 inches
Potential rooting depth: 20 to 40 inches
Runoff: Medium

Inclusions

- Soils on slopes of more than 8 percent
- Soils, on small knolls, that are 10 to 20 inches deep to consolidated shale

Uses of the Unit

Major current uses:
• Rangeland

Cropland

Zatoville and Orinoco
Commonly grown crops:
• Nonirrigated—none
Zatoville
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Water erosion
• Restrictive permeability
Orinoco
Capability classification:
• Nonirrigated—VIe
Main soil limitations and hazards:
• Soil blowing
• Restrictive permeability
• Depth to consolidated shale
• Sodium content
• Salt content
• Water erosion

Rangeland

Zatoville and Orinoco
Range site:
• Clayey Saline, 10- to 14-inch precipitation zone

Windbreaks

Zatoville and Orinoco
Windbreak suitability group:
• 3S

Prime Farmland

Prime farmland is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, seed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. Adequate moisture and a sufficiently long growing season are required. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources, and farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food and fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures. Public land is land not available for farming in national forests, national parks, military reservations, and state parks.

Prime farmland soils commonly get an adequate and dependable supply of moisture from precipitation or irrigation. Temperature and length of growing season are favorable, and level of acidity or alkalinity is acceptable. The soils have few, if any, rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not flooded during the growing season. The slope ranges mainly from 0 to 6 percent.

Soils that have a high water table, are subject to flooding, or are droughty may qualify as prime farmland soils if the limitations are overcome by drainage, flood control, or irrigation. Onsite evaluation is necessary to determine the effectiveness of corrective measures. More information on the criteria for prime farmland soils can be obtained at the local office of the Soil Conservation Service.

A recent trend in land use has been the conversion of prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on lands that are less productive than prime farmland.

About 64,296 acres, or nearly 6 percent of the survey area, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available.

The map units in the survey area that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Use and Management of the Soils

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

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and 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 and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Hay

General management needed for crops and hay is suggested in this section *(9)*. The crops or hay plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants commonly grown are listed for each soil.

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

Cultivated cropland takes in about 5 percent of Petroleum County. Winter wheat is the main crop. Barley, spring wheat, alfalfa hay, and grass hay are also important.

On nonirrigated cropland, the main management concerns in this county are conserving moisture, controlling soil blowing and water erosion, and maintaining soil fertility.

Conserving moisture consists mainly of reducing evaporation, limiting runoff, increasing the water intake rate, and controlling weeds. Conservation tillage, a conservation cropping system, contour farming, stripcropping, field windbreaks, and leaving crop residue on the surface help to conserve moisture. Fallow helps to control weeds and thus conserves moisture.

Conservation tillage, stripcropping, field windbreaks, tall grass barriers, contour farming, a conservation cropping system, use of crop residue, diversions, and grassed waterways help control soil blowing and water erosion. Generally, a combination of several practices is needed in controlling wind and water erosion.

In maintaining fertility, the effective practices include applying chemical fertilizer and barnyard manure and using green manure crops. Controlling erosion also helps to maintain fertility. All the soils used for nonirrigated crops respond to fertiiizer.

On irrigated soils, where the main crop is alfalfa hay, the management concerns are using water efficiently, maintaining fertility, and controlling erosion. An irrigation system is needed that provides optimum control and distribution of water at minimum cost. Overirrigation wastes water, leaches plant nutrients, and erodes the

soil. It also creates drainage problems, raises the water table, and increases soil salinity.

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 6. 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 each map unit 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 are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum economic 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. Yields for dryland crops are based on an alternate crop-fallow system.

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 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils generally are grouped at three levels: capability class, subclass, and unit *(8)*. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

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

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

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main 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 I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Rangeland

Eugene J. Handl, range conservationist, Soil Conservation Service, helped prepare this section.

Rangeland or grazable woodland makes up about 89 percent of the land in Petroleum County. These areas provide forage for nearly 36,000 cow/calf pairs and 6,100 sheep and lambs. Nearly 85 percent of farm income is derived from livestock, mainly cattle. The cow/calf operation is the major type of livestock enterprise. The average size of a ranch is about 7,000 acres.

Most grazing is on native rangeland. On some ranches, species such as crested wheatgrass have been introduced for early spring grazing. Summer grazing is permitted on some Bureau of Land Management land belonging to the Federal Government.

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, vegetation, and water.

Rangeland produces a native plant community of mainly grasses, forbs, and shrubs. It is primarily used for grazing domestic livestock; however, it is also used as wildlife habitat, recreation areas, and watershed and for esthetic value.

Table 7 shows, for nearly all soils, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. Only those soils that are used as rangeland or are suited to use as rangeland are listed. Explanation of the column headings in table 7 follows.

Range Sites

Many different soils are in the survey area, as well as several different kinds of rangeland, or range sites. Over time, the combination of plants best adapted to a particular soil and climate has been developed. If the soil is not excessively disturbed, this group of plants is the potential, or climax, plant community for the site. Climax plant communities are not static; they vary slightly from year to year and from place to place. Each range site has different kinds, amounts, and proportions of native plants.

The relationship between soils and vegetation was established during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal water table also are important.

The range sites identified in Petroleum County are described in the following paragraphs.

Clay Pan, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of western wheatgrass, thickspike wheatgrass, and green needlegrass (fig. 4). If cattle excessively graze the range, green needlegrass decreases and western wheatgrass, thickspike wheatgrass, blue grama, big sagebrush, and plains pricklypear increase in proportion. Continual excessive grazing may cause annual grasses, wooly indianwheat, weedlike forbs, and other plant invaders to increase.

Clayey, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of bluebunch wheatgrass, western wheatgrass, and green needlegrass. If cattle excessively graze the range, bluebunch wheatgrass and green needlegrass decrease and western wheatgrass and big sagebrush increase in proportion. Continual excessive grazing may cause broom snakeweed, annual grasses, weedlike forbs, and other plant invaders to increase.

Clayey Saline, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of green needlegrass, Nuttall saltbush, and western wheatgrass. If cattle excessively graze the range, green needlegrass and Nuttall saltbush decrease and western wheatgrass, big sagebrush, and Sandburg bluegrass increase in proportion. Continual excessive grazing may cause plants such as broom snakeweed, annual grasses, and weedlike forbs to invade.

Coarse Clay, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of prairie sandreed, plains reedgrass, western wheatgrass, and longleaf sagebrush. If cattle excessively graze the range, prairie sandreed decrease and horizontal juniper, plains reedgrass, goldenpea, and prairie rose increase in proportion. Under continual excessive grazing, plants such as broom snakeweed, annual grasses, and weedlike forbs may invade.

Dense Clay, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of western wheatgrass, thickspike wheatgrass, greasewood, and big sagebrush. If cattle excessively graze the range, western wheatgrass and thickspike wheatgrass decrease and blue grama, plains pricklypear, and Sandberg bluegrass increase in proportion. Under continual excessive grazing, plant invaders such as annual brome, broom snakeweed, and weedlike forbs may increase.

Gravel, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of bluebunch wheatgrass and needleandthread. If cattle excessively graze the range, bluebunch wheatgrass decreases and needleandthread,

Figure 4.—An area of Gerdrum-Vanda complex, 1 to 6 percent slopes, in rangeland. The Clay Pan range site on the Gerdrum soil produces more forage than the Dense Clay range site on the Vanda soil.

blue grama, fringed sagewort, and threadleaf sedge increase in proportion. Continual excessive grazing may cause the increase of annual grasses, broom snakeweed, weedlike forbs, and other plant invaders.

Overflow, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of green needlegrass, basin wildrye, and western wheatgrass. If cattle excessively graze the range, green needlegrass and basin wildrye decrease and western wheatgrass, silver sagebrush, and western snowberry increase in proportion. Continual excessive grazing may result in the increase of Kentucky bluegrass, annual grasses, weedlike forbs, and other plant invaders.

Saline Lowland, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of alkali sacaton, slender wheatgrass, Nuttall saltbush, western wheatgrass, and greasewood. If cattle excessively graze the range, alkali sacaton, slender wheatgrass, and Nuttall saltbush decrease and western wheatgrass and inland saltgrass increase in proportion. Under continual excessive grazing, plants such as bottlebush squirreltail, annual grasses, and weedlike forbs may invade.

Saline Upland, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of alkali sacaton, western wheatgrass, alkali bluegrass, Nuttall saltbush, and greasewood. If cattle excessively graze the range, alkali sacaton, western wheatgrass, alkali bluegrass, and Nuttall saltbush decrease and greasewood, inland saltgrass, and plains pricklypear increase in proportion. If excessive grazing continues, plant invaders such as kochia, annual saltbush, and weedlike forbs may increase.

Sandy, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community

consists of prairie sandreed, little bluestem, bluebunch wheatgrass, and needleandthread. If cattle excessively graze the range, prairie sandreed, little bluestem, and bluebunch wheatgrass decrease and needleandthread, blue grama, and threadleaf sedge increase in proportion. Under continual excessive grazing, plant invaders such as red threeawn, annual bromes, annual buckwheat, and weedlike forbs may increase.

Shale, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of western wheatgrass, Nuttall saltbush, slender eriogonum, and rubber rabbitbrush. If cattle excessively graze the range, western wheatgrass and Nuttall saltbush decrease and slender eriogonum, rubber rabbitbrush, and fringed sagewort increase in proportion. Continual excessive grazing causes the increase of invader plants such as broom snakeweed and weedlike forbs.

Shallow, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of bluebunch wheatgrass, little bluestem, needleandthread, and skunkbush sumac. If cattle excessively graze the range, bluebunch wheatgrass and little bluestem decrease and needleandthread, threadleaf sedge, and fringed sagewort increase in proportion. Continual excessive grazing causes an increase in invader plants, such as annual grasses, broom snakeweed, and weedlike forbs.

Shallow Clay, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of bluebunch wheatgrass, western wheatgrass, and green needlegrass. If cattle excessively graze the range, bluebunch wheatgrass and green needlegrass decrease and western wheatgrass and big sagebrush increase in proportion. Continual excessive grazing will cause the increase of invader plants, such as annual bromes, broom snakeweed, and weedlike forbs.

Silty, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of bluebunch wheatgrass, western wheatgrass, and needleandthread. If cattle excessively graze the range, bluebunch wheatgrass decrease and western wheatgrass, needleandthread, fringed sagewort, and silver sagebrush increase in proportion. Under continual excessive grazing, club moss, annual grasses, broom snakeweed, weedlike forbs, and other invader plants may increase.

Silty-Limy, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of bluebunch wheatgrass, western wheatgrass, and needleandthread. If cattle excessively graze the range, bluebunch wheatgrass and western wheatgrass decrease and needleandthread, blue grama, fringed sagewort, and threadleaf sedge increase in proportion. Under continual excessive grazing, invader plants such as annual grasses, broom snakeweed, and weedlike forbs may increase.

Thin Clayey, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of bluebunch wheatgrass, western wheatgrass, and green needlegrass. If cattle excessively graze the range, bluebunch wheatgrass and green needlegrass decrease and western wheatgrass and big sagebrush increase in proportion. If excessive grazing continues, plants such as broom snakeweed, annual grasses, and weedlike forbs may invade.

Thin Silty, 10- to 14-inch precipitation zone. The dominant vegetation in the potential plant community consists of bluebunch wheatgrass, western wheatgrass, and needleandthread. If cattle excessively graze the range, bluebunch wheatgrass decreases and western wheatgrass, needleandthread, blue grama, silver sagebrush, and fringed sagewort increase in proportion. Under continual excessive grazing, invader plants such as annual grasses, broom snakeweed, and weedlike forbs may increase.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland 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 years of above average precipitation and for years of below average precipitation. In a favorable year, the amount and distribution of precipitation and the temperature make growing conditions substantially better than average. In an unfavorable year, growing conditions are well below average generally because of low available soil moisture.

Dry weight is the total annual yield per acre of air-dry vegetation. Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods.

Characteristic vegetation is the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil and is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range Condition

Range condition is a comparison of the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition.

Abnormal disturbances that change the climax plant community include repeated overuse by livestock, excessive burning, erosion, and plowing. Grazing animals select the most palatable plants; therefore, these plants will eventually die if continually grazed. A very severe disturbance can completely destroy the climax community, and the less desirable plants, such as annuals and weedlike plants, may invade. If the plant community has not deteriorated significantly, under proper grazing management it eventually can return to dominantly climax plants.

Four range condition classes are used to show the degree of deterioration of the climax plant community. An area of rangeland is in excellent vegetative condition if more than 75 percent of the present plant community is the same as in the climax plant community. It is in good vegetative condition if the climax plants make up 51 to 75 percent; fair vegetative condition if those plants make up 26 to 50 percent; and poor vegetative condition if they make up less than 25 percent.

Knowledge of the range site and condition is necessary as a basis for planning and applying needed management to improve or maintain the desired plant community for selected uses. Such information is needed to determine management objectives, proper grazing systems and stocking rates, suitable wildlife management practices, recreation potential, and the condition of watersheds.

Rangeland Management

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, reduction of less desirable species, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Grazing management is the most important part of any rangeland management program. Proper grazing, deferred grazing, and planned rotation grazing systems are key practices. Rancher experience and research have shown that if no more than one-half of the current year's growth is grazed, a plant community in good or excellent condition can be maintained and one in fair condition can be improved. The remaining one-half enables plants to make food for regrowth, root development, and storage for future growth. This makes the desirable plants healthier and keeps the less desirable plants and weeds from replacing them. It also protects the soil from wind or water erosion, acts as a mulch that improves soil tilth and water infiltration, and helps to control runoff.

Certain practices are often needed to obtain uniform grazing use. These include development of water for livestock, fencing, proper location of salt and mineral supplements, constructing stock trails in rougher areas, and riding or herding. These practices generally are essential for good range management.

Grazing systems such as rest-rotation, deferred-rotation, time controlled-short duration, and complimentary are often used in range management. No grazing system is best under all conditions. A grazing system must be designed to improve the quantity and quality of the range vegetation and also fit the needs of the individual operator, topography, type of grazing animals, and resource management objectives.

Special improvement practices are needed in places where management practices do not achieve the desired results or where recovery is too slow under forage management alone. These include range seeding, brush management, waterspreading, prescribed burning, and mechanical treatment.

Some soils are suited to mechanical treatment for range improvement, but others must rely solely on proper grazing management to obtain desired range improvement. Soils in capability class I through IV are suited to practices such as seeding, mechanical brush and weed control, and waterspreading; those in capability class VII and VIII are not. Soils in capability class I through IV are suited to tillage for seedbed preparation for seeding native or introduced forage plant species. Soils in capability class VI are suited to limited soil disturbance, such as scarification, for the purpose of seeding and for improving the water intake rate for seed germination.

Where feasible, mechanical renovation practices such as shallow chiseling can help speed recovery. These practices open up the surface to allow the absorption of more moisture, which encourages production of the more desirable plants. Mechanical renovation practices, brush management, and a critical, adequate period of resting or deferred grazing allow recovery of the desired plants.

Seeding may be needed in areas where the less desirable plants are predominant. A clean, firm seedbed should be prepared, seeded to adapted species, and rested long enough to allow the new plants to become established.

Figure 5.—An area of Volborg silty clay, moist, 2 to 25 percent slopes, in woodland use.

Special improvement practices will be effective only if a management system helps maintain a healthy condition for desirable plants.

Woodland Management and Productivity

Harold E. Hunter, forester, Soil Conservation Service, helped prepare this section.

Forest land takes in about 64,296 acres. About 6,500 acres of this land is commercial forest land, that is, land producing more than 20 cubic feet of wood per acre per year. Estimates are based on this soil survey. Overall, the stands are of very low productivity, and, commercially, little of the forest resource has been used for timber products. Because all of the forest soils are shallow and rainfall in the area is limited, productivity is very low *(3, 4)*.

On the forest land in the northeast part of the county, Ponderosa pine is the primary forest type. In most stands ponderosa pine is the only adapted tree species. In the northwest part of the county, however, Douglas fir is associated with ponderosa pine on Pinebreaks soils. According to the forest survey definition of commercial forest land, forests are most productive on Pinebreaks soils; Cabbart, high precipitation, soils; and Volborg, moist, soils (fig. 5). Plains cottonwood forest covers, by estimates, less than 500 acres of the survey area.

Few roads have been built in the forest for timber removal. Road construction is easy in the soft shale parent materials of forest soils. However, the materials as well as the overlying soil have low strength when wet, and, unless the road surfaces are graveled, roads may be used only when the surface is dry or frozen. Because gravel is a limited resource and harvestable volumes of timber are low, road surfacing is impractical. In road construction the hazard of water erosion also is high. Careful layout of roads, adequate drainage to handle runoff, and seeding of disturbed areas are needed to help control erosion.

Additional information on grazing and other uses of woodland is provided for each forested soil in the detailed map unit descriptions. Included in the information is site index and potential yield estimates. Information on the forested range resource also can be found in the detailed map unit descriptions. A more

complete discussion of the forested range resource can be found in the section "Woodland Understory Vegetation." Map units that have potential for supporting a forest resource are listed below. The term "potential" indicates that not all of the acreage of a soil series capable of supporting a forest is necessarily forested. Some areas that have potential may be devoid of trees because of fire or other disturbance and, given enough time, can be forested again.

9	Bascovy-Neldore-Neldore, moist, silty clays, 6 to 60 percent slopes
17	Cabbart-Delpoint-Cabbart, moist, loams, 4 to 35 percent slopes
22	Cabbart, high precipitation-Cabbart, moist, complex, 15 to 60 percent slopes
23	Cabbart, moist-Blackhall-Delpoint complex, 6 to 60 percent slopes
70	Neldore, moist-Bascovy-Neldore, south, silty clays, 6 to 60 percent slopes
72	Pinebreaks-Neldore, moist, silty clays, 15 to 60 percent slopes
88	Volborg silty clay, moist, 2 to 25 percent slopes

Definitions and explanations of terms used in the forest management section of the map unit descriptions are given in the following paragraphs.

The first part of the ordination symbol defining the woodland suitability subclass, a number, indicates the potential productivity of the soil for ponderosa pine. The number 1 indicates a potential productivity class, the average of which is 1 cubic meter per hectare (14.3 cubic feet per acre). The number 2 indicates a potential productivity class, the average of which is 2 cubic meters per hectare. The second part of the symbol, a letter, indicates a major kind of soil limitation. The letter *D* has been assigned to all forested soils in the survey area; *D* means restricted rooting depth.

Potential soil productivity is the estimated yield of each forest species that a soil can produce under a given level of management. Site index is a common index of potential soil productivity. It is the average height that the dominant or codominant trees attain at a specified age, depending on the species. It applies to fully-stocked, even-aged, unmanaged stands. The specific number of years may be different for different species. For ponderosa pine, the specified age is 100 years. In this survey area, yield estimates were made only for ponderosa pine. Site index values can be related to yield tables to determine potential board-feet or cubic-feet volumes (yields) of wood material per acre.

Yield estimates in the map unit descriptions are expressed as average annual board-feet (Scribner rule) per acre and average annual total cubic feet per acre at the culmination of mean annual increment (CMAI).

Potential yield estimates presented in the map units were determined from average annual yield of CMAI versus site index. Curves were developed after an adjustment of published data *(5)*. Site index values of forest soils varied little from the lowest producing sites to the highest, and apparently some soils were much more productive than others with the same site index. The more productive sites had more trees per acre growing on them even though the site index was the same. Consequently, yield estimates were further adjusted based on the typical basal area of trees on each soil, as compared to the basal area indicated in the yield table for ponderosa pine.

Woodland Understory Vegetation

Some forest land in this survey area can produce enough suitable understory vegetation to support grazing of livestock and wildlife without damage to trees. Understory vegetation consists of grasses, forbs, shrubs, and other plants growing beneath a forest canopy.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive. Overstory canopy densities within the survey area are mostly less than 35 percent.

Major plant species in the forest understory change significantly with changes in soils. For example, the Volborg, moist, soil formed in consolidated acid shale of the Colorado Group. In the understory of the Volborg, moist, soil, the dominant components are obtuse sedge and creeping juniper. Ponderosa pine does not commonly regenerate in the understory. These Volborg soils contrast strongly with Cabbart, moist, and Cabbart, high precipitation, soils.

These Cabbart soils formed in calcareous, weakly consolidated, sedimentary beds of the Hell Creek Formation. Ponderosa pine regeneration is common in the understory. Rocky mountain juniper is also conspicuous in the understory, but creeping juniper is rare. The dominant grass on these Cabbart soils is bluebunch wheatgrass. Little bluestem is common on the Cabbart, moist, soil, but does not grow on the Cabbart, high precipitation, soil.

The Neldore, moist, Neldore, south, and Pinebreaks soils formed in nonacid to slightly acid, consolidated shales of the Bearpaw Formation. Ponderosa pine does not commonly regenerate in the understory. Western

wheatgrass and bluebunch wheatgrass are common understory components on both Neldore soils. Western wheatgrass is the dominant understory plant on the drier Neldore, south, soil, and bluebunch wheatgrass is dominant on the Neldore, moist, soil. Rocky mountain juniper is also dominant in the understory on the Neldore, south, soil. The understory of the Pinebreaks soil is similar to that of the Neldore, moist, soil; however, hawksbeard is common in the understory, and Douglas fir is common in the overstory. The woodland on the Pinebreaks soil receives the greatest effective precipitation within the survey area.

The potential for producing understory vegetation is presented in the detailed soil map unit description for each woodland soil. The map unit description lists, in order of decreasing quantitative importance, the common names of the characteristic understory plants expected on each soil under a canopy density that is most nearly typical of woodland in which the production of wood crops is highest.

The total production of understory vegetation includes the herbaceous plants and the leaves, twigs, and fruit of woody plants as much as 5 feet tall. The total is expressed in pounds per acre of air-dry vegetation in favorable and unfavorable years. (In a favorable year, soil moisture is above average during the optimum part of the growing season.)

Thinning the forest overstory can generally increase the forage value of forest understory. This practice generally also improves the potential for timber production.

Proper management of rangeland and grazable forest land in Petroleum County will result in the optimum long-term production of forage for livestock and wildlife, habitat for wildlife, conservation of water, and control of erosion. Well managed native rangeland and forest land add to the natural beauty of an area and maintain a quality environment.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, hold snow on the fields, and provide food and cover for wildlife.

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 insure 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 table 8 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.

At the end of each description under the heading "Detailed Soil Map Units," the soil has been assigned to a windbreak suitability group. These groups are based primarily on the suitability of the soil for the locally adapted species, as is indicated by their growth and vigor. Detailed interpretations for each windbreak suitability group in the county are provided in the Technical Guide, which is available in the local office of the Soil Conservation Service.

Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Windbreak Suitability Groups

Windbreak suitability groups (WSG) are groups of soils that have about the same degree of hazards and limitations for tree and shrub survival and development in windbreak plantings.

Group 1 consists of soils that have no, or only slight, soil-related hazards or limitations for windbreak use. The soils are on slopes of less than 15 percent.

Group 2L consists of soils that have a concentrated lime layer (more than 15 percent calcium carbonate equivalent) at 15 to 24 inches below the surface. Available water-holding capacity is at least 5 inches. The soils are well drained and do not have a salinity or alkalinity problem (EC: less than 4 mmhos per cm). Slopes are less than 15 percent.

Group 2M consists of soils that have a moderate available water-holding capacity (5 to 10 inches) because of texture, depth, or both. They are well drained and do not have a salinity problem. If the soils have a concentrated lime layer, the layer is below a depth of 24 inches. Slopes are less than 15 percent.

Group 2S consists of soils that have a moderate salinity problem (EC: 4 to 12 mmhos per cm). Available water-holding capacity is at least 5 inches. If the soils have a concentrated lime zone, the zone is at a depth of 15 inches or more. The water table is at a depth of 30 inches or more. Slopes are less than 15 percent.

Group 3M consists of soils that have an available

water-holding capacity of 2 to 5 inches because of texture, depth, or both. If they have a concentrated lime zone, the zone is at a depth of not less than 15 inches. These soils are well drained and do not have a salinity problem (EC: less than 4 mmhos per cm).

Group 3L consists of soils that have a concentrated lime layer (more than 15 percent calcium carbonate equivalent) at a depth of less than 15 inches. The permanent water table is at a depth of more than 30 inches. The available water-holding capacity is more than 5 inches. The soils do not have a salinity problem (EC: less than 4 mmhos per cm). Slopes are less than 15 percent.

Group 3S consists of soils that have a severe salinity or alkalinity problem (EC: 12 to 16 mmhos per cm). The available water-holding capacity is 5 inches or more. If the soils have a concentrated lime zone, the zone is at a depth of more than 15 inches. The permanent water table is at a depth of at least 30 inches. Slopes are 15 percent or less.

Group 4 consists of all soils on slopes of more than 15 percent, except for slope lengths of 100 feet or less, and those on flatter slopes that have very severe soil conditions. These soils are as follows:

- Soils that have a very low available water-holding capacity (2 inches or less), rock outcrops, and very shallow, stony, and gravelly soils.
- Strongly saline and alkali soils (EC: greater than 16 mmhos per cm) and pH of more than 9.0.

Recreation

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties generally are favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for dwellings without basements and for local roads and streets in table 10 and interpretations for septic tank absorption fields in table 11.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils are gently sloping and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

Ronald F. Batchelor, biologist, Soil Conservation Service, helped prepare this section.

Wildlife is a product of the land, and the abundance of a species is directly related to the extent and diversity of its habitat. Soils influence wildlife populations primarily through the kind of vegetation they support. Wildlife abundance is directly related to soil fertility and moisture. Wildlife can live on almost all

lands, but wildlife productivity is generally a function of the biotic potential of the soil. Species of wildlife are more readily associated with the plant communities that comprise their habitat rather than with specific soils. Productive, well managed soils generally support, or can support, vigorous wildlife populations; less fertile, poorly managed soils can support only sparse populations. Together, plants and animals constitute natural communities with influences from the soil and other environmental factors.

The quality and interspersion of habitat is a determinant of wildlife numbers. The suitability of a given habitat for a particular species depends on the nature, complexity, and extent of plant communities present. The prevailing land use practices and management determine the quantity, quality, and distribution of a particular habitat. The soils of the area govern these factors to some extent.

Rating soils on their ability to produce the vegetative elements of wildlife habitat does not take into account climatic influences, current use of soils, juxtaposition of habitats, or present distribution of wildlife species. For these reasons, the selection and suitability of an area for wildlife habitat development require onsite evaluation. Grassland prairies, pine woodlands of the Missouri River Breaks, dry and irrigated cropland and hayland, riparian woodland, streams and rivers, and ponds, marshes, and reservoirs provide a variety of habitats for the wildlife of Petroleum County.

Rocky Mountain elk inhabit the Breaks of the Missouri River in the northern part of the county. Habitat for these elk is generally confined to rugged breaks, ravines, and timbered slopes, ridges, and meadows. Elk prefer to range on native bunchgrass, but frequently adapt to grazing in adjacent woodlands. The soils in general soil map units 621, 145, and 429 provide the major part of elk habitat in Petroleum County.

Mule deer and white-tailed deer both inhabit the county. White-tailed deer are most common in the lowlands and bottoms of the Missouri and Musselshell Rivers. Mule deer are scattered throughout the county in brushy draws, dissected rangelands, and timbered slopes, as well as in the bottom land of the Missouri and Musselshell Rivers. The soils in general soil map unit 256 support much of the habitat for white-tailed deer, but the entire county provides the necessary components of habitat for mule deer.

Pronghorn antelope and domestic livestock both range the expanse of prairies. However, competition between cattle and pronghorns seldom occurs if the ranges are well managed. Pronghorns graze on forbs and shrubs that cattle do not commonly eat, unless the cattle are forced through late fall and winter grazing or the ranges are overgrazed. The soils in general soil map units 225, 145, 164, 590, 568, and 415 provide much of the habitat for pronghorns in the county.

General soil map unit 256 includes the bottom land of Flatwillow and Box Elder Creeks. The habitat for ring-necked pheasant in the survey area is mostly in this unit. It consists of grain fields, brushy thickets, ditchbanks, and fence rows.

Gray, or Hungarian, partridge, an introduced game bird, is associated with grain crops and grasslands of the survey area. Like sharp-tailed grouse, it varies in population apparently with changes in available habitat, weather variances, and, possibly, disease. Sharp-tailed grouse inhabit interspersed prairie uplands, grain fields, and brushy draws that have abundant fruit-bearing shrubs.

The soils in general soil map units 225, 621, 145, 164, 590, 568, and 415 support plant communities that are potential habitats for sharp-tailed grouse and gray partridge. These plant communities consist of grain fields, shelterbelts, windbreaks, brushy draws, and intermixed shrubs, forbs, and grasses.

On optimum habitat for sage grouse, plant communities of big sage and silver sagebrush are collocated with habitat requirements including breeding grounds and water sources. The soils in general soil map units 225, 145, 164, 590, 568, and 415 support good habitat for sage grouse. This habitat consists of brushy drainageways, meadows, and sagebrush rangeland.

Habitat for waterfowl during the spring and fall migrations and the summer production period comprises many water bodies in the county. Ducks, geese, and various shore, marsh, and wading birds rest, nest, and rear their broods in marshes, sloughs, ponds, potholes, and reservoirs.

Beaver, mink, and raccoon inhabit the principal river systems. Badgers, ground squirrels, coyotes, bobcats, and various small mammals live in scattered habitats throughout the county.

The wildlife population can be enhanced through improving habitat. Conservation practices that improve habitat are developing herbaceous cover, preventing fires, protecting grazing, and establishing hedgerows, shelterbelts, and windbreaks. Other conservation practices that increase wildlife populations are proper grazing use, planned grazing systems, stripcropping, and minimum tillage.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the

most limiting features are identified. The ratings are given in the following tables: Building Site Development, Sanitary Facilities, Construction Materials, and Water Management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

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

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations 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 grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreation 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 and soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

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

Building Site Development

Table 10 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year.

They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills generally are limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity *(6)*.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 5 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of about 5 feet.

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

The ratings are for the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel, or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and depth to the water table is less than 1 foot. These soils may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the taxonomic unit descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a *probable* source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an *improbable* source. Coarse fragments of soft bedrock, such as

shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils generally is 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 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

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

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

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

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

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, a low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features listed in tables are explained on the following pages.

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

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 14 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under "Taxonomic Units and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added; for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the system adopted by the American Association of State Highway and Transportation Officials *(1)* and the Unified soil classification system *(2)*.

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

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

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

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an 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 grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each taxonomic unit under "Taxonomic Units and Their Morphology."

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

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

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

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

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

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

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate or high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, very fine sand,

sand, and organic matter (as much as 4 percent) and on soil structure and permeability. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value the more susceptible the soil is to sheet and rill erosion.

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

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.
8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 15, 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 or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 16 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 16 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as

none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in the table.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 5 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

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

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

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

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

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(10)*. 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 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven 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 Aridisol.

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 Orthid (*Orth*, meaning true, plus *id*, from Aridisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Camborthids (*Camb*, meaning to change, plus *orthid*, the suborder of the Aridisols that has an aridic moisture regime).

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

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, mineral content, temperature regime, thickness of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, Borollic Camborthids.

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

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (7)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (10)*. Unless otherwise stated, matrix colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Abor Series

Depth class: Moderately deep
Drainage class: Well drained

Landform: Uplands
Parent material: Material derived from consolidated shale
Slope range: 1 to 25 percent

Taxonomic Class: Fine, montmorillonitic, frigid Udorthentic Chromusterts

Typical Pedon

Abor silty clay, 1 to 8 percent slopes, in an area of rangeland; 2,500 feet west and 150 feet south of the northeast corner of sec. 28, T. 16 N., R. 28 E.

A—0 to 2 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong fine granular structure; slightly hard, friable, very sticky and plastic; many very fine roots; mildly alkaline; clear smooth boundary.

Bw—2 to 16 inches; light brownish gray (2.5Y 6/2) silty clay, olive brown (2.5Y 4/4) moist; weak fine prismatic structure parting to moderate fine and medium subangular blocky; very hard, firm, very sticky and very plastic; common very fine roots; common slickensides that intersect at a 30- to 40-degree angle from horizontal; strongly effervescent; mildly alkaline; gradual smooth boundary.

Bk—16 to 23 inches; light brownish gray (2.5Y 6/2) silty clay, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; extremely hard, firm, very sticky and very plastic; few very fine roots; common slickensides that intersect at a 30- to 40-degree angle from horizontal; common fine and medium masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bky—23 to 32 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, very sticky and very plastic; common seams and masses of lime and gypsum; strongly effervescent; mildly alkaline; clear smooth boundary.

Cr—32 to 60 inches; grayish brown (2.5Y 5/2) consolidated shale, dark grayish brown (2.5Y 4/2) moist.

Range in Characteristics

Depth to consolidated shale: 20 to 40 inches
Reaction in the solum: Mildly alkaline or moderately alkaline
Surface cracks: 1 to 3 inches in width and extending to depths of more than 20 inches during the dry, late part of summer

A horizon
Rock fragments: 0 to 5 percent pebbles

Absher Series

Depth class: Deep
Drainage class: Moderately well drained
Landform: Fans, foot slopes
Parent material: Alluvium
Slope range: 0 to 4 percent

Taxonomic Class: Fine, montmorillonitic Borollic Natrargids

Typical Pedon

Absher silty clay, in an area of Nobe-Absher silty clays, 0 to 4 percent slopes, used as rangeland; 1,400 feet north and 1,950 feet east of the southwest corner of sec. 2, T. 13 N., R. 26 E.

E—0 to 2 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate thin platy structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; neutral; abrupt smooth boundary.

Bt—2 to 6 inches; pale brown (10YR 6/3) silty clay, dark brown (10YR 3/3) moist; moderate medium columnar structure parting to strong medium angular blocky; hard, firm, sticky and plastic; few very fine roots; many faint clay skins in root channels and on faces of peds; moderately alkaline; clear smooth boundary.

Bty—6 to 12 inches; pale brown (10YR 6/3) silty clay, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; few very fine roots; common faint clay skins on faces of peds; common fine masses and seams of gypsum; moderately alkaline; clear smooth boundary.

Byz1—12 to 17 inches; pale brown (10YR 6/3) silty clay, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; many fine masses and seams of gypsum and other salts; slightly effervescent; moderately alkaline; clear smooth boundary.

Byz2—17 to 60 inches; pale brown (10YR 6/3) silty clay, dark brown (10YR 3/3) moist; massive; hard, firm, sticky and plastic; common fine masses and seams of gypsum and other salts; slightly effervescent; moderately alkaline.

Range in Characteristics

E horizon
Thickness: ½ inch to 2 inches

Bt horizon
Texture of the fraction less than 2 millimeters in size: Silty clay or clay
SAR: Greater than 18

By horizon
SAR: 23 to 30

Bz horizon
EC: 16 to 30 millimhos per centimeter

Amherst Series

Depth class: Shallow
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from hard sandstone
Slope range: 1 to 25 percent

Taxonomic Class: Clayey, montmorillonitic Lithic Argiborolls

Typical Pedon

Amherst clay loam, 1 to 6 percent slopes, in an area of rangeland; 2,600 feet west and 700 feet south of the northeast corner of sec. 4, T. 12 N., R. 25 E.

A—0 to 3 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; neutral; clear smooth boundary.

Bt1—3 to 8 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; weak fine prismatic structure parting to moderate medium angular blocky; hard, friable, sticky and plastic; many fine roots; many distinct clay skins in root channels and on faces of peds; about 10 percent pebble-sized, hard sandstone fragments; neutral; clear smooth boundary.

Bt2—8 to 12 inches; brown (10YR 4/3) gravelly clay loam, dark brown (10YR 3/3) moist; weak fine prismatic structure parting to moderate medium angular blocky; hard, friable, sticky and plastic; many fine roots; many prominent clay skins on faces of peds and as coatings on pebbles; about 30 percent pebble-sized hard sandstone fragments; neutral; clear smooth boundary.

R—12 to 60 inches; hard platy sandstone that is ½ inch to 2 inches thick; few roots between sandstone plates in upper 4 inches; few lime coatings on faces of sandstone plates.

Range in Characteristics

Depth to hard sandstone: 10 to 20 inches

A horizon
Thickness: 2 to 4 inches

Bt horizon
Rock fragments: 10 to 30 percent hard, pebble-size sandstone fragments

Attewan Series

Depth class: Deep
Drainage class: Well drained
Landform: Terraces
Parent material: Alluvium
Slope range: 0 to 4 percent

Taxonomic Class: Fine-loamy over sandy or sandy skeletal, mixed Aridic Argiborolls

Typical Pedon

Attewan loam, 0 to 4 percent slopes, in an area of rangeland; 1,500 feet west and 700 feet south of the northeast corner of sec. 3, T. 12 N., R. 26 E.

A—0 to 3 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and very plastic; many fine and medium roots; about 5 percent pebbles; neutral; clear smooth boundary.

Bt—3 to 12 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky; hard, firm, sticky and plastic; common fine roots; common fine tubular pores; common distinct clay skins on faces of peds and in pores; about 5 percent pebbles; mildly alkaline; clear smooth boundary.

Bk1—12 to 15 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; common fine roots; common fine tubular pores; about 5 percent pebbles; common fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—15 to 30 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; slightly hard, firm, sticky and plastic; few fine roots; common fine tubular pores; about 5 percent pebbles; many fine and medium masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

2C—30 to 60 inches; light yellowish brown (10YR 6/4) very gravelly loamy sand, dark yellowish brown (10YR 4/4) moist; single grain; loose, nonsticky and nonplastic; about 50 percent pebbles; violently effervescent; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 12 inches
Depth to the 2C horizon: 20 to 36 inches
Solum: 0 to 15 percent pebbles

Bascovy Series

Depth class: Moderately deep
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from consolidated shale
Slope range: 2 to 15 percent

Taxonomic Class: Fine, montmorillonitic, frigid Udorthentic Chromusterts

Typical Pedon

Bascovy silty clay, in an area of Bascovy-Neldore silty clays, 2 to 15 percent slopes, used as rangeland; 1,900 feet west and 2,500 feet north of the southeast corner of sec. 9, T. 20 N., R. 27 E.

A—0 to 2 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium granular structure; surface layer has ¼-inch vesicular crust; slightly hard, firm, very sticky and very plastic; many fine and very fine roots; neutral; clear smooth boundary.

Bw—2 to 10 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium subangular blocky structure; very hard, firm, very sticky and very plastic; many fine and very fine roots; neutral; clear smooth boundary.

By—10 to 20 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak fine and medium subangular blocky structure; very hard, firm, very sticky and very plastic; common fine and very fine roots; common fine seams of gypsum; few slickensides that intersect at 30- to 40-degree angles from horizontal; neutral; gradual smooth boundary.

BC—20 to 34 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak fine and medium subangular blocky structure; hard, firm, very sticky and very plastic; few very fine roots; about 40 percent soft shale fragments; few fine seams of gypsum; neutral; gradual smooth boundary.

Cr—34 to 60 inches; gray (2.5Y 5/0) consolidated shale.

Range in Characteristics

Depth to consolidated shale: 20 to 40 inches
Depth to the By horizon: 9 to 18 inches
Vesicular crust: A ¼- to ½-inch vesicular crust on the surface in some pedons
Surface cracks: 1 to 3 inches in width and extending to depths of more than 20 inches during the dry, late parts of summer

B horizon
Texture of the fraction less than 2 millimeters in size: Silty clay or clay
Reaction: Medium acid to mildly alkaline

BC horizon
Rock fragments: 30 to 70 percent soft shale fragments, increasing with depth

Blackhall Series

Depth class: Shallow
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from semiconsolidated sandstone
Slope range: 2 to 60 percent

Taxonomic Class: Loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents

Typical Pedon

Blackhall fine sandy loam, in an area of Blackhall-Rock outcrop-Twilight complex, 8 to 45 percent slopes, used as rangeland; 700 feet north and 300 feet west of the southeast corner of sec. 10, T. 12 N., R. 26 E.

A—0 to 2 inches; light olive brown (2.5Y 5/4) fine sandy loam, olive brown (2.5Y 4/4) moist; moderate very fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots and few medium and coarse roots; about 5 percent hard, pebble-size sandstone fragments; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk—2 to 13 inches; yellowish brown (10YR 5/4) fine sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine and medium roots; about 10 percent hard, pebble-sized sandstone fragments; few fine masses of lime; violently effervescent; moderately alkaline; clear wavy boundary.

Cr—13 to 60 inches; light yellowish brown (10YR 6/4) calcareous semiconsolidated sandstone.

Range in Characteristics

Depth to semiconsolidated sandstone: 10 to 20 inches

A horizon
Reaction: Mildly alkaline or moderately alkaline

Busby Series

Depth class: Deep
Drainage class: Well drained

Landform: Fans and side slopes on uplands
Parent material: Alluvium
Slope range: 2 to 15 percent

Taxonomic Class: Coarse-loamy, mixed Borollic Camborthids

Typical Pedon

Busby fine sandy loam, in an area of Busby-Twilight complex, 2 to 8 percent slopes, used as rangeland; 1,300 feet west and 1,280 feet north of the southeast corner of sec. 10, T. 12 N., R. 26 E.

A—0 to 3 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; moderate medium granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; moderately alkaline; clear smooth boundary.

Bw—3 to 14 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to weak coarse subangular blocky; slightly hard, very friable, nonsticky and nonplastic; common fine roots; slightly effervescent in lower 2 inches; moderately alkaline; clear smooth boundary.

Bk1—14 to 30 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine roots; few fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Bk2—30 to 60 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Depth to carbonates: 10 to 20 inches

A horizon
Reaction: Mildly alkaline or moderately alkaline

Cabbart Series

Depth class: Shallow
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from weakly consolidated sedimentary beds
Slope range: 2 to 60 percent

Taxonomic Class: Loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents

Typical Pedon

Cabbart loam, in an area of Delpoint-Cabbart loams, 2 to 8 percent slopes, used as rangeland; 1,200 feet west and 750 feet north of the southeast corner of sec. 21, T. 15 N., R. 27 E.

A—0 to 3 inches; light olive brown (2.5Y 5/4) loam, olive brown (2.5Y 4/4) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and medium roots; strongly effervescent; mildly alkaline; clear smooth boundary.

Bk—3 to 12 inches; light gray (2.5Y 7/2) loam, light olive brown (2.5Y 5/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common medium and many fine and very fine roots; many fine and medium masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

BC—12 to 17 inches; light yellowish brown (2.5Y 6/4) loam, light olive brown (2.5Y 5/4) moist; massive; hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; violently effervescent; moderately alkaline; gradual smooth boundary.

Cr—17 to 60 inches; light brownish gray (2.5Y 6/2) weakly consolidated sedimentary beds, dark grayish brown (2.5Y 4/2) moist.

Range in Characteristics

Depth to weakly consolidated sedimentary beds: 10 to 20 inches
Soil phases: Moist, high precipitation

A horizon
Reaction: Mildly alkaline or moderately alkaline

Bk horizon
Texture of the fraction less than 2 millimeters in size: Loam, clay loam, silty clay loam

Chinook Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans, terraces, uplands
Parent material: Alluvium or eolian material
Slope range: 2 to 8 percent

Taxonomic Class: Coarse-loamy, mixed Aridic Haploborolls

Typical Pedon

Chinook fine sandy loam, 2 to 8 percent slopes, in an area of rangeland; 2,100 feet south and 950 feet west

of the northeast corner of sec. 2, T. 15 N., R. 28 E.

Ap—0 to 4 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; mildly alkaline; abrupt smooth boundary.

Bw—4 to 15 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; common fine tubular pores; mildly alkaline; clear smooth boundary.

Bk1—15 to 30 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; common fine roots; common fine tubular pores; common fine masses of lime; strongly effervescent; mildly alkaline; gradual smooth boundary.

Bk2—30 to 60 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine roots; common fine tubular pores; common fine and medium masses of lime; violently effervescent; strongly alkaline.

Range in Characteristics

Mollic epipedon thickness: 10 to 15 inches
Depth to carbonates: 12 to 20 inches

A horizon
Reaction: Neutral or mildly alkaline

Crago Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans, terraces
Parent material: Alluvium derived mainly from limestone
Slope range: 0 to 35 percent

Taxonomic Class: Loamy-skeletal, carbonatic Borollic Calciorthids

Typical Pedon

Crago gravelly loam, in an area of Yawdim-Crago complex, 4 to 35 percent slopes, used as rangeland; 2,300 feet east and 2,600 feet north of the southwest corner of sec. 8, T. 15 N., R. 25 E.

A—0 to 6 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; about 20 percent pebbles; strongly effervescent; mildly alkaline; gradual wavy boundary.

Bk1—6 to 18 inches; light yellowish brown (10YR 6/4) gravelly loam, dark brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; about 35 percent pebbles; thin crusts of lime on underside of pebbles; disseminated lime in soil matrix; strongly effervescent; mildly alkaline; clear wavy boundary.

Bk2—18 to 40 inches; very pale brown (10YR 7/4) extremely gravelly sandy loam, light yellowish brown (10YR 6/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; about 65 percent pebbles; thick crusts of lime on underside of pebbles; disseminated lime in soil matrix; violently effervescent; moderately alkaline; gradual wavy boundary.

2C—40 to 60 inches; very pale brown (10YR 7/4) extremely gravelly loamy sand, light yellowish brown (10YR 6/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; about 75 percent pebbles; thin crusts of lime on underside of pebbles; disseminated lime in soil matrix; violently effervescent; moderately alkaline.

Range in Characteristics

Rock fragments: 35 to 80 percent in the control section
Depth to very gravelly or extremely gravelly material: 4 to 20 inches
Calcium carbonate equivalent of the fine-earth fraction: 20 to 40 percent

A horizon
Texture of the fraction less than 2 millimeters in size: Loam
Rock fragments: 10 to 35 percent

Bk horizon
Rock fragments: 0 to 15 percent cobbles

Creed Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans, terraces
Parent material: Alluvium
Slope range: 0 to 8 percent

Taxonomic Class: Fine, montmorillonitic Borollic Natrargids

Typical Pedon

Creed loam, in an area of Gerdrum-Vanda-Creed complex, 0 to 8 percent slopes, used as rangeland; 15

feet west and 500 feet south of the northeast corner of sec. 18, T. 16 N., R. 25 E.

A—0 to 4 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; about 5 percent pebbles; mildly alkaline; clear smooth boundary.

E—4 to 6 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; about 5 percent pebbles; moderately alkaline; abrupt wavy boundary.

Bt—6 to 12 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; strong medium columnar structure parting to strong medium angular blocky; very hard, very firm, very sticky and very plastic; common fine and medium roots; many prominent clay skins on faces of peds; moderately alkaline; clear smooth boundary.

Btk—12 to 20 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; very hard, very firm, very sticky and plastic; few fine roots; common faint clay skins in root channels and on faces of peds; common fine masses of lime; strongly effervescent; strongly alkaline; gradual smooth boundary.

Bky—20 to 31 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; massive; hard, firm, sticky and plastic; few fine roots; common fine masses of lime; common fine seams of gypsum; strongly effervescent; moderately alkaline; clear smooth boundary.

By—31 to 60 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; massive; hard, firm, sticky and plastic; many fine and medium seams of gypsum; moderately alkaline.

Range in Characteristics

Combined A and E horizons: 5 to 10 inches thick

Bt horizon

Texture of the fraction less than 2 millimeters in size: Silty clay or clay

SAR: 13 to 20

Bky horizon

EC: 4 to 8 millimhos per centimeter

Delplain Series

Depth class: Shallow

Drainage class: Well drained

Landform: Uplands

Parent material: Residuum or colluvium derived from hard shale and sandstone

Slope range: 2 to 15 percent

Taxonomic Class: Clayey-skeletal, mixed, nonacid, frigid Lithic Ustic Torriorthents

Typical Pedon

Delplain channery clay loam, in an area of Amherst-Delplain complex, 2 to 15 percent slopes, used as rangeland; 1,700 feet east and 1,100 feet south of the northwest corner of sec. 28, T. 16 N., R. 24 E.

A—0 to 3 inches; light brownish gray (2.5Y 6/2) channery clay loam, dark grayish brown (2.5Y 4/2) moist; moderate very fine granular structure; soft, very friable, sticky and plastic; few coarse, common fine and many very fine roots; about 20 percent channers; neutral; clear smooth boundary.

C1—3 to 7 inches; light brownish gray (2.5Y 6/2) very channery clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; soft, very friable, sticky and plastic; common fine and many very fine roots; about 50 percent channers; neutral; gradual wavy boundary.

C2—7 to 12 inches; light brownish gray (2.5Y 6/2) extremely channery clay loam, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; soft, very friable, sticky and plastic; common very fine roots; about 80 percent channers; neutral.

R—12 inches; hard platy shale and fine grained sandstone.

Range in Characteristics

Depth to hard platy shale and fine grained sandstone: 10 to 20 inches

A horizon

Rock fragments: 20 to 40 percent

C horizon

Rock fragments: 40 to 85 percent

Delpoint Series

Depth class: Moderately deep

Drainage class: Well drained

Landform: Uplands

Parent material: Material derived from weakly consolidated sedimentary beds

Slope range: 2 to 25 percent

Taxonomic Class: Fine-loamy, mixed Borollic Camborthids

Typical Pedon

Delpoint loam, in an area of Delpoint-Cabbart-Yamac loams, 4 to 15 percent slopes, used as rangeland; 1,400 feet west and 1,750 feet north of the southeast corner of sec. 18, T. 15 N., R. 27 E.

A—0 to 3 inches; pale brown (10YR 6/3) loam, dark brown (10YR 4/3) moist; moderate fine and very fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; neutral; clear smooth boundary.

Bw—3 to 12 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; slightly effervescent in lower part; neutral; gradual smooth boundary.

Bk—12 to 28 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common fine masses of lime; violently effervescent; moderately alkaline; gradual smooth boundary.

Cr—28 to 60 inches; light gray (10YR 7/1) weakly consolidated sedimentary beds.

Range in Characteristics

Depth to weakly consolidated sedimentary beds: 20 to 40 inches

A horizon

Reaction: Neutral to moderately alkaline

Bw horizon

Texture of the fraction less than 2 millimeters in size: Loam, clay loam, silty clay loam

Ethridge Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans, terraces
Parent material: Alluvium
Slope range: 0 to 8 percent

Taxonomic Class: Fine, montmorillonitic Aridic Argiborolls

Typical Pedon

Ethridge clay loam, 2 to 8 percent slopes, in an area of rangeland; 2,300 feet east and 600 feet north of the southwest corner of sec. 24, T. 15 N., R. 26 E.

A—0 to 4 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; neutral; abrupt smooth boundary.

Bt—4 to 12 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; many very fine roots; common distinct clay skins on faces of peds; neutral; clear smooth boundary.

Bk—12 to 27 inches; light brownish gray (10YR 6/2) silty clay loam, grayish brown (10YR 5/2) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, sticky and plastic; many very fine roots; many fine masses of lime; strongly effervescent; moderately alkaline; clear wavy boundary.

Bky—27 to 60 inches; light brownish gray (10YR 6/2) silty clay loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; many fine masses of lime and gypsum; strongly effervescent; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 14 inches
Depth to the Bky horizon: 20 to 45 inches

Bt horizon

Texture of the fraction less than 2 millimeters in size: Silty clay loam, silty clay, clay

Evanston Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans, terraces
Parent material: Alluvium
Slope range: 0 to 8 percent

Taxonomic Class: Fine-loamy, mixed Aridic Argiborolls

Typical Pedon

Evanston loam, 2 to 8 percent slopes, in an area of rangeland; 1,700 feet east and 200 feet north of the southwest corner of sec. 29, T. 17 N., R. 26 E.

A—0 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard, very friable, sticky and slightly plastic; many very fine roots; neutral; clear smooth boundary.

Bt—4 to 16 inches; pale brown (10YR 6/3) clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, sticky and

plastic; many very fine roots; common faint clay skins on faces of peds; mildly alkaline; clear smooth boundary.

Bk1—16 to 36 inches; light gray (10YR 7/2) clay loam, grayish brown (10YR 5/2) moist; weak fine and medium subangular blocky structure; hard, firm, sticky and plastic; common very fine roots; many fine masses of lime; violently effervescent; moderately alkaline; diffuse smooth boundary.

Bk2—36 to 60 inches; light gray (10YR 7/2) clay loam, grayish brown (10YR 5/2) moist; massive; hard, firm, sticky and plastic; few very fine roots; many fine masses of lime; strongly effervescent; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 15 inches
Soil: 0 to 10 percent pebbles

A horizon
Reaction: Neutral or mildly alkaline

Gerdrum Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans, terraces
Parent material: Alluvium
Slope range: 0 to 15 percent

Taxonomic Class: Fine, montmorillonitic Borollic Natrargids

Typical Pedon

Gerdrum clay loam (mixed), in an area of Gerdrum-Vanda-Creed complex, 0 to 8 percent slopes, used as rangeland; 15 feet west and 1,200 feet south of the northeast corner of sec. 18, T. 16 N., R. 25 E.

E—0 to 3 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common fine and medium roots; mildly alkaline; abrupt smooth boundary.

Bt—3 to 10 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; strong medium columnar structure parting to strong medium angular blocky; very hard, very firm, sticky and plastic; common fine and medium roots; few fine tubular pores; many distinct clay skins in pores and on faces of peds; mildly alkaline; clear smooth boundary.

Btk—10 to 15 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, sticky and plastic; few fine roots; few fine tubular pores; common faint clay skins in pores and on faces of peds; few fine soft masses of lime; violently effervescent; strongly alkaline; clear smooth boundary.

Bky1—15 to 21 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; massive; hard, firm, sticky and plastic; few fine roots; few fine tubular pores; few fine soft masses of lime; common fine seams of gypsum; strongly effervescent; strongly alkaline; clear smooth boundary.

Bky2—21 to 60 inches; gray (10YR 5/1) silty clay, dark gray (10YR 4/1) moist; massive; hard, firm, sticky and plastic; few fine roots; few fine soft masses of lime; many fine and medium seams of gypsum; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil phases: Clay loam, clay
Surface layer: 2 to 4 inches thick

Bt horizon
Texture of the fraction less than 2 millimeters in size: Silty clay, clay
SAR: 13 to 20

Bky2 horizon
EC: 8 to 16 millimhos per centimeter

Glendive Series

Depth class: Deep
Drainage class: Well drained
Landform: Flood plains, low stream terraces
Parent material: Alluvium
Slope range: 0 to 2 percent

Taxonomic Class: Coarse-loamy, mixed (calcareous), frigid Ustic Torrifluvents

Typical Pedon

Glendive fine sandy loam, in an area of Havre-Glendive complex, 0 to 2 percent slopes, used as rangeland; 1,200 feet north and 20 feet west of the southeast corner of sec. 25, T. 19 N., R. 29 E.

A—0 to 4 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak very fine subangular blocky structure parting to moderate fine granular; soft, very friable, slightly sticky and slightly plastic; few very fine roots; slightly effervescent; moderately alkaline; gradual smooth boundary.

C1—4 to 7 inches; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; slightly hard, friable,

sticky and slightly plastic; few very fine roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

C2—7 to 45 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; strongly effervescent; moderately alkaline; gradual wavy boundary.

C3—45 to 60 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; massive; soft, very friable, nonsticky and nonplastic; strongly effervescent; moderately alkaline.

Range in Characteristics

Texture of particle-size control section: Mainly fine sandy loam or sandy loam; thin strata of loamy fine sand, very fine sandy loam, loam, or silt loam in some pedons

Soil phases: Rarely flooded, occasionally flooded

A horizon

Reaction: Neutral to moderately alkaline but is usually calcareous

Harlem Series

Depth class: Deep
Drainage class: Well drained
Landform: Flood plains, low terraces
Parent material: Alluvium
Slope range: 0 to 4 percent

Taxonomic Class: Fine, montmorillonitic, frigid Ustic Torrifluvents

Typical Pedon

Harlem silty clay, 0 to 2 percent slopes, in an area of rangeland; 650 feet west and 1,900 feet north of the southeast corner of sec. 6, T. 16 N., R. 26 E.

A—0 to 3 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; weak thin platy structure; very hard, firm, sticky and plastic; common very fine roots; neutral; clear smooth boundary.

C1—3 to 15 inches; pale brown (10YR 6/3) silty clay, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; common very fine roots; slightly effervescent; mildly alkaline; gradual wavy boundary.

C2—15 to 28 inches; pale brown (10YR 6/3) silty clay loam consisting of thin strata of loam, clay loam, and silty clay, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; strongly effervescent; moderately alkaline; diffuse boundary.

C3—28 to 60 inches; pale brown (10YR 6/3) silty clay loam consisting of thin strata of loam, clay loam, and silty clay, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, sticky and plastic; few very fine roots; strongly effervescent; moderately alkaline.

Range in Characteristics

Texture of particle-size control section: Mainly silty clay or silty clay loam; thin strata as coarse as fine sandy loam in some pedons

Soil phases: Saline, channeled, occasionally flooded, rarely flooded

A horizon

Reaction: Neutral to moderately alkaline

Havre Series

Depth class: Deep
Drainage class: Well drained
Landform: Flood plains, low terraces
Parent material: Alluvium
Slope range: 0 to 2 percent

Taxonomic Class: Fine-loamy, mixed (calcareous), frigid Ustic Torrifluvents

Typical Pedon

Havre loam, in an area of Havre-Glendive complex, 0 to 2 percent slopes, used as cropland; 1,100 feet west and 1,250 feet south of the northeast corner of sec. 8, T. 15 N., R. 30 E.

Ap—0 to 6 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate thin and medium platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; mildly alkaline; abrupt wavy boundary.

C1—6 to 25 inches; light brownish gray (10YR 6/2) loam consisting of thin strata of silt loam, clay loam, and fine sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; slightly effervescent; moderately alkaline; clear wavy boundary.

C2—25 to 60 inches; light brownish gray (10YR 6/2) loam consisting of thin strata of fine sandy loam, grayish brown (10YR 5/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine and very fine roots; slightly effervescent; moderately alkaline.

Range in Characteristics

Texture of particle-size control section: Mainly loam or silt loam, thin strata of fine sandy loam to clay loam in some pedons
Soil phases: Channeled, saline, occasionally flooded, rarely flooded

A horizon
Reaction: Mildly alkaline or moderately alkaline

Julin Series

Depth class: Moderately deep
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from consolidated acid shale
Slope range: 4 to 15 percent

Taxonomic Class: Fine, montmorillonitic, acid, frigid Ustic Torriorthents

Typical Pedon

Julin silty clay, in an area of Volborg-Volborg, eroded-Julin silty clays, 4 to 25 percent slopes, used as rangeland; 2,200 feet west and 250 feet south of the northeast corner of sec. 28, T. 16 N., R. 27 E.

A—0 to 4 inches; light brownish gray 10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; strong medium granular structure; loose, firm, very sticky and very plastic; many very fine roots; about 5 percent soft shale fragments; strongly acid; clear smooth boundary.

C1—4 to 16 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, firm, very sticky and very plastic; many very fine roots; about 45 percent soft shale fragments; very strongly acid; gradual wavy boundary.

C2—16 to 24 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; massive; hard, firm, very sticky and very plastic; few very fine roots; about 50 percent soft shale fragments; common pale yellow (2.5Y 7/4) sulfur stains; very strongly acid; gradual wavy boundary.

C3—24 to 30 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; massive; hard, firm, very sticky and very plastic; few very fine roots; about 80 percent soft shale fragments; common pale yellow (2.5Y 7/4) sulfur stains; extremely acid; clear smooth boundary.

Cr—30 to 60 inches; dark gray (10YR 4/1) extremely acid consolidated shale.

Range in Characteristics

Depth to consolidated shale: 20 to 40 inches
Texture of particle-size control section: Clay or silty clay

Kobar Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans, terraces
Parent material: Alluvium
Slope range: 1 to 6 percent

Taxonomic Class: Fine, montmorillonitic Borollic Camborthids

Typical Pedon

Kobar silty clay loam, in an area of Kobar-Zatoville silty clay loams, 1 to 6 percent slopes, used as rangeland; 700 feet east and 1,200 feet south of the northwest corner of sec. 5, T. 13 N., R. 30 E.

A—0 to 5 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate very fine subangular blocky structure; hard, friable, sticky and plastic; many fine and very fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

Bw—5 to 16 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many fine and very fine roots; slightly effervescent; mildly alkaline; clear smooth boundary.

Bk—16 to 36 inches; light brownish gray (10YR 6/2) silty clay loam, grayish brown (10YR 5/2) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; common very fine roots; common medium masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bky—36 to 60 inches; light brownish gray (10YR 6/2) silty clay loam, grayish brown (10YR 5/2) moist; massive; very hard, firm, sticky and plastic; few very fine roots; many fine masses of lime and gypsum; strongly effervescent; strongly alkaline.

Range in Characteristics

Bw horizon
Clay content: 35 to 45 percent

Bk horizon
Clay content: 35 to 45 percent
EC: 0 to 4 millimhos per centimeter

Bky horizon
Clay content: 35 to 45 percent

Kremlin Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans, terraces, uplands
Parent material: Alluvium
Slope range: 0 to 8 percent

Taxonomic Class: Fine-loamy, mixed Aridic Haploborolls

Typical Pedon

Kremlin loam, 2 to 8 percent slopes, in an area of rangeland; 2,600 feet west and 1,700 feet north of the southeast corner of sec. 2, T. 17 N., R. 29 E.

A—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; slightly hard, very friable, sticky and slightly plastic; many very fine roots; neutral; clear smooth boundary.

Bw—6 to 14 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium angular blocky; hard, friable, sticky and slightly plastic; common very fine roots; neutral; gradual smooth boundary.

Bk1—14 to 31 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; hard, friable, sticky and slightly plastic; few very fine roots; common fine soft masses of lime; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bk2—31 to 60 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; hard, friable, sticky and slightly plastic; few very fine roots; many fine soft masses of lime; violently effervescent; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 14 inches
Rock fragments: 0 to 5 percent pebbles throughout

A horizon
Reaction: Neutral or mildly alkaline

Marias Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans, terraces
Parent material: Alluvium
Slope range: 0 to 4 percent

Taxonomic Class: Fine, montmorillonitic, frigid Udorthentic Chromusterts

Typical Pedon

Marias silty clay, 0 to 4 percent slopes, in an area of rangeland; 2,600 feet east and 450 feet south of the northwest corner of sec. 28, T. 15 N., R. 27 E.

A—0 to 2 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; strong fine granular structure; hard, firm, sticky and plastic; common medium and many fine and very fine roots; mildly alkaline; clear smooth boundary.

Bw1—2 to 12 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure parting to strong very fine angular blocky; very hard, firm, very sticky and very plastic; few medium and common fine and very fine roots; slightly effervescent; moderately alkaline; gradual smooth boundary.

Bw2—12 to 28 inches; light brownish gray (10YR 6/2) silty clay, grayish brown (10YR 5/2) moist; weak medium subangular blocky structure parting to moderate very fine angular blocky; very hard, firm, very sticky and very plastic; common fine and very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

By—28 to 60 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, very sticky and very plastic; few very fine roots; common slickensides that intersect at a 30- to 40-degree angle from horizontal; common masses of gypsum; slightly effervescent; moderately alkaline.

Range in Characteristics

Surface cracks: 1 to 4 inches in width and extending to depths of more than 20 inches in the dry, late part of summer

A horizon
Reaction: Mildly alkaline or moderately alkaline

By horizon
Reaction: Moderately alkaline or strongly alkaline
EC: 4 to 8 millimhos per centimeter

Marmarth Series

Depth class: Moderately deep
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from weakly consolidated sandstone
Slope range: 1 to 8 percent

Taxonomic Class: Fine-loamy, mixed Aridic Argiborolls

Typical Pedon

Marmarth fine sandy loam, 1 to 8 percent slopes, in an area of tame pasture; 800 feet east and 1,300 feet north of the southwest corner of sec. 22, T. 13 N., R. 27 E.

Ap—0 to 6 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; neutral; clear smooth boundary.

Bt1—6 to 11 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, friable, sticky and plastic; common very fine roots; common faint clayskins in root channels and on faces of peds; mildly alkaline; clear smooth boundary.

Bt2—11 to 16 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; weak fine prismatic structure parting to strong medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine roots; common faint clayskins in root channels and on faces of peds; mildly alkaline; clear smooth boundary.

Bk—16 to 27 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; common fine soft masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Cr—27 to 60 inches; light brownish gray (2.5Y 6/2) weakly consolidated sandstone.

Range in Characteristics

Depth to weakly consolidated sandstone: 20 to 40 inches

Bt horizon

Texture of the fraction less than 2 millimeters in size: Sandy clay loam, clay loam

Bk horizon

Texture of the fraction less than 2 millimeters in size: Fine sandy loam, loam, clay loam

Marvan Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans, terraces, foot slopes
Parent material: Alluvium
Slope range: 0 to 8 percent

Taxonomic Class: Fine, montmorillonitic, frigid Udorthentic Chromusterts

Typical Pedon

Marvan silty clay, 1 to 8 percent slopes, in an area of rangeland; 2,150 feet north and 3,800 feet east of the southwest corner of sec. 19, T. 17 N., R. 27 E.

A—0 to 3 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; common fine and many very fine roots; slightly effervescent; moderately alkaline; clear smooth boundary.

Bw—3 to 12 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common fine and many very fine roots; few slickensides; slightly effervescent; moderately alkaline; clear smooth boundary.

By—12 to 35 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; very hard, very firm, sticky and plastic; common very fine roots; few slickensides; common fine masses and seams of gypsum; strongly effervescent; strongly alkaline; gradual smooth boundary.

Byz—35 to 60 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; very hard, very firm, sticky and plastic; common very fine roots; common fine masses and seams of gypsum and other salts; strongly effervescent; strongly alkaline.

Range in Characteristics

Surface cracks: 1 to 3 inches in width and extending to depths of more than 20 inches in the dry, late part of summer

A horizon

Reaction: Mildly alkaline or moderately alkaline

Bw horizon

Texture of the fraction less than 2 millimeters in size: Silty clay, clay

By horizon

Texture of the fraction less than 2 millimeters in size: Silty clay, clay

Byz horizon

Texture of the fraction less than 2 millimeters in size: Silty clay, clay
EC: 8 to 16 millimhos per centimeter
SAR: 13 to 20

Musselshell Series

Depth class: Deep

Drainage class: Well drained
Landform: Terraces
Parent material: Alluvium
Slope range: 0 to 4 percent

Taxonomic Class: Coarse-loamy, carbonatic Borollic Calciorthids

Typical Pedon

Musselshell loam, in an area of Crago-Musselshell-Crago complex, 0 to 4 percent slopes, used as rangeland; 500 feet east and 400 feet north of the southwest corner of sec. 28, T. 12 N., R. 25 E.

A—0 to 4 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; strongly effervescent; mildly alkaline; clear smooth boundary.

Bk1—4 to 13 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; common fine masses of lime; violently effervescent; moderately alkaline; gradual wavy boundary.

Bk2—13 to 25 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; disseminated lime; violently effervescent; moderately alkaline; abrupt wavy boundary.

2C—25 to 60 inches; very pale brown (10YR 7/4) very gravelly fine sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; about 50 percent pebbles and 5 percent cobbles; violently effervescent; moderately alkaline.

Range in Characteristics

Depth to the 2C horizon: 23 to 35 inches
Calcium carbonate equivalent of the fine-earth fraction: 40 to 60 percent in the 10- to 40-inch particle-size control section

A horizon
Rock fragments: 0 to 15 percent pebbles

B horizon
Rock fragments: 0 to 15 percent pebbles

2C horizon
Rock fragments: 40 to 65 percent

Neldore Series

Depth class: Shallow
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from consolidated shale
Slope range: 2 to 60 percent

Taxonomic Class: Clayey, montmorillonitic, nonacid, frigid, shallow Ustic Torriorthents

Typical Pedon

Neldore silty clay, in an area of Neldore-Bascovy-Rock outcrop complex, 6 to 60 percent slopes, used as rangeland; 2,600 feet west and 1,500 feet north of the southeast corner of sec. 25, T. 19 N., R. 29 E.

A—0 to 2 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; slightly hard, firm, sticky and plastic; few fine and common very fine roots; mildly alkaline; abrupt smooth boundary.

C1—2 to 9 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; massive; slightly hard, firm, sticky and plastic; common very fine roots; about 5 percent soft shale fragments; mildly alkaline; clear smooth boundary.

C2—9 to 17 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; massive; slightly hard, firm, sticky and plastic; common very fine roots; about 65 percent soft shale fragments; mildly alkaline; clear smooth boundary.

Cr—17 to 60 inches; grayish brown (10YR 5/2) consolidated shale; dark grayish brown (10YR 4/2) moist.

Range in Characteristics

Depth to consolidated shale: 10 to 20 inches
Soil phases: Saline, moist

A horizon
Reaction: Neutral or mildly alkaline

C horizon
Texture of the fraction less than 2 millimeters in size: Silty clay, clay

Nobe Series

Depth class: Deep
Drainage class: Moderately well drained
Landform: Fans, terraces
Parent material: Alluvium
Slope range: 0 to 4 percent

Taxonomic Class: Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents

Typical Pedon

Nobe silty clay (mixed), in an area of Nobe-Absher silty

clays, 0 to 4 percent slopes, used as rangeland; 2,000 feet north and 250 feet east of the southwest corner of sec. 2, T. 13 N., R. 26 E.

E—0 to 1 inch; pale brown (10YR 6/3) clay loam, dark brown (10YR 4/3) moist; weak thin platy structure; surface layer is ¼-inch vesicular crust; slightly hard, friable, sticky and plastic; common very fine roots; neutral; abrupt smooth boundary.

Bw—1 to 4 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; common very fine roots; moderately alkaline; clear smooth boundary.

Byz—4 to 12 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; massive; hard, firm, sticky and plastic; few very fine roots; many fine masses and seams of gypsum and other salts; slightly effervescent; moderately alkaline; clear smooth boundary.

Bz—12 to 60 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; massive; hard, firm, sticky and plastic; many fine masses and seams of salt; slightly effervescent; moderately alkaline.

Range in Characteristics

E horizon: 1 to 2 inches thick

Bw horizon
SAR: 13 to 30

Bz horizon
EC: 16 to 25 millimhos per centimeter
SAR: greater than 30

Orinoco Series

Depth class: Moderately deep
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from consolidated shale
Slope range: 2 to 25 percent

Taxonomic Class: Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents

Typical Pedon

Orinoco silty clay loam, in an area of Zatoville-Orinoco silty clay loams, 2 to 8 percent slopes, used as rangeland; 2,000 feet east and 2,000 feet south of the northwest corner of sec. 3, T. 15 N., R. 26 E.

A—0 to 4 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium granular structure; hard, friable, very sticky and plastic; common medium and many fine roots; strongly effervescent; mildly alkaline; clear smooth boundary.

Bw—4 to 8 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; very hard, friable, very sticky and very plastic; common medium and many fine roots; strongly effervescent; moderately alkaline; gradual smooth boundary.

Bky1—8 to 16 inches; gray (10YR 5/1) silty clay, dark gray (10YR 4/1) moist; weak fine and medium subangular blocky structure; very hard, firm, very sticky and very plastic; common fine and very fine roots; common fine masses and seams of lime and gypsum; strongly effervescent; moderately alkaline; clear smooth boundary.

Bky2—16 to 24 inches; gray (10YR 5/1) silty clay, dark gray (10YR 4/1) moist; weak fine and medium subangular blocky structure; very hard, firm, very sticky and very plastic; common fine and very fine roots; many fine masses and seams of lime and gypsum; strongly effervescent; moderately alkaline; clear smooth boundary.

BC—24 to 34 inches; very pale brown (10YR 7/4) silty clay, yellowish brown (10YR 5/4) moist; massive; hard, firm, very sticky and very plastic; few fine and very fine roots; about 50 percent soft shale fragments; strongly effervescent; moderately alkaline; gradual smooth boundary.

Cr—34 to 60 inches; gray (10YR 5/1) consolidated shale, dark gray (10YR 4/1) moist.

Range in Characteristics

Depth to consolidated shale: 20 to 40 inches

Bky1 horizon
EC: 4 to 8 millimhos per centimeter

Bky2 horizon
EC: 8 to 16 millimhos per centimeter

BC horizon
EC: 8 to 16 millimhos per centimeter
SAR: 15 to 30

Pinebreaks Series

Depth class: Shallow
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from consolidated acid shale
Slope range: 15 to 60 percent

Taxonomic Class: Clayey, montmorillonitic, acid, frigid, shallow Typic Ustorthents

Typical Pedon

Pinebreaks silty clay, in a wooded area of Pinebreaks-Neldore, moist, silty clays, 15 to 60 percent slopes; 1,700 feet west and 1,150 feet north of the southeast corner of sec. 31, T. 21 N., R. 27 E.

O—2 inches to 0; partially decomposed forest litter.

A—0 to 3 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; slightly hard, friable, sticky and plastic; common medium, fine, and very fine roots; slightly acid; clear wavy boundary.

Bw—3 to 8 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; common coarse, medium, fine, and very fine roots; many very fine pores; about 10 percent soft shale fragments; slightly acid; clear wavy boundary.

BC—8 to 18 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, very sticky and very plastic; common coarse, medium, fine, and very fine roots between shale fragments; about 70 percent soft shale fragments; very strongly acid; diffuse wavy boundary.

Cr—18 to 60 inches; consolidated shale; very strongly acid.

Range in Characteristics

Depth to consolidated shale: 10 to 20 inches

Reaction: Strongly acid or very strongly acid in the control section

BC horizon

Rock fragments: 60 to 90 percent soft shale fragments

Tanna Series

Depth class: Moderately deep
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from interbedded shale and sandstone
Slope range: 1 to 8 percent

Taxonomic Class: Fine, montmorillonitic Aridic Argiborolls

Typical Pedon

Tanna clay loam, 1 to 6 percent slopes, in an area of rangeland; 1,500 feet south and 180 feet west of the northeast corner of sec. 19, T. 14 N., R. 27 E.

A—0 to 4 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate fine and medium granular structure; slightly hard, friable, sticky and plastic; common fine and very fine roots; neutral; clear smooth boundary.

Bt1—4 to 7 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, firm, sticky and plastic; common fine and very fine roots; common distinct clay skins on faces of peds; neutral; clear smooth boundary.

Bt2—7 to 14 inches; brown (10YR 5/3) clay, dark brown (10YR 3/3) moist; strong medium angular blocky structure; hard, firm, very sticky and plastic; common fine and very fine roots; many distinct clay skins on faces of peds; mildly alkaline; clear smooth boundary.

Bk1—14 to 24 inches; light brownish gray (10YR 6/2) clay, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; common medium masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Bk2—24 to 32 inches; pale brown (10YR 6/3) clay loam, dark brown (10YR 4/3) moist; massive; hard, firm, sticky and plastic; few very fine roots; many coarse soft masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

Cr—32 to 60 inches; light yellowish brown (10YR 6/4) interbedded shale and sandstone that crush to clay loam, dark yellowish brown (10YR 4/4) moist; violently effervescent; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 15 inches

Depth to interbedded shale and sandstone: 30 to 40 inches

Profile: 0 to 5 percent pebbles

Bt horizon

Texture of the fraction less than 2 millimeters in size: Clay loam, clay

Teigen Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans
Parent material: Alluvium from acid shales
Slope range: 1 to 6 percent

Taxonomic Class: Fine, montmorillonitic Borollic Camborthids

Typical Pedon

Teigen silty clay loam, 1 to 6 percent slopes, in an area

of rangeland; 1,050 feet east and 2,000 feet north of the southwest corner of sec. 33, T. 16 N., R. 25 E.

A—0 to 3 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; medium acid; clear smooth boundary.

Bw1—3 to 15 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; medium acid; gradual wavy boundary.

Bw2—15 to 35 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; strongly acid; gradual wavy boundary.

BC—35 to 60 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, firm, sticky and plastic; about 5 percent soft shale fragments; strongly acid.

Range in Characteristics

BC horizon

Rock fragments: 5 to 10 percent soft shale fragments

Twilight Series

Depth class: Moderately deep
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from semiconsolidated sandstone
Slope range: 2 to 25 percent

Taxonomic Class: Coarse-loamy, mixed Borollic Camborthids

Typical Pedon

Twilight sandy loam, in an area of Twilight-Blackhall-Rock outcrop complex, 4 to 25 percent slopes, used as rangeland; 250 feet west and 250 feet north of the southeast corner of sec. 24, T. 18 N., R. 25 E.

A—0 to 3 inches; light olive brown (2.5Y 5/4) sandy loam, olive brown (2.5Y 4/4) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; mildly alkaline; clear smooth boundary.

Bw—3 to 11 inches; light olive brown (2.5Y 5/4) sandy loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; mildly alkaline; clear smooth boundary.

Bk—11 to 19 inches; light yellowish brown (2.5Y 6/4) fine sandy loam, light olive brown (2.5Y 5/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; common very fine masses of lime; violently effervescent; moderately alkaline; clear smooth boundary.

BC—19 to 29 inches; light yellowish brown (2.5Y 6/4) fine sandy loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; violently effervescent; moderately alkaline; gradual smooth boundary.

Cr—29 to 60 inches; light olive brown (2.5Y 5/4) semiconsolidated sandstone.

Range in Characteristics

Depth to carbonates: 10 to 18 inches
Depth to semiconsolidated sandstone: 20 to 40 inches

B horizon

Texture of the fraction less than 2 millimeters in size: Sandy loam, fine sandy loam

Ustic Torriorthents

Depth class: Shallow to deep
Drainage class: Well drained
Landform: Fans, terraces, uplands
Parent material: Alluvium or residuum
Slope range: 0 to 45 percent

Typical Pedon

Ustic Torriorthents, 15 to 45 percent slopes, in an area of rangeland; 2,800 feet east and 100 feet north of the southwest corner of sec. 24, T. 18 N, R 26 E.

A—0 to 3 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; weak medium subangular structure; hard, friable, sticky and plastic; common very fine roots; strongly effervescent; mildly alkaline; clear smooth boundary.

Bk1—3 to 16 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, sticky and plastic; common very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

B—16 to 60 inches; light olive brown (2.5Y 5/4)) clay loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, sticky and plastic; few very fine roots; strongly effervescent; moderately alkaline; clear smooth boundary.

Range in Characteristics

Soil phases: Moderately saline, strongly saline
Depth to sedimentary beds: 10 inches to a depth of 60 inches or more
Reaction: Slightly acid to strongly acid
Texture: Variable and ranges from sandy loam to silty clay
Electrical conductivity: 2 to more than 16 millimhos per centimeter

Vaeda Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans, terraces
Parent material: Alluvium
Slope range: 0 to 6 percent

Taxonomic Class: Fine, montmorillonitic, nonacid, frigid Ustic Torriorthents

Typical Pedon

Vaeda silty clay, 0 to 6 percent slopes, in an area of rangeland; 500 feet west and 500 feet north of the southeast corner of sec. 23, T. 13 N., R. 27 E.

E—0 to 1 inch; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; weak thin platy structure; surface layer has ¼-inch vesicular crust; hard, friable, sticky and plastic; slightly acid; abrupt smooth boundary.

Bz—1 to 3 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots; few fine masses of salts; slightly acid; gradual wavy boundary.

Byz1—3 to 16 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; few fine masses of gypsum and other salts; medium acid; gradual wavy boundary.

Byz2—16 to 30 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common medium masses of gypsum and other salts; medium acid; gradual wavy boundary.

Byz3—30 to 60 inches; pale brown (10YR 6/3) silty clay, brown (10YR 4/3) moist; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few fine masses of gypsum and other salts; medium acid.

Range in Characteristics

Surface layer: ¼- to ½-inch vesicular crust

B horizon
EC: 8 to 16 millimhos per centimeter
SAR: 13 to 20

Vanda Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans, terraces
Parent material: Alluvium
Slope range: 0 to 8 percent

Taxonomic Class: Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents

Typical Pedon

Vanda silty clay (mixed), in an area of Gerdrum-Vanda-Creed complex, 0 to 8 percent slopes, used as rangeland; 500 feet south and 20 feet west of the northeast corner of sec. 18, T. 16 N., R. 25 E.

E—0 to 1 inch; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; moderate fine subangular blocky structure; surface layer has ½-inch vesicular crust; hard, friable, slightly sticky and nonplastic; few very fine roots; mildly alkaline; abrupt smooth boundary.

By1—1 to 7 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; very hard, very firm, sticky and plastic; few very fine roots; few fine seams of gypsum; moderately alkaline; clear wavy boundary.

By2—7 to 12 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, sticky and plastic; few very fine roots; common fine seams of gypsum; strongly effervescent; strongly alkaline; clear smooth boundary.

Byz—12 to 18 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; massive; very hard, very firm, sticky and plastic; many fine seams of gypsum; common fine masses of salts; strongly effervescent; strongly alkaline; clear smooth boundary.

Bz—18 to 60 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; massive; very hard, firm, sticky and plastic; many fine masses of salts; slightly effervescent; moderately alkaline.

Range in Characteristics

Surface layer: ¼- to 1-inch vesicular crust
EC: 8 to 20 millimhos per centimeter throughout the profile

B horizons
Texture of the fraction less than 2 millimeters in size: Silty clay loam, silty clay, clay
SAR: 15 to 30

Verson Series

Depth class: Deep
Drainage class: Well drained
Landform: Terraces
Parent material: Alluvium
Slope range: 0 to 4 percent

Taxonomic Class: Clayey over loamy-skeletal, mixed Aridic Argiborolls

Typical Pedon

Verson clay loam, 0 to 4 percent slopes, in an area of cropland; 2,640 feet south and 1,500 feet west of the northeast corner of sec. 13, T. 12 N., R. 25 E.

Ap—0 to 5 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; hard, friable, sticky and plastic; many very fine roots; neutral; abrupt smooth boundary.

Bt—5 to 12 inches; brown (10YR 5/3) silty clay, brown (10YR 4/3) moist; moderate medium prismatic structure parting to strong medium subangular blocky; very hard, firm, sticky and plastic; many very fine roots; common distinct clay skins on faces of peds; mildly alkaline; clear smooth boundary.

Bk1—12 to 22 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; many very fine roots; few fine masses of lime; strongly effervescent; mildly alkaline; clear smooth boundary.

Bk2—22 to 28 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to moderate fine and medium subangular blocky; very hard, firm, sticky and plastic; common very fine roots; few fine masses of lime; strongly effervescent; mildly alkaline; clear smooth boundary.

2C—28 to 60 inches; yellowish brown (10YR 5/6) extremely gravelly sandy loam, dark yellowish brown (10YR 4/6) moist; massive; loose, nonsticky and nonplastic; about 65 percent pebbles; about 5 percent cobbles; strongly effervescent; mildly alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 12 inches
Depth to the 2C horizon: 20 to 36 inches

2C horizon
Rock fragments: 45 to 75 percent pebbles and 5 to 10 percent cobbles

Volborg Series

Depth class: Shallow
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from consolidated acid shale
Slope range: 2 to 25 percent

Taxonomic Class: Clayey, montmorillonitic, acid, frigid, shallow Ustic Torriorthents

Typical Pedon

Volborg silty clay, in an area of Volborg-Volborg, eroded-Julin silty clays, 4 to 25 percent slopes, used as rangeland; 600 feet east and 500 feet south of the northwest corner of sec. 30, T. 16 N., R. 28 E.

A—0 to 3 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate fine and very fine granular structure; soft, very friable, sticky and plastic; common very fine roots; medium acid; clear smooth boundary.

C1—3 to 8 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; weak fine subangular blocky structure; slightly hard, friable, very sticky and very plastic; common fine and very fine roots; about 30 percent soft shale fragments; very strongly acid; clear smooth boundary.

C2—8 to 14 inches; gray (10YR 5/1) silty clay, dark gray (10YR 4/1) moist; massive; slightly hard, friable, very sticky and very plastic; common fine and very fine roots; about 75 percent soft shale fragments; very strongly acid; clear smooth boundary.

Cr—14 to 60 inches; gray (10YR 5/1) consolidated acid shale.

Range in Characteristics

Depth to consolidated acid shale: 10 to 20 inches
Soil phases: Eroded, moist

C horizon
Reaction: Strongly acid or very strongly acid

Warhorse Series

Depth class: Shallow
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from interbedded shale and sandstone
Slope range: 1 to 8 percent

Taxonomic Class: Clayey, montmorillonitic, shallow Borollic Haplargids

Typical Pedon

Warhorse loam, in an area of Weingart-Warhorse complex, 1 to 8 percent slopes, used as rangeland; 2,600 feet east and 200 feet south of the northwest corner of sec. 14, T. 15 N., R. 26 E.

A—0 to 4 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; neutral; clear smooth boundary.

Bt—4 to 11 inches; brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate fine subangular blocky; hard, firm, sticky and plastic; common fine and very fine roots; common distinct clay skins on faces of peds; mildly alkaline; clear smooth boundary.

BC—11 to 18 inches; brown (10YR 4/3) silty clay loam, dark brown (10YR 3/3) moist; massive; slightly hard, friable, sticky and plastic; common very fine roots; about 75 percent soft shale fragments; mildly alkaline; gradual smooth boundary.

Cr—18 to 60 inches; semiconsolidated interbedded shale and sandstone; mildly alkaline.

Range in Characteristics

Depth to semiconsolidated interbedded shale and sandstone: 10 to 20 inches

BC horizon

Rock fragments: 50 to 80 percent soft shale fragments and 0 to 10 percent hard sandstone fragments

Secondary carbonates: A thin accumulation at the shale contact in some pedons

Weingart Series

Depth class: Moderately deep
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from consolidated shale
Slope range: 1 to 10 percent

Taxonomic Class: Fine, montmorillonitic Borollic Natrargids

Typical Pedon

Weingart silty clay loam (mixed), 1 to 8 percent slopes, in an area of rangeland; 1,600 feet west and 950 feet north of the southeast corner of sec. 34, T. 15 N., R. 29 E.

E—0 to 3 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) moist; moderate thin platy structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; mildly alkaline; abrupt smooth boundary.

Bt—3 to 11 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate medium columnar structure; very hard, firm, sticky and very plastic; common fine and very fine roots; common distinct clay skins on faces of peds; moderately alkaline; clear smooth boundary.

Bk—11 to 18 inches; grayish brown (10YR 5/2) silty clay, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; very hard, firm, sticky and very plastic; few fine and very fine roots; common medium masses of lime; strongly effervescent; moderately alkaline; clear smooth boundary.

Byz—18 to 29 inches; light brownish gray (10YR 6/2) silty clay, brown (10YR 4/3) moist; massive; very hard, firm, sticky and very plastic; few fine and very fine roots; common fine masses of gypsum and other salts; about 30 percent soft shale fragments; moderately alkaline; clear smooth boundary.

Cr—29 to 60 inches; consolidated shale.

Range in Characteristics

Depth to consolidated shale: 25 to 40 inches

Bt horizon

Texture of the fraction less than 2 millimeters in size: Clay, silty clay

EC: 2 to 8 millimhos per centimeter

SAR: 13 to 20

Byz horizon

EC: 8 to 16 millimhos per centimeter

SAR: 13 to 20

Yamac Series

Depth class: Deep
Drainage class: Well drained

Landform: Fans, terraces, foot slopes
Parent material: Alluvium
Slope range: 0 to 8 percent

Taxonomic Class: Fine-loamy, mixed Borollic Camborthids

Typical Pedon

Yamac loam, in an area of Yamac-Delpoint loams, 2 to 8 percent slopes, used as rangeland; 2,100 feet east and 350 feet south of the northwest corner of sec. 36, T. 15 N., R. 28 E.

A—0 to 3 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; mildly alkaline; clear smooth boundary.

Bw—3 to 12 inches; yellowish brown (10YR 5/4) clay loam, dark brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common very fine roots; mildly alkaline; clear smooth boundary.

Bk—12 to 38 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; many fine and medium masses of lime; violently effervescent; strongly alkaline; gradual wavy boundary.

BC—38 to 60 inches; light brownish gray (10YR 6/2) clay loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, sticky and plastic; common fine masses of lime; strongly effervescent; strongly alkaline.

Range in Characteristics

Profile: 0 to 10 percent pebbles

A horizon

Texture of the fraction less than 2 millimeters in size: Loam or clay loam

Yawdim Series

Depth class: Shallow
Drainage class: Well drained
Landform: Uplands
Parent material: Material derived from consolidated shale
Slope range: 4 to 35 percent

Taxonomic Class: Clayey, montmorillonitic (calcareous), frigid, shallow Ustic Torriorthents

Typical Pedon

Yawdim silty clay, in an area of Yawdim-Orinoco complex, 4 to 15 percent slopes, used as rangeland; 1,300 feet south and 2,400 feet east of the northwest corner of sec. 23, T. 17 N., R. 23 E.

A—0 to 1 inch; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots; mildly alkaline; gradual wavy boundary.

C1—1 to 13 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots; moderately alkaline; gradual wavy boundary.

C2—13 to 16 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, very sticky and very plastic; few very fine roots; about 50 percent soft shale fragments; moderately alkaline; gradual wavy boundary.

Cr—16 to 60 inches; gray (2.5Y 5/0) consolidated shale.

Range in Characteristics

Depth to consolidated shale: 10 to 20 inches

Zatoville Series

Depth class: Deep
Drainage class: Well drained
Landform: Fans
Parent material: Alluvium derived from shale
Slope range: 1 to 8 percent

Taxonomic Class: Fine, montmorillonitic, frigid Cambic Gypsiorthids

Typical Pedon

Zatoville silty clay loam, 1 to 6 percent slopes, in an area of rangeland; 550 feet north and 250 feet west of the southeast corner of sec. 5, T. 15 N., R. 25 E.

A—0 to 3 inches; light brownish gray (10YR 6/2) silty clay loam, dark grayish brown (10YR 4/2) moist; weak thin platy structure; hard, friable, very sticky and very plastic; many very fine roots; strongly effervescent; mildly alkaline; clear smooth boundary.

Bw—3 to 12 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; weak fine prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, very sticky

and very plastic; common very fine roots; violently effervescent; moderately alkaline; clear smooth boundary.

Bk—12 to 17 inches; pale brown (10YR 6/3) silty clay, dark grayish brown (10YR 4/2) moist; moderate fine and medium subangular blocky structure; hard, firm, very sticky and very plastic; common very fine roots; few fine seams of lime; violently effervescent; moderately alkaline; clear smooth boundary.

By1—17 to 23 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; many seams and masses of gypsum; moderately alkaline; clear smooth boundary.

By2—23 to 60 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (10YR 4/2) moist; massive; very hard, firm, very sticky and very plastic; few very fine roots; common seams of gypsum; strongly effervescent; moderately alkaline.

Range in Characteristics

By horizon

EC: 8 to 16 millimhos per centimeter
SAR: 18 to 30

Formation of the Soils

Soil consists of mineral matter mixed with varying amounts of organic matter derived mostly from vegetation. The mineral matter is parent material that various forces have weathered and broken down. These forces, which are the combined effects of climate, living organisms, and relief acting over long periods of time, can vary within short distances. Consequently, the soils that form can have different fertility, productivity, and physical and chemical characteristics.

Climate

Climate is an active force in forming soils. Temperature and precipitation mainly determine erosion and alternate freezing and thawing, all of which break down rocks into weathered material from which soils form. Chemical reactions, such as solution and hydration, further break down this material. Precipitation and temperature affect the kind and amount of native vegetation that grows on the soil. Decaying vegetation produces organic matter in the soil. Soils with cool temperatures and high precipitation generally are dark, and those with warm temperatures and low precipitation generally are light colored. In Petroleum County, precipitation mainly ranges from about 10 to 14 inches per year and the mean annual temperature ranges from 40 to 45 degrees.

Living Organisms

Living organisms are active in forming soils. Organic matter is the main source of the dark color of the surface layer of soils. Fungi and algae inhabit and help decompose rocks. Rocks decomposed into soil enable grasses, shrubs, and trees to grow and support animal life.

The kinds of plants and animals present on the soil largely determine the kinds and amount of organic matter and the way in which it is added to and incorporated into the soil. Roots, rodents, and insects penetrate the soils, influencing its structure. Leaves, roots, and whole plants remain in the surface layer, where micro-organisms, chemicals in the soils, and insects change them into humus.

The vegetation in this survey area is mainly short and mid grasses and shrubs. Gophers, badgers, and rabbits are common. In making their burrows they have dug up many of the pebbles and stones on the surface of terraces and other areas.

Topography

The main determinant of topography is the age of geologic formations and their resistance to water and wind erosion. On the eroded uplands, runoff has carved deep, multibranched valleys into the original bedrock. The rugged relief contrasts sharply with the smooth, low relief of the fans, terraces, and flood plains of river valleys.

On uplands, soil horizons decrease in number and distinctness as slope increases. Steep soils that have rapid runoff have many characteristics similar to those of soils that formed in arid climates. In this survey area nearly level to moderately sloping soils typically have several distinct soil horizons. Moderately steep and steep Cabbart soils and nearly level to moderately sloping Ethridge soils are examples. Unlike the shallow Cabbart soils, Ethridge soils have a distinct B horizon.

Parent Material

Most soils in Petroleum County formed in material derived from shale and sandstone. Some soils formed in alluvium. Alluvium was deposited in the major valleys and on some bordering uplands. The clayey soils, such as Abor soils, formed in material derived from shale formed by the consolidation of clay. The loamy soils, such as Havre soils, formed in mixed alluvium derived from shale and sandstone. Saline and sodic soils, such as Absher soils, acquired salt and sodium from their parent material.

Time

The changes that take place in a soil over long periods of time are called soil genesis. They give the soil distinct, recognizable layers, or horizons. The kinds and arrangement of these horizons are called soil

morphology. They are described in terms of color, texture, structure, consistence, thickness, permeability, and chemistry.

The age of soils, from young to mature, is determined from several properties. These include the thickness of the A horizon, the content of organic matter and clay, the depth to which soluble material is leached, and the form and distribution of calcium carbonate and gypsum in the soil.

The young Harlem soils are Entisols on flood plains adjacent to streams. They contain little organic matter with which to form an A horizon. In addition, they have no accumulated clay, and few carbonates have been translocated to form Bk horizons.

The mature Ethridge soils are Mollisols that formed in alluvium on fans and terraces. They formed in parent material similar to, but much older than, that of Harlem soils. They contain organic matter and have a moderately dark A horizon. They also have a distinct clay accumulation in the B2t horizon, and nearly all carbonates have been leached below a depth of about 13 inches.

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Glossary

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

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 cone. The material washed down the sides of mountains and hills by ephemeral streams and deposited at the mouth of gorges in the form of a moderately steep, conical mass descending equally in all directions from the point of issue.

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.

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.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Arroyo. The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in alluvium.

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 3.75
Low	3.75 to 5.0
Moderate	5.0 to 7.5
High	More than 7.5

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

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.

Bajada. A broad alluvial slope extending from the base of a mountain range out into a basin and formed by coalescence of separate alluvial fans.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

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.

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.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by 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.

Board foot. A unit of measure of wood in lumber, logs, or trees; the amount of wood in a board 1 foot wide, 1 foot long, and 1 inch thick before finishing.

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 to very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4½ feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to reduce or eliminate competition of woody vegetation to allow understory grasses and forbs to recover or to make conditions favorable for reseeding. It increases production of forage, which reduces erosion. Brush management may 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.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

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 just 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 a 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.

Cement rock. Shaly limestone used in the manufacture of cement.

Channeled. Drainage area in which natural meandering of or repeated branching and converging of a streambed have created deeply incised cuts, either active or abandoned, within alluvial material.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation by use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil

and bring clods to the surface. A form of emergency tillage to control soil blowing.

Cirque. Semicircular, concave, bowllike areas that have steep faces primarily resulting from glacial ice and snow abrasion.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay skin. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay film.

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 plant community on a given site that will be established if present environmental conditions continue to prevail and the site is properly managed.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

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 is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.

Codominant trees. Trees with crowns forming the general level of the forest canopy and receiving full light from above but comparatively little from the sides.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Commercial forest. Forest land capable of producing 20 total cubic feet or more of wood per acre per year at the culmination of mean annual increment.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil 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. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Congeliturbate. Soil material disturbed by frost action.

Conglomerate. A coarse grained, clastic rock composed of rounded to subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. If soil improving crops and practices used in the system more than offset the soil depleting crops and deteriorating practices, then it is a good conservation cropping system. 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. Any tillage and planting system that maintains enough residue after planting to cover at least 30 percent of the surface. This cover of plant residue helps to control water erosion. For wind erosion, the system must maintain at least 1,000 pounds of flat small grain residue equivalent on the surface during the critical erosion period.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.
Soft.—When dry, breaks into powder or individual grains under very slight pressure.
Cemented.—Hard; little affected by moistening.

Consolidated sandstone. A sandstone that will disperse within a few hours when fragments are placed in water. When dry, the fragments are extremely hard or very hard and not easily crushed and use of the usual field method cannot texture them.

Consolidated shale. A shale that will disperse within a few hours when fragments are placed in water. When dry, the fragments are extremely hard or very hard and are not easily crushed.

Contour stripcropping (or contour farming). 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.

Coppice dune. A small dune of fine-grained soil material stabilized around shrubs or small trees.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

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.

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.

Cropping system. Growing crops using a planned system of rotation and management practices.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cuesta. An asymmetric, homoclinal ridge capped by resistant rock layers of slight to moderate dip.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

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.

Deep soil. Generally, a soil deeper than 40 inches to bedrock or other material restrictive to plant roots.

Deferred grazing. Postponing grazing or arresting grazing for a prescribed period.

Delta. A body of alluvium whose surface is nearly flat and fan shaped, deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Desert pavement. A layer of gravel or coarser fragments on a desert soil surface that was emplaced by upward movement of fragments from underlying sediment or remains after finer particles have been removed by running water or wind.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming with the dip of underlying bedded rock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—These soils have very high and high hydraulic conductivity and low water-holding capacity. They are not suited to crop production unless irrigated.
Somewhat excessively drained.—These soils have

high hydraulic conductivity and low water-holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.

Well drained.—These soils have intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless artificial drainage is provided. Moderately well drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless artificial drainage is provided. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. They are wet enough to prevent the growth of important crops (except rice) unless artificially drained.

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley, generally more open and with broader bottom land than a ravine or gulch.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Duff. A term used to identify a generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

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.

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.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and produced by erosion or faulting. Synonym: scarp.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Even aged. A stand of trees in which only small differences in age occur between the individuals. A range of 20 years is allowed.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

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.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

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.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of men and equipment in fire fighting. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material is 35 to 60 percent flagstones, and extremely flaggy soil material is more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. 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 (or 300 meters) and fringes a mountain range or high-plateau escarpment.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant that is not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest land. Land that has the potential to support the growth of trees to the extent that 10 percent or more of the area is stacked with trees.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

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.

Gilgai. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

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 is 15 to 50 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 (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum. Hydrous calcium sulfate.

Hard rock. Rock 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.

Head out. To form a flower head.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Crops such 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 upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some 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, the number 2 precedes the letter C.

Cr horizon.—Weakly consolidated and consolidated sedimentary beds, consolidated sandstone, and semiconsolidated and consolidated shale. Generally, roots cannot penetrate this horizon except along fracture planes.

R layer.—Consolidated rock beneath the soil. The rock 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-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay

layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

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.

Inclusion. Soil or landscape characteristics for which the interpretations for the major uses and management are more restrictive than for the named components in the unit.

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 are 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

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.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

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.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

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 (7.5 centimeters) or more across. Large stones

adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand and loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Crops such 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.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

Mean annual increment (MAI). The average annual increase in volume of a tree during the entire life of a tree.

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.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

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 deep soil. Generally, a soil 20 to 40 inches to bedrock or other material impervious or restrictive to plant roots.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

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.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Observed rooting depth. Depth to which roots have been observed to penetrate.

Open space. A relatively undeveloped green or wooded area provided mainly within an urban area to minimize feelings of congested living.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

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.

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.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Pediment. A sloping erosional surface at the foot of a hill.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

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 to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	Less than 0.06 inch
Slow	0.06 to 0.2 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. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

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. The water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

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.

Post and piling outlet. A market location where posts and pilings are bought, processed, and sold.

Potential native plant community. The plant community on a given site that will be established if present environmental conditions continue to prevail and the site is properly managed. (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. The application of fire to land under such conditions of weather, soil moisture, and time of day as presumably will result in the intensity of heat and spread required to accomplish specific forest management, wildlife, grazing, or fire hazard reduction purposes.

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 increases the vigor and reproduction of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Range. Range includes rangeland, native pasture, and much forest land that support an understory or periodic cover of vegetation suitable for grazing.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata mainly red in color and composed largely of sandstone and shale.

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.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. A saline soil has an electrical conductivity of 4 mmhos/centimeter or more. Salinity is expressed as electrical conductivity in the following way—nonsaline, 0-4 mmhos/centimeter; slightly saline, 4-8 mmhos/centimeter; moderately saline, 8-16 mmhos/centimeter; and strongly saline, more than 16 mmhos/centimeter.

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.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Scribner's log rule. A method of estimating the number of board feet that can be cut from a log of a given diameter and length.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Selection system. Removing, at various intervals, mature and immature trees either singly or in groups. In so doing, regeneration is established almost continuously, and an uneven-aged stand of trees is maintained. This system favors regeneration of the more tolerant associated trees.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Shallow soil. Generally, a soil 10 to 20 inches to bedrock or other material impervious or restrictive to plant roots.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shelterwood system. Removing the stand of trees in a series of cuts to allow regeneration under a partial forest canopy. After established regeneration, a final harvest cut removes the shelterwood and permits the stand to develop in the open as an even-aged stand. This system is well adapted to sites where shelter is needed for new reproduction, and it can be used to favor regeneration of the more intolerant species in a forest stand.

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.

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 soil. Soil or landscape characteristics for which interpretations for the major uses and management are similar to those for the named components in the unit.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site class. A grouping of site indexes into 5 to 7 production capability levels. Each level can be represented by a site curve.

Site curve (50-year). A set of related curves on a graph that shows the average height of dominant trees for the range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant trees that are 50 years old or are 50 years old at breast height.

Site curve (100-year). A set of related curves on a graph that show the average height of dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant and codominant trees that are 100 years old or are 100 years old at breast height.

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 loamy or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical

distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 2 percent
Gently sloping	2 to 4 percent
Moderately sloping	4 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent
Very steep	45 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

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 absorption 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

Soft rock. Rock 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 underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 6 to 15 inches (15 to 38 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 soil blowing 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 grain* (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 soil blowing 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 loosen a layer that is restrictive to roots.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying 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.

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."

Tail water. The water just downstream of a structure.

Talus. Rock fragments of any size or shape, commonly coarse and angular, derived from and lying at the base of a cliff or very steep, rock slope. The accumulated mass of such loose, broken rock formed chiefly by falling, rolling, or sliding.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

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 too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

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, are in soils in extremely small amounts. They are essential to plant growth.

Trafficability. An expression of the degree to which a soil is capable of supporting vehicular traffic across a wide range of soil moisture conditions.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial 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.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

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.

Waterspreading. Diverting runoff from natural channels by means of a system of dams, dikes, or ditches, and spreading it over relatively flat surfaces.

Weakly consolidated sedimentary beds. Soft geologic sediments which will disperse quickly when fragments are placed in water. Fragments are hard or very hard when dry, and are textured easily by the usual field methods.

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.

Windthrow. The action of uprooting and tipping over trees by the wind.

Woodland suitability subclass. A grouping of soils that are capable of producing similiar kinds of woodcrops and have similar soil features affecting use and management.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-84 at Flatwillow and Grassrange, Montana, and 1959-84 at Mosby, Montana)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
FLATWILLOW:											
January	31.9	7.2	19.6	61	-31	58	0.53	0.19	0.81	2	8.4
February	39.6	14.5	27.1	69	-21	55	.35	.09	.55	1	5.1
March	45.5	20.0	32.8	75	-16	86	.57	.23	.84	2	5.4
April	57.7	30.1	43.9	84	9	179	1.18	.48	1.75	4	5.4
May	68.2	39.6	53.9	92	21	431	2.65	1.25	3.84	6	1.1
June	77.3	47.6	62.5	97	34	675	2.56	1.35	3.61	7	.0
July	87.3	53.2	70.3	103	39	939	1.26	.54	1.87	4	.0
August	86.2	51.4	68.8	102	37	893	1.24	.46	1.90	3	.0
September	73.9	42.2	58.1	97	24	543	1.09	.31	1.70	3	.6
October	63.1	33.3	48.2	88	10	276	.85	.23	1.34	3	2.7
November	46.8	21.3	34.1	73	-10	61	.43	.14	.66	2	3.8
December	36.8	12.5	24.7	67	-28	61	.48	.13	.76	2	7.6
Yearly:											
Average	59.5	31.1	45.3	---	---	---	---	---	---	---	---
Extreme	---	---	---	105	-35	---	---	---	---	---	---
Total	---	---	---	---	---	4,257	13.19	10.22	15.97	39	40.1
GRASSRANGE:											
January	34.1	7.2	20.7	63	-32	56	.76	.23	1.18	3	13.5
February	41.4	14.0	27.7	68	-22	49	.43	.13	.67	2	8.1
March	46.3	18.9	32.6	74	-18	87	.79	.36	1.16	3	10.3
April	57.3	28.2	42.8	82	8	156	1.46	.72	2.10	4	8.9
May	67.5	38.0	52.8	90	21	397	3.24	1.46	4.76	7	1.6
June	76.3	45.2	60.8	95	31	624	3.07	1.63	4.31	7	.1
July	85.8	50.6	68.2	101	37	874	1.65	.68	2.46	5	.0
August	84.9	49.1	67.0	101	36	837	1.55	.55	2.36	4	.0
September	73.4	40.0	56.7	96	22	501	1.41	.39	2.23	4	.5
October	63.6	31.7	47.7	88	10	256	.97	.27	1.52	3	4.0
November	47.9	20.4	34.2	75	-11	62	.58	.16	.90	2	7.7
December	39.0	12.4	25.7	66	-29	52	.56	.12	.89	2	8.2
Yearly:											
Average	59.8	29.6	44.7	---	---	---	---	---	---	---	---
Extreme	---	---	---	102	-36	---	---	---	---	---	---
Total	---	---	---	---	---	3,951	16.47	12.78	19.90	46	62.9

See footnote at end of table.

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
MOSBY:											
January----	29.8	6.9	18.4	58	-32	49	0.59	0.22	0.89	2	8.2
February---	38.9	15.2	27.1	65	-23	57	.35	.13	.52	1	4.4
March------	46.7	22.4	34.6	75	-17	92	.54	.24	.79	2	4.6
April------	58.8	32.8	45.8	84	12	226	1.32	.44	2.04	4	5.0
May--------	69.4	42.7	56.1	93	27	499	2.50	1.40	3.48	6	1.2
June-------	79.3	51.5	65.4	97	36	762	2.26	1.03	3.31	6	.1
July-------	89.0	57.5	73.3	103	43	1,032	1.62	.64	2.44	4	.0
August-----	87.8	55.5	71.7	102	40	983	1.11	.35	1.72	3	.0
September--	75.1	44.7	59.9	98	27	597	1.40	.37	2.22	3	.1
October----	63.7	35.2	49.5	87	14	314	.82	.21	1.30	2	2.1
November---	46.6	22.6	34.6	75	-11	50	.39	.11	.61	1	3.7
December---	34.7	12.2	23.5	65	-30	65	.47	.15	.73	2	6.9
Yearly:											
Average---	60.0	33.3	46.7	---	---	---	---	---	---	---	---
Extreme---	---	---	---	105	-34	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,726	13.37	10.33	16.62	36	36.3

* 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 1951-84 at Flatwillow and Grassrange, Montana, and 1959-84 at Mosby, Montana)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
FLATWILLOW:			
Last freezing temperature in spring:			
1 year in 10 later than--	May 12	May 26	June 3
2 years in 10 later than--	May 6	May 20	May 29
5 years in 10 later than--	Apr. 26	May 10	May 20
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 24	Sept. 14	Sept. 5
2 years in 10 earlier than--	Sept. 30	Sept. 18	Sept. 9
5 years in 10 earlier than--	Oct. 12	Sept. 28	Sept. 18
GRASSRANGE:			
Last freezing temperature in spring:			
1 year in 10 later than--	May 13	May 30	June 12
2 years in 10 later than--	May 8	May 24	June 7
5 years in 10 later than--	Apr. 28	May 13	May 27
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 17	Sept. 7	Sept. 1
2 years in 10 earlier than--	Sept. 23	Sept. 13	Sept. 6
5 years in 10 earlier than--	Oct. 4	Sept. 24	Sept. 16

TABLE 2.--FREEZE DATES IN SPRING AND FALL--Continued

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
MOSBY:			
Last freezing temperature in spring:			
1 year in 10 later than--	May 1	May 11	May 27
2 years in 10 later than--	Apr. 26	May 6	May 21
5 years in 10 later than--	Apr. 16	Apr. 27	May 11
First freezing temperature in fall:			
1 year in 10 earlier than--	Sept. 29	Sept. 18	Sept. 8
2 years in 10 earlier than--	Oct. 5	Sept. 23	Sept. 13
5 years in 10 earlier than--	Oct. 18	Oct. 3	Sept. 23

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-84 at Flatwillow and Grassrange, Montana, and 1959-84 at Mosby, Montana)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
FLATWILLOW:			
9 years in 10	145	118	102
8 years in 10	153	125	108
5 years in 10	168	140	120
2 years in 10	182	155	132
1 year in 10	190	163	139
GRASSRANGE:			
9 years in 10	142	112	89
8 years in 10	147	119	96
5 years in 10	157	133	111
2 years in 10	168	147	126
1 year in 10	173	154	133
MOSBY:			
9 years in 10	160	139	117
8 years in 10	169	146	123
5 years in 10	185	160	134
2 years in 10	203	174	146
1 year in 10	213	182	153

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Abor silty clay, 1 to 8 percent slopes	6,730	0.6
2	Abor-Neldore silty clays, 2 to 8 percent slopes	11,290	1.1
3	Amherst clay loam, 1 to 6 percent slopes	10,014	0.9
4	Amherst clay loam, 6 to 25 percent slopes	2,966	0.3
5	Amherst-Delplain complex, 2 to 15 percent slopes	5,012	0.5
6	Attewan loam, 0 to 4 percent slopes	7,676	0.7
7	Badland	391	*
8	Bascovy-Neldore silty clays, 2 to 15 percent slopes	23,491	2.2
9	Bascovy-Neldore-Neldore, moist, silty clays, 6 to 60 percent slopes	55,366	5.2
10	Blackhall-Rock outcrop-Twilight complex, 8 to 45 percent slopes	5,021	0.5
11	Busby fine sandy loam, 8 to 15 percent slopes	431	*
12	Busby-Blackhall fine sandy loams, 8 to 15 percent slopes	3,231	0.3
13	Busby-Twilight complex, 2 to 8 percent slopes	6,702	0.6
14	Cabbart loam, 8 to 15 percent slopes	975	0.1
15	Cabbart-Crago-Delpoint complex, 8 to 35 percent slopes	6,791	0.6
16	Cabbart-Delpoint loams, 4 to 15 percent slopes	11,831	1.1
17	Cabbart-Delpoint-Cabbart, moist, loams, 4 to 35 percent slopes	21,094	2.0
18	Cabbart-Delpoint-Rock outcrop complex, 8 to 45 percent slopes	9,542	0.9
19	Cabbart-Rock outcrop-Blackhall complex, 8 to 45 percent slopes	6,419	0.6
20	Cabbart-Yawdim-Delpoint complex, 15 to 35 percent slopes	5,442	0.5
21	Cabbart-Yawdim-Rock outcrop complex, 4 to 35 percent slopes	36,869	3.4
22	Cabbart, high precipitation-Cabbart, moist, complex, 15 to 60 percent slopes	2,306	0.2
23	Cabbart, moist-Blackhall-Delpoint complex, 6 to 60 percent slopes	40,857	3.8
24	Chinook fine sandy loam, 2 to 8 percent slopes	1,893	0.2
25	Crago gravelly loam, 0 to 8 percent slopes	1,190	0.1
26	Crago gravelly loam, 8 to 35 percent slopes	3,564	0.3
27	Crago-Musselshell-Crago complex, 0 to 4 percent slopes	2,001	0.2
28	Crago-Musselshell-Attewan complex, 0 to 2 percent slopes	2,351	0.2
29	Creed-Gerdrum complex, 1 to 6 percent slopes	7,634	0.7
30	Delpoint loam, 2 to 8 percent slopes	902	0.1
31	Delpoint-Cabbart loams, 2 to 8 percent slopes	7,387	0.7
32	Delpoint-Cabbart-Yamac loams, 4 to 15 percent slopes	34,029	3.2
33	Ethridge clay loam, 0 to 2 percent slopes	6,563	0.6
34	Ethridge clay loam, 2 to 8 percent slopes	13,893	1.3
35	Evanston loam, 0 to 2 percent slopes	2,771	0.3
36	Evanston loam, 2 to 8 percent slopes	26,053	2.4
37	Evanston-Attewan loams, 0 to 2 percent slopes	1,140	0.1
38	Gerdrum-Bascovy clays, 2 to 15 percent slopes	10,151	0.9
39	Gerdrum-Creed complex, 1 to 6 percent slopes	30,902	2.9
40	Gerdrum-Vanda complex, 1 to 6 percent slopes	31,020	2.9
41	Gerdrum-Vanda-Creed complex, 0 to 8 percent slopes	71,481	6.7
42	Harlem silty clay, 0 to 2 percent slopes	2,462	0.2
43	Harlem silty clay, 0 to 2 percent slopes, occasionally flooded	4,836	0.5
44	Harlem silty clay, saline, 0 to 2 percent slopes	1,943	0.2
45	Harlem-Havre complex, 0 to 2 percent slopes	8,524	0.8
46	Harlem-Havre complex, 0 to 2 percent slopes, occasionally flooded	3,164	0.3
47	Harlem-Havre complex, saline, 0 to 2 percent slopes	3,941	0.4
48	Havre loam, 0 to 2 percent slopes	4,624	0.4
49	Havre loam, 0 to 2 percent slopes, occasionally flooded	5,622	0.5
50	Havre-Glendive complex, 0 to 2 percent slopes	3,119	0.3
51	Havre-Glendive complex, 0 to 2 percent slopes, occasionally flooded	2,821	0.3
52	Havre-Harlem complex, 0 to 2 percent slopes, occasionally flooded, channeled	5,317	0.5
53	Havre-Yamac loams, 0 to 4 percent slopes	3,037	0.3
54	Kobar-Zatoville silty clay loams, 1 to 6 percent slopes	14,849	1.4
55	Kremlin loam, 0 to 2 percent slopes	315	*
56	Kremlin loam, 2 to 8 percent slopes	492	*
57	Marias silty clay, 0 to 4 percent slopes	3,571	0.3
58	Marmarth fine sandy loam, 1 to 8 percent slopes	6,663	0.6
59	Marvan silty clay, 1 to 8 percent slopes	7,731	0.7
60	Marvan-Vanda silty clays, 0 to 8 percent slopes	12,349	1.2
61	Neldore silty clay, 4 to 25 percent slopes	12,319	1.1
62	Neldore-Abor silty clays, 4 to 15 percent slopes	26,049	2.4

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
63	Neldore-Abor silty clays, 15 to 45 percent slopes	28,634	2.7
64	Neldore-Bascovy-Rock outcrop complex, 6 to 60 percent slopes	38,564	3.6
65	Neldore-Neldore, saline, silty clays, 4 to 25 percent slopes	7,215	0.7
66	Neldore-Rock outcrop complex, 15 to 45 percent slopes	21,518	2.0
67	Neldore-Volborg silty clays, 4 to 25 percent slopes	19,632	1.8
68	Neldore-Weingart complex, 2 to 15 percent slopes	9,263	0.9
69	Neldore-Yawdim complex, 4 to 25 percent slopes	3,438	0.3
70	Neldore, moist-Bascovy-Neldore, south, silty clays, 6 to 60 percent slopes	35,151	3.3
71	Nobe-Absher silty clays, 0 to 4 percent slopes	9,109	0.9
72	Pinebreaks-Neldore, moist, silty clays, 15 to 60 percent slopes	2,651	0.2
73	Riverwash	1,148	0.1
74	Rock outcrop	663	0.1
75	Tanna clay loam, 1 to 6 percent slopes	6,230	0.6
76	Tanna-Weingart complex, 2 to 8 percent slopes	5,691	0.5
77	Teigen silty clay loam, 1 to 6 percent slopes	3,228	0.3
78	Twilight sandy loam, 2 to 8 percent slopes	1,233	0.1
79	Twilight-Blackhall sandy loams, 2 to 15 percent slopes	17,590	1.6
80	Twilight-Blackhall-Rock outcrop complex, 4 to 25 percent slopes	11,904	1.1
81	Ustic Torriorthents, 15 to 45 percent slopes	6,954	0.6
82	Ustic Torriorthents, moderately saline, 15 to 45 percent slopes	1,879	0.2
83	Ustic Torriorthents, strongly saline, 0 to 8 percent slopes	838	0.1
84	Vaeda silty clay, 0 to 6 percent slopes	2,303	0.2
85	Vanda silty clay, 0 to 4 percent slopes	1,794	0.2
86	Vanda-Harlem-Marvan silty clays, 0 to 4 percent slopes	3,325	0.3
87	Verson clay loam, 0 to 4 percent slopes	20,586	1.9
88	Volborg silty clay, moist, 2 to 25 percent slopes	4,112	0.4
89	Volborg-Volborg, eroded-Julin silty clays, 4 to 25 percent slopes	6,756	0.6
90	Volborg, eroded-Rock outcrop-Julin complex, 4 to 25 percent slopes	9,267	0.9
91	Weingart silty clay loam, 1 to 8 percent slopes	12,493	1.2
92	Weingart-Warhorse complex, 1 to 8 percent slopes	9,669	0.9
93	Yamac loam, 0 to 2 percent slopes	724	0.1
94	Yamac loam, 2 to 8 percent slopes	6,739	0.6
95	Yamac clay loam, 0 to 2 percent slopes	905	0.1
96	Yamac clay loam, 2 to 8 percent slopes	2,043	0.2
97	Yamac-Busby complex, 2 to 8 percent slopes	3,325	0.3
98	Yamac-Delpoint loams, 2 to 8 percent slopes	14,488	1.4
99	Yawdim silty clay, 8 to 15 percent slopes	1,548	0.1
100	Yawdim-Crago complex, 4 to 35 percent slopes	16,560	1.5
101	Yawdim-Orinoco complex, 4 to 15 percent slopes	21,340	2.0
102	Yawdim-Orinoco complex, 15 to 35 percent slopes	10,294	1.0
103	Zatoville silty clay loam, 1 to 6 percent slopes	2,989	0.3
104	Zatoville-Orinoco silty clay loams, 2 to 8 percent slopes	6,887	0.6
	Water	11,800	1.1
	Total	1,071,600	100.0

* Map units assigned an asterisk make up a total of 0.1 percent of the county.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered 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
6	Attewan loam, 0 to 4 percent slopes (where irrigated)
33	Ethridge clay loam, 0 to 2 percent slopes (where irrigated)
35	Evanston loam, 0 to 2 percent slopes (where irrigated)
37	Evanston-Attewan loams, 0 to 2 percent slopes (where irrigated)
48	Havre loam, 0 to 2 percent slopes (where irrigated)
49	Havre loam, 0 to 2 percent slopes, occasionally flooded (where irrigated)
53	Havre-Yamac loams, 0 to 4 percent slopes (where irrigated)
55	Kremlin loam, 0 to 2 percent slopes (where irrigated)
75	Tanna clay loam, 1 to 6 percent slopes (where irrigated)
87	Verson clay loam, 0 to 4 percent slopes (where irrigated)
93	Yamac loam, 0 to 2 percent slopes (where irrigated)
95	Yamac clay loam, 0 to 2 percent slopes (where irrigated)

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS

(Yields in the N columns are for nonirrigated soils; those in the I columns are for irrigated soils. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability		Spring wheat		Winter wheat		Barley		Alfalfa hay		Grass hay	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
1---------- Abor	IVe	---	---	---	26	---	---	---	---	---	---	---
2:												
Abor----------	IVe	---	---	---	---	---	---	---	---	---	---	---
Neldore----------	VIs	---	---	---	---	---	---	---	---	---	---	---
3---------- Amherst	VIs	---	---	---	---	---	---	---	---	---	---	---
4---------- Amherst	VIIe	---	---	---	---	---	---	---	---	---	---	---
5:												
Amherst----------	VIe	---	---	---	---	---	---	---	---	---	---	---
Delplain----------	VIIs	---	---	---	---	---	---	---	---	---	---	---
6---------- Attewan	IIIe	IIIe	---	---	30	---	---	---	---	---	1.4	---
7*---------- Badland	VIII	---	---	---	---	---	---	---	---	---	---	---
8:												
Bascovy----------	IVe	---	---	---	---	---	---	---	---	---	---	---
Neldore----------	VIe	---	---	---	---	---	---	---	---	---	---	---
9:												
Bascovy----------	IVe	---	---	---	---	---	---	---	---	---	---	---
Neldore----------	VIIe	---	---	---	---	---	---	---	---	---	---	---
Neldore, moist---	VIIe	---	---	---	---	---	---	---	---	---	---	---
10:												
Blackhall--------	VIIe	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop-----	VIII	---	---	---	---	---	---	---	---	---	---	---
Twilight---------	IVe	---	---	---	---	---	---	---	---	---	---	---
11---------- Busby	IVe	---	---	---	25	---	---	---	---	---	---	---
12:												
Busby----------	IVe	---	20	---	25	---	33	---	---	---	---	---
Blackhall--------	VIe	---	---	---	---	---	---	---	---	---	---	---
13:												
Busby----------	IVe	---	22	---	27	---	38	---	---	---	---	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability		Spring wheat		Winter wheat		Barley		Alfalfa hay		Grass hay	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
13:												
Twilight	IVe	---	17	---	20	---	25	---	---	---	---	---
14--Cabbart	VIe	---	---	---	---	---	---	---	---	---	---	---
15:												
Cabbart	VIIe	---	---	---	---	---	---	---	---	---	---	---
Crago	VIe	---	---	---	---	---	---	---	---	---	---	---
Delpoint	IVe	---	---	---	---	---	---	---	---	---	---	---
16:												
Cabbart	VIe	---	---	---	---	---	---	---	---	---	---	---
Delpoint	IIIe	---	---	---	---	---	---	---	---	---	---	---
17:												
Cabbart	VIIe	---	---	---	---	---	---	---	---	---	---	---
Delpoint	IVe	---	---	---	---	---	---	---	---	---	---	---
Cabbart, moist	VIIe	---	---	---	---	---	---	---	---	---	---	---
18*:												
Cabbart	VIIe	---	---	---	---	---	---	---	---	---	---	---
Delpoint	IVe	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop	VIII	---	---	---	---	---	---	---	---	---	---	---
19:												
Cabbart	VIIe	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop	VIII	---	---	---	---	---	---	---	---	---	---	---
Blackhall	VIIe	---	---	---	---	---	---	---	---	---	---	---
20:												
Cabbart	VIIe	---	---	---	---	---	---	---	---	---	---	---
Yawdim	VIIe	---	---	---	---	---	---	---	---	---	---	---
Delpoint	VIe	---	---	---	---	---	---	---	---	---	---	---
21*:												
Cabbart	VIIe	---	---	---	---	---	---	---	---	---	---	---
Yawdim	VIIe	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop	VIII	---	---	---	---	---	---	---	---	---	---	---
22:												
Cabbart, high precipitation	VIIe	---	---	---	---	---	---	---	---	---	---	---
Cabbart, moist	VIIe	---	---	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability		Spring wheat		Winter wheat		Barley		Alfalfa hay		Grass hay	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
23:												
Cabbart	VIIe	---	---	---	---	---	---	---	---	---	---	---
Blackhall	VIIe	---	---	---	---	---	---	---	---	---	---	---
Delpoint	IVe	---	---	---	---	---	---	---	---	---	---	---
24---------- Chinook	IVe	---	23	---	28	---	38	---	---	---	---	---
25---------- Crago	VIs	---	---	---	---	---	---	---	---	---	---	---
26---------- Crago	VIe	---	---	---	---	---	---	---	---	---	---	---
27:												
Crago	VIs	---	---	---	---	---	---	---	---	---	---	---
Musselshell	IVe	---	---	---	---	---	---	---	---	---	---	---
Crago	VIs	---	---	---	---	---	---	---	---	---	---	---
28:												
Crago	VIs	---	---	---	---	---	---	---	---	---	---	---
Musselshell	IVe	---	---	---	---	---	---	---	---	---	---	---
Attewan	IIIe	---	---	---	---	---	---	---	---	---	---	---
29:												
Creed	IVe	---	---	---	15	---	---	---	---	---	---	---
Gerdrum	VIe	---	---	---	12	---	---	---	---	---	---	---
30---------- Delpoint	IIIe	---	21	---	26	---	35	---	---	---	---	---
31:												
Delpoint	IIIe	---	17	---	21	---	30	---	---	---	---	---
Cabbart	VIs	---	11	---	13	---	20	---	---	---	---	---
32:												
Delpoint	IIIe	---	17	---	21	---	30	---	---	---	---	---
Cabbart	VIe	---	11	---	13	---	20	---	---	---	---	---
Yamac	IIIe	---	25	---	29	---	38	---	---	---	---	---
33---------- Ethridge	IIIe	IIIe	30	---	35	---	48	---	---	5.5	---	---
34---------- Ethridge	IIIe	---	28	---	38	---	45	---	---	---	---	---
35---------- Evanston	IIIe	IIe	32	---	37	---	49	---	---	5.5	---	---

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability		Spring wheat		Winter wheat		Barley		Alfalfa hay		Grass hay	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
36---------- Evanston	IIIe	---	30	---	35	---	46	---	---	---	---	---
37:												
Evanston---------	IIIe	IIe	---	---	---	---	---	---	---	---	---	---
Attewan----------	IIIe	IIe	---	---	---	---	---	---	---	---	---	---
38:												
Gerdrum----------	VIe	---	---	---	---	---	---	---	---	---	---	---
Bascovy----------	IVe	---	---	---	---	---	---	---	---	---	---	---
39:												
Gerdrum----------	VIe	---	---	---	---	---	---	---	---	---	---	---
Creed------------	IVe	---	---	---	---	---	---	---	---	---	---	---
40:												
Gerdrum----------	VIe	---	---	---	---	---	---	---	---	---	---	---
Vanda------------	VIIs	---	---	---	---	---	---	---	---	---	---	---
41:												
Gerdrum----------	VIe	---	---	---	---	---	---	---	---	---	---	---
Vanda------------	VIIs	---	---	---	---	---	---	---	---	---	---	---
Creed------------	IVe	---	---	---	---	---	---	---	---	---	---	---
42---------- Harlem	IVs	IVs	27	40	32	---	44	---	1.5	5.0	---	3.0
43---------- Harlem	IVw	---	---	---	---	---	---	---	---	---	1.4	---
44---------- Harlem	VIs	---	---	---	---	---	---	---	---	---	---	---
45:												
Harlem-----------	IVs	IVs	27	---	32	---	44	---	1.5	5.0	---	3.0
Havre------------	IIIe	IIe	30	---	35	---	47	---	1.8	5.5	---	3.0
46:												
Harlem-----------	IVw	---	---	---	---	---	---	---	---	---	1.4	---
Havre------------	IIIw	---	---	---	---	---	---	---	---	---	1.5	---
47:												
Harlem-----------	VIs	---	---	---	---	---	---	---	---	---	---	---
Havre------------	VIs	---	---	---	---	---	---	---	---	---	---	---
48---------- Havre	IIIe	IIe	30	---	35	---	47	---	---	5.5	1.5	3.0
49---------- Havre	IIIw	IIw	25	---	30	---	42	---	1.5	---	1.5	---

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability		Spring wheat		Winter wheat		Barley		Alfalfa hay		Grass hay	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
50:												
Havre	IIIe	IIe	---	---	35	---	47	---	---	5.0	1.5	3.0
Glendive	IVe	IVe	25	---	28	---	35	---	---	5.0	1.5	3.0
51:												
Havre	IIIw	---	25	---	30	---	40	---	---	---	1.5	---
Glendive	IVw	---	22	---	25	---	35	---	---	---	1.5	---
52:												
Havre	VIw	---	---	---	---	---	---	---	---	---	---	---
Harlem	VIw	---	---	---	---	---	---	---	---	---	---	---
53:												
Havre	IIIw	IIw	---	---	---	---	---	---	---	---	---	---
Yamac	IIIe	IIe	---	---	---	---	---	---	---	---	---	---
54:												
Kobar	IIIe	---	27	---	30	---	40	---	---	---	---	---
Zatoville	VIe	---	18	---	21	---	30	---	---	---	---	---
55---------- Kremlin	IIIe	IIe	30	---	35	---	---	---	---	---	---	---
56---------- Kremlin	IIIe	---	28	---	33	---	---	---	---	---	---	---
57---------- Marias	IVe	---	---	---	32	---	---	---	---	---	1.4	---
58---------- Marmarth	IVe	---	---	---	25	---	---	---	---	---	1.2	---
59---------- Marvan	IVe	IVe	14	---	---	---	23	---	---	2.5	0.5	---
60:												
Marvan	IVe	---	---	---	---	---	---	---	---	---	---	---
Vanda	VIIs	---	---	---	---	---	---	---	---	---	---	---
61---------- Neldore	VIIe	---	---	---	---	---	---	---	---	---	---	---
62:												
Neldore	VIe	---	---	---	---	---	---	---	---	---	---	---
Abor	IVe	---	---	---	---	---	---	---	---	---	---	---
63:												
Neldore	VIIe	---	---	---	---	---	---	---	---	---	---	---
Abor	VIe	---	---	---	---	---	---	---	---	---	---	---
64:												
Neldore	VIIe	---	---	---	---	---	---	---	---	---	---	---

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability		Spring wheat		Winter wheat		Barley		Alfalfa hay		Grass hay	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
64:												
Bascovy	IVe	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop	VIII	---	---	---	---	---	---	---	---	---	---	---
65:												
Neldore	VIIe	---	---	---	---	---	---	---	---	---	---	---
Neldore, saline	VIIe	---	---	---	---	---	---	---	---	---	---	---
66:												
Neldore	VIIe	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop	VIII	---	---	---	---	---	---	---	---	---	---	---
67:												
Neldore	VIIe	---	---	---	---	---	---	---	---	---	---	---
Volborg	VIIe	---	---	---	---	---	---	---	---	---	---	---
68:												
Neldore	VIe	---	---	---	---	---	---	---	---	---	---	---
Weingart	VIe	---	---	---	---	---	---	---	---	---	---	---
69:												
Neldore	VIIe	---	---	---	---	---	---	---	---	---	---	---
Yawdim	VIIe	---	---	---	---	---	---	---	---	---	---	---
70:												
Neldore, moist	VIIe	---	---	---	---	---	---	---	---	---	---	---
Bascovy	IVe	---	---	---	---	---	---	---	---	---	---	---
Neldore, south	VIIe	---	---	---	---	---	---	---	---	---	---	---
71:												
Nobe	VIIs	---	---	---	---	---	---	---	---	---	---	---
Absher	VIIs	---	---	---	---	---	---	---	---	---	---	---
72:												
Pinebreaks	VIIe	---	---	---	---	---	---	---	---	---	---	---
Neldore	VIIe	---	---	---	---	---	---	---	---	---	---	---
73* Riverwash	VIII	---	---	---	---	---	---	---	---	---	---	---
74* Rock outcrop	VIII	---	---	---	---	---	---	---	---	---	---	---
75 Tanna	IIIe	IIIe	25	---	30	---	---	---	---	---	1.2	---
76:												
Tanna	IIIe	---	24	---	28	---	---	---	---	---	---	---
Weingart	VIe	---	10	---	12	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability		Spring wheat		Winter wheat		Barley		Alfalfa hay		Grass hay	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
77--Teigen	IVe	---	---	---	---	---	---	---	---	---	---	---
78--Twilight	IVe	---	---	---	20	---	---	---	---	---	---	---
79:												
Twilight	IVe	---	---	---	18	---	---	---	---	---	---	---
Blackhall	VIe	---	---	---	13	---	---	---	---	---	---	---
80:												
Twilight	VIe	---	---	---	---	---	---	---	---	---	---	---
Blackhall	VIIe	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop	VIII	---	---	---	---	---	---	---	---	---	---	---
81, 82--Ustic Torriorthents	VIIe	---	---	---	---	---	---	---	---	---	---	---
83--Ustic Torriorthents	VIIIs	---	---	---	---	---	---	---	---	---	---	---
84--Vaeda	VIIs	---	---	---	---	---	---	---	---	---	---	---
85--Vanda	VIIs	---	---	---	---	---	---	---	---	---	---	---
86:												
Vanda	VIIs	---	---	---	---	---	---	---	---	---	---	---
Harlem	IVw	---	---	---	---	---	---	---	---	---	---	---
Marvan	IVe	---	---	---	---	---	---	---	---	---	---	---
87--Verson	IIIe	IIIe	---	---	32	---	---	---	---	---	1.4	---
88--Volborg	VIIe	---	---	---	---	---	---	---	---	---	---	---
89:												
Volborg	VIIe	---	---	---	---	---	---	---	---	---	---	---
Volborg, eroded	VIIe	---	---	---	---	---	---	---	---	---	---	---
Julin	IVe	---	---	---	---	---	---	---	---	---	---	---
90:												
Volborg	VIIe	---	---	---	---	---	---	---	---	---	---	---
Rock outcrop	VIII	---	---	---	---	---	---	---	---	---	---	---
Julin	IVe	---	---	---	---	---	---	---	---	---	---	---

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability		Spring wheat		Winter wheat		Barley		Alfalfa hay		Grass hay	
	N	I	N	I	N	I	N	I	N	I	N	I
			Bu	Bu	Bu	Bu	Bu	Bu	Tons	Tons	Tons	Tons
91---------- Weingart	VIe	---	---	---	---	---	---	---	---	---	---	---
92:												
Weingart---------	VIe	---	---	---	---	---	---	---	---	---	---	---
Warhorse---------	VIe	---	---	---	---	---	---	---	---	---	---	---
93---------- Yamac	IIIe	IIe	30	---	35	---	47	---	---	5.0	---	3.0
94---------- Yamac	IIIe	IIIe	28	---	33	---	45	---	---	4.8	---	2.5
95---------- Yamac	IIIe	IIe	30	---	35	---	47	---	---	5.0	---	3.0
96---------- Yamac	IIIe	IIIe	28	---	33	---	44	---	---	4.8	---	2.5
97:												
Yamac----------	IIIe	---	28	---	33	---	45	---	---	---	---	---
Busby----------	IVe	---	22	---	27	---	36	---	---	---	---	---
98:												
Yamac----------	IIIe	---	28	---	33	---	45	---	---	---	---	---
Delpoint---------	IIIe	---	23	---	28	---	35	---	---	---	---	---
99---------- Yawdim	VIe	---	---	---	---	---	---	---	---	---	---	---
100:												
Yawdim----------	VIIe	---	---	---	---	---	---	---	---	---	---	---
Crago----------	VIe	---	---	---	---	---	---	---	---	---	---	---
101:												
Yawdim----------	VIe	---	---	---	---	---	---	---	---	---	---	---
Orinoco----------	VIe	---	---	---	---	---	---	---	---	---	---	---
102:												
Yawdim----------	VIIe	---	---	---	---	---	---	---	---	---	---	---
Orinoco----------	VIe	---	---	---	---	---	---	---	---	---	---	---
103---------- Zatoville	VIe	---	---	---	---	---	---	---	---	---	---	---
104:												
Zatoville--------	VIe	---	---	---	---	---	---	---	---	---	---	---
Orinoco----------	VIe	---	---	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

(Only the soils that support rangeland vegetation suitable for grazing are listed)

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
1---------- Abor	Clayey, 10-14" Ppt Zone-------	Favorable	1,800	Western wheatgrass-------	35
		Normal	1,300	Bluebunch wheatgrass-----	25
		Unfavorable	900	Green needlegrass--------	20
				Other perennial forbs----	5
				Other shrubs-------------	5
2:					
Abor----------	Clayey, 10-14" Ppt Zone-------	Favorable	1,800	Western wheatgrass-------	35
		Normal	1,300	Bluebunch wheatgrass-----	25
		Unfavorable	900	Green needlegrass--------	20
				Other perennial forbs----	5
				Other shrubs-------------	5
Neldore-------	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass-------	30
		Normal	1,000	Bluebunch wheatgrass-----	30
		Unfavorable	700	Green needlegrass--------	25
				Big sagebrush------------	5
3---------- Amherst	Shallow, 10-14" Ppt Zone------	Favorable	1,100	Bluebunch wheatgrass-----	50
		Normal	900	Western wheatgrass-------	15
		Unfavorable	700	Needleandthread----------	15
				Big sagebrush------------	5
				Other shrubs-------------	5
4---------- Amherst	Shallow, 10-14" Ppt Zone------	Favorable	1,100	Bluebunch wheatgrass-----	50
		Normal	900	Western wheatgrass-------	15
		Unfavorable	700	Needleandthread----------	15
				Big sagebrush------------	5
				Other shrubs-------------	5
5:					
Amherst-------	Shallow, 10-14" Ppt Zone------	Favorable	1,100	Bluebunch wheatgrass-----	50
		Normal	900	Western wheatgrass-------	15
		Unfavorable	700	Needleandthread----------	15
				Big sagebrush------------	5
				Other shrubs-------------	5
Delplain------	Shallow, 10-14" Ppt Zone------	Favorable	1,100	Bluebunch wheatgrass-----	50
		Normal	900	Western wheatgrass-------	15
		Unfavorable	700	Needleandthread----------	15
				Big sagebrush------------	5
				Other shrubs-------------	5
6---------- Attewan	Silty, 10-14" Ppt Zone--------	Favorable	1,700	Bluebunch wheatgrass-----	50
		Normal	1,400	Western wheatgrass-------	15
		Unfavorable	1,000	Needleandthread----------	15
				Green needlegrass--------	10
				Big sagebrush------------	5
				Other shrubs-------------	5
8:					
Bascovy-------	Clayey, 10-14" Ppt Zone-------	Favorable	1,800	Western wheatgrass-------	35
		Normal	1,300	Bluebunch wheatgrass-----	25
		Unfavorable	900	Green needlegrass--------	20
				Other perennial forbs----	5
				Other shrubs-------------	5

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
8:					
Neldore	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
9:					
Bascovy	Clayey, 10-14" Ppt Zone	Favorable	1,800	Western wheatgrass	35
		Normal	1,300	Bluebunch wheatgrass	25
		Unfavorable	900	Green needlegrass	20
				Other perennial forbs	5
				Other shrubs	5
Neldore	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
Neldore, moist.					
10:					
Blackhall	Shallow, 10-14" Ppt Zone	Favorable	1,100	Bluebunch wheatgrass	40
		Normal	900	Needleandthread	20
		Unfavorable	600	Sedge	5
				Other perennial forbs	5
				Skunkbush sumac	5
Rock outcrop.					
Twilight	Sandy, 10-14" Ppt Zone	Favorable	1,900	Indian ricegrass	15
		Normal	1,500	Needleandthread	15
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Other perennial forbs	5
11--Busby	Sandy, 10-14" Ppt Zone	Favorable	2,000	Indian ricegrass	15
		Normal	1,600	Needleandthread	15
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Other perennial forbs	5
12:					
Busby	Sandy, 10-14" Ppt Zone	Favorable	2,000	Indian ricegrass	15
		Normal	1,600	Needleandthread	15
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Other perennial forbs	5
Blackhall	Shallow, 10-14" Ppt Zone	Favorable	1,100	Bluebunch wheatgrass	40
		Normal	900	Needleandthread	20
		Unfavorable	600	Sedge	5
				Other perennial forbs	5
				Skunkbush sumac	5
13:					
Busby	Sandy, 10-14" Ppt Zone	Favorable	2,000	Indian ricegrass	15
		Normal	1,600	Needleandthread	15
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Other perennial forbs	5
Twilight	Sandy, 10-14" Ppt Zone	Favorable	1,900	Indian ricegrass	15
		Normal	1,500	Needleandthread	15
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Other perennial forbs	5

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
14---------- Cabbart	Shallow, 10-14" Ppt Zone------	Favorable	1,100	Bluebunch wheatgrass-----	50
		Normal	900	Western wheatgrass-------	15
		Unfavorable	600	Needleandthread----------	15
				Other perennial forbs----	5
				Skunkbush sumac----------	5
15:					
Cabbart-------	Shallow, 10-14" Ppt Zone------	Favorable	1,100	Bluebunch wheatgrass-----	50
		Normal	900	Western wheatgrass-------	15
		Unfavorable	600	Needleandthread----------	15
				Other perennial forbs----	5
				Skunkbush sumac----------	5
Crago---------	Gravel, 10-14" Ppt Zone-------	Favorable	800	Bluebunch wheatgrass-----	40
		Normal	600	Western wheatgrass-------	15
		Unfavorable	400	Needleandthread----------	15
				Rubber rabbitbrush-------	5
				Other perennial forbs----	5
				Other shrubs------------	5
Delpoint------	Silty, 10-14" Ppt Zone--------	Favorable	1,700	Bluebunch wheatgrass-----	40
		Normal	1,400	Needleandthread----------	15
		Unfavorable	1,000	Green needlegrass--------	15
				Western wheatgrass-------	10
				Other shrubs------------	5
16:					
Cabbart-------	Shallow, 10-14" Ppt Zone------	Favorable	1,100	Bluebunch wheatgrass-----	50
		Normal	900	Western wheatgrass-------	15
		Unfavorable	600	Needleandthread----------	15
				Other perennial forbs----	5
				Skunkbush sumac----------	5
Delpoint------	Silty, 10-14" Ppt Zone--------	Favorable	1,700	Bluebunch wheatgrass-----	40
		Normal	1,400	Needleandthread----------	15
		Unfavorable	1,000	Green needlegrass--------	15
				Western wheatgrass-------	10
				Other shrubs------------	5
17:					
Cabbart-------	Shallow, 10-14" Ppt Zone------	Favorable	1,100	Bluebunch wheatgrass-----	50
		Normal	900	Western wheatgrass-------	15
		Unfavorable	600	Needleandthread----------	15
				Other perennial forbs----	5
				Skunkbush sumac----------	5
Delpoint------	Silty, 10-14" Ppt Zone--------	Favorable	1,700	Bluebunch wheatgrass-----	40
		Normal	1,400	Needleandthread----------	15
		Unfavorable	1,000	Green needlegrass--------	15
				Western wheatgrass-------	10
				Other shrubs------------	5
Cabbart, moist.					
18:					
Cabbart-------	Shallow, 10-14" Ppt Zone------	Favorable	1,100	Bluebunch wheatgrass-----	50
		Normal	900	Western wheatgrass-------	15
		Unfavorable	600	Needleandthread----------	15
				Other perennial forbs----	5
				Skunkbush sumac----------	5

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
18:					
Delpoint	Silty, 10-14" Ppt Zone	Favorable	1,700	Bluebunch wheatgrass	40
		Normal	1,400	Needleandthread	15
		Unfavorable	1,000	Western wheatgrass	10
				Other shrubs	5
				Green needlegrass	5
Rock outcrop.					
19:					
Cabbart	Shallow, 10-14" Ppt Zone	Favorable	1,100	Bluebunch wheatgrass	50
		Normal	900	Western wheatgrass	15
		Unfavorable	600	Needleandthread	15
				Other perennial forbs	5
				Skunkbush sumac	5
Rock outcrop.					
Blackhall	Shallow, 10-14" Ppt Zone	Favorable	1,100	Bluebunch wheatgrass	40
		Normal	900	Needleandthread	20
		Unfavorable	600	Sedge	5
				Other perennial forbs	5
				Skunkbush sumac	5
20:					
Cabbart	Shallow, 10-14" Ppt Zone	Favorable	1,100	Bluebunch wheatgrass	50
		Normal	900	Western wheatgrass	15
		Unfavorable	600	Needleandthread	15
				Other perennial forbs	5
				Skunkbush sumac	5
Yawdim	Shallow Clay, 10-14" Ppt Zone	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
Delpoint	Thin Silty, 10-14" Ppt Zone	Favorable	1,400	Bluebunch wheatgrass	40
		Normal	1,200	Western wheatgrass	10
		Unfavorable	900	Needleandthread	10
				Green needlegrass	10
				Big sagebrush	5
				Other shrubs	5
21:					
Cabbart	Shallow, 10-14" Ppt Zone	Favorable	1,100	Bluebunch wheatgrass	50
		Normal	900	Western wheatgrass	15
		Unfavorable	600	Needleandthread	15
				Other perennial forbs	5
				Skunkbush sumac	5
Yawdim	Shallow Clay, 10-14" Ppt Zone	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
Rock outcrop.					
23:					
Cabbart.					

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
23:					
Blackhall	Shallow, 10-14" Ppt Zone	Favorable	1,100	Bluebunch wheatgrass	40
		Normal	900	Needleandthread	20
		Unfavorable	600	Sedge	5
				Other perennial forbs	5
				Skunkbush sumac	5
Delpoint	Silty, 10-14" Ppt Zone	Favorable	1,700	Bluebunch wheatgrass	40
		Normal	1,400	Needleandthread	15
		Unfavorable	1,000	Green needlegrass	15
				Western wheatgrass	10
				Other shrubs	5
24--- Chinook	Sandy, 10-14" Ppt Zone	Favorable	2,000	Indian ricegrass	15
		Normal	1,600	Needleandthread	15
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Other perennial forbs	5
25--- Crago	Gravel, 10-14" Ppt Zone	Favorable	800	Bluebunch wheatgrass	40
		Normal	600	Western wheatgrass	15
		Unfavorable	400	Needleandthread	15
				Rubber rabbitbrush	5
				Other perennial forbs	5
				Other shrubs	5
26--- Crago	Gravel, 10-14" Ppt Zone	Favorable	800	Bluebunch wheatgrass	40
		Normal	600	Western wheatgrass	15
		Unfavorable	400	Needleandthread	15
				Rubber rabbitbrush	5
				Other perennial forbs	5
				Other shrubs	5
27:					
Crago	Gravel, 10-14" Ppt Zone	Favorable	800	Bluebunch wheatgrass	40
		Normal	600	Western wheatgrass	15
		Unfavorable	400	Needleandthread	15
				Rubber rabbitbrush	5
				Other perennial forbs	5
				Other shrubs	5
Musselshell	Silty-limy, 10-14" Ppt Zone	Favorable	1,300	Bluebunch wheatgrass	50
		Normal	1,000	Needleandthread	20
		Unfavorable	700	Western wheatgrass	10
				Threadleaf sedge	5
				Other perennial forbs	5
				Other shrubs	5
Crago	Gravel, 10-14" Ppt Zone	Favorable	800	Bluebunch wheatgrass	40
		Normal	600	Western wheatgrass	15
		Unfavorable	400	Needleandthread	15
				Rubber rabbitbrush	5
				Other perennial forbs	5
				Other shrubs	5
28:					
Crago	Gravel, 10-14" Ppt Zone	Favorable	800	Bluebunch wheatgrass	40
		Normal	600	Western wheatgrass	15
		Unfavorable	400	Needleandthread	15
				Rubber rabbitbrush	5
				Other perennial forbs	5
				Other shrubs	5

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
28:					
Musselshell---	Silty-limy, 10-14" Ppt Zone---	Favorable	1,300	Bluebunch wheatgrass-----	50
		Normal	1,000	Needleandthread----------	20
		Unfavorable	700	Western wheatgrass-------	10
				Threadleaf sedge---------	5
				Other perennial forbs----	5
				Other shrubs-------------	5
Attewan-------	Silty, 10-14" Ppt Zone--------	Favorable	1,700	Bluebunch wheatgrass-----	50
		Normal	1,400	Western wheatgrass-------	15
		Unfavorable	1,000	Needleandthread----------	15
				Green needlegrass--------	10
				Big sagebrush------------	5
				Other shrubs-------------	5
29:					
Creed---------	Claypan, 10-14" Ppt Zone------	Favorable	1,400	Western wheatgrass-------	20
		Normal	1,100	Green needlegrass--------	15
		Unfavorable	800	Big sagebrush------------	5
				Threadleaf sedge---------	5
				Other perennial forbs----	5
				Other perennial grasses--	5
Gerdrum-------	Claypan, 10-14" Ppt Zone------	Favorable	1,100	Western wheatgrass-------	20
		Normal	800	Green needlegrass--------	15
		Unfavorable	500	Big sagebrush------------	5
				Other perennial forbs----	5
				Alkali sacaton-----------	5
30----------	Silty, 10-14" Ppt Zone--------	Favorable	1,700	Bluebunch wheatgrass-----	40
Delpoint		Normal	1,400	Needleandthread----------	15
		Unfavorable	1,000	Green needlegrass--------	15
				Western wheatgrass-------	10
				Other shrubs-------------	5
31:					
Delpoint------	Silty, 10-14" Ppt Zone--------	Favorable	1,700	Bluebunch wheatgrass-----	40
		Normal	1,400	Needleandthread----------	15
		Unfavorable	1,000	Green needlegrass--------	15
				Western wheatgrass-------	10
				Other shrubs-------------	5
Cabbart-------	Shallow, 10-14" Ppt Zone------	Favorable	1,100	Bluebunch wheatgrass-----	50
		Normal	900	Western wheatgrass-------	15
		Unfavorable	600	Needleandthread----------	15
				Other perennial forbs----	5
				Skunkbush sumac----------	5
32:					
Delpoint------	Silty, 10-14" Ppt Zone--------	Favorable	1,700	Bluebunch wheatgrass-----	40
		Normal	1,400	Needleandthread----------	15
		Unfavorable	1,000	Green needlegrass--------	15
				Western wheatgrass-------	10
				Other shrubs-------------	5
Cabbart-------	Shallow, 10-14" Ppt Zone------	Favorable	1,100	Bluebunch wheatgrass-----	50
		Normal	900	Western wheatgrass-------	15
		Unfavorable	600	Needleandthread----------	15
				Other perennial forbs----	5
				Skunkbush sumac----------	5

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
32:					
Yamac	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	40
		Normal	1,500	Needleandthread	15
		Unfavorable	1,000	Green needlegrass	15
				Western wheatgrass	10
				Other perennial forbs	5
33 Ethridge	Clayey, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	35
		Normal	1,500	Green needlegrass	25
		Unfavorable	900	Western wheatgrass	20
				Big sagebrush	5
				Other perennial forbs	5
34 Ethridge	Clayey, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	35
		Normal	1,500	Green needlegrass	25
		Unfavorable	900	Western wheatgrass	20
				Other perennial forbs	5
				Other shrubs	5
35 Evanston	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	40
		Normal	1,500	Green needlegrass	15
		Unfavorable	1,000	Western wheatgrass	10
				Needleandthread	10
				Other perennial forbs	5
				Other shrubs	5
36 Evanston	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	40
		Normal	1,500	Other perennial grasses	15
		Unfavorable	1,000	Green needlegrass	15
				Western wheatgrass	10
				Needleandthread	10
				Other perennial forbs	5
				Other shrubs	5
37:					
Evanston	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	40
		Normal	1,500	Green needlegrass	15
		Unfavorable	1,000	Western wheatgrass	10
				Needleandthread	10
				Other perennial forbs	5
				Other shrubs	5
Attewan	Silty, 10-14" Ppt Zone	Favorable	1,700	Bluebunch wheatgrass	50
		Normal	1,400	Western wheatgrass	15
		Unfavorable	1,000	Needleandthread	15
				Green needlegrass	10
				Big sagebrush	5
				Other shrubs	5
38:					
Gerdrum	Claypan, 10-14" Ppt Zone	Favorable	1,100	Western wheatgrass	20
		Normal	800	Green needlegrass	15
		Unfavorable	500	Big sagebrush	5
				Other perennial forbs	5
				Alkali sacaton	5
Bascovy	Clayey, 10-14" Ppt Zone	Favorable	1,800	Western wheatgrass	35
		Normal	1,300	Bluebunch wheatgrass	25
		Unfavorable	900	Green needlegrass	20
				Other perennial forbs	5
				Other shrubs	5

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
39:					
Gerdrum	Claypan, 10-14" Ppt Zone	Favorable	1,100	Western wheatgrass	20
		Normal	800	Green needlegrass	15
		Unfavorable	500	Big sagebrush	5
				Other perennial forbs	5
				Alkali sacaton	5
Creed	Claypan, 10-14" Ppt Zone	Favorable	1,400	Western wheatgrass	20
		Normal	1,100	Green needlegrass	15
		Unfavorable	800	Big sagebrush	5
				Threadleaf sedge	5
				Other perennial forbs	5
				Other perennial grasses	5
40:					
Gerdrum	Claypan, 10-14" Ppt Zone	Favorable	1,100	Western wheatgrass	20
		Normal	800	Green needlegrass	15
		Unfavorable	500	Big sagebrush	5
				Other perennial forbs	5
				Alkali sacaton	5
Vanda	Saline Upland, 10-14" Ppt Zone	Favorable	600	Alkali sacaton	30
		Normal	500	Western wheatgrass	25
		Unfavorable	350	Alkali bluegrass	5
				Other shrubs	5
41:					
Gerdrum	Claypan, 10-14" Ppt Zone	Favorable	1,100	Western wheatgrass	20
		Normal	800	Green needlegrass	15
		Unfavorable	500	Big sagebrush	5
				Other perennial forbs	5
				Alkali sacaton	5
Vanda	Saline Upland, 10-14" Ppt Zone	Favorable	600	Alkali sacaton	30
		Normal	500	Western wheatgrass	25
		Unfavorable	350	Alkali bluegrass	5
				Other shrubs	5
Creed	Claypan, 10-14" Ppt Zone	Favorable	1,400	Western wheatgrass	20
		Normal	1,100	Green needlegrass	15
		Unfavorable	800	Big sagebrush	5
				Threadleaf sedge	5
				Other perennial forbs	5
42 Harlem	Clayey, 10-14" Ppt Zone	Favorable	1,800	Basin wildrye	30
		Normal	1,500	Western wheatgrass	25
		Unfavorable	1,000	Green needlegrass	25
				Common snowberry	5
43 Harlem	Overflow, 10-14" Ppt Zone	Favorable	3,000	Basin wildrye	30
		Normal	2,500	Western wheatgrass	25
		Unfavorable	2,000	Green needlegrass	25
				Common snowberry	5
44 Harlem	Saline Lowland, 10-14" Ppt Zone.	Favorable	3,500	Alkali sacaton	30
		Normal	3,000	Western wheatgrass	25
		Unfavorable	2,000	Inland saltgrass	15
				Slender wheatgrass	5

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
45:					
Harlem	Clayey, 10-14" Ppt Zone	Favorable	1,800	Western wheatgrass	30
		Normal	1,500	Green needlegrass	25
		Unfavorable	1,000	Basin wildrye	5
				Common snowberry	5
Havre	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	30
		Normal	1,500	Western wheatgrass	20
		Unfavorable	1,000	Green needlegrass	20
				Needleandthread	15
				Other perennial forbs	5
46:					
Harlem	Overflow, 10-14" Ppt Zone	Favorable	3,000	Western wheatgrass	25
		Normal	2,500	Green needlegrass	25
		Unfavorable	2,000	Basin wildrye	5
				Common snowberry	5
Havre	Overflow, 10-14" Ppt Zone	Favorable	3,000	Basin wildrye	30
		Normal	2,500	Western wheatgrass	25
		Unfavorable	2,000	Green needlegrass	25
				Common snowberry	5
47:					
Harlem	Saline Lowland, 10-14" Ppt Zone.	Favorable	3,500	Alkali sacaton	30
		Normal	3,000	Western wheatgrass	25
		Unfavorable	2,000	Inland saltgrass	15
				Slender wheatgrass	5
Havre	Saline Lowland, 10-14" Ppt Zone.	Favorable	3,500	Alkali sacaton	30
		Normal	3,000	Western wheatgrass	25
		Unfavorable	2,000	Inland saltgrass	15
				Slender wheatgrass	5
48--Havre	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	30
		Normal	1,500	Western wheatgrass	20
		Unfavorable	1,000	Green needlegrass	20
				Needleandthread	15
				Other perennial forbs	5
49--Havre	Overflow, 10-14" Ppt Zone	Favorable	3,000	Basin wildrye	30
		Normal	2,500	Western wheatgrass	25
		Unfavorable	2,000	Green needlegrass	25
				Common snowberry	5
50:					
Havre	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	30
		Normal	1,500	Western wheatgrass	20
		Unfavorable	1,000	Green needlegrass	20
				Needleandthread	15
				Other perennial forbs	5
Glendive	Sandy, 10-14" Ppt Zone	Favorable	2,000	Prairie sandreed	25
		Normal	1,500	Bluebunch wheatgrass	20
		Unfavorable	1,000	Little bluestem	15
				Needleandthread	15
				Blue grama	5
				Thickspike wheatgrass	5
				Silver sagebrush	5

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
51:					
Havre	Overflow, 10-14" Ppt Zone	Favorable	3,000	Basin wildrye	30
		Normal	2,500	Western wheatgrass	25
		Unfavorable	2,000	Green needlegrass	25
				Common snowberry	5
Glendive	Overflow, 10-14" Ppt Zone	Favorable	3,000	Basin wildrye	35
		Normal	2,500	Green needlegrass	25
		Unfavorable	2,000	Needleandthread	5
52:					
Havre	Overflow, 10-14" Ppt Zone	Favorable	3,000	Basin wildrye	30
		Normal	2,500	Western wheatgrass	25
		Unfavorable	2,000	Green needlegrass	25
				Common snowberry	5
Harlem	Overflow, 10-14" Ppt Zone	Favorable	3,000	Basin wildrye	30
		Normal	2,500	Western wheatgrass	25
		Unfavorable	2,000	Green needlegrass	25
				Common snowberry	5
53:					
Havre	Overflow, 10-14" Ppt Zone	Favorable	3,000	Basin wildrye	30
		Normal	2,500	Western wheatgrass	25
		Unfavorable	2,000	Green needlegrass	25
Yamac	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	40
		Normal	1,500	Needleandthread	15
		Unfavorable	1,000	Green needlegrass	15
				Western wheatgrass	10
				Other perennial forbs	5
54:					
Kobar	Clayey, 10-14" Ppt Zone	Favorable	1,800	Western wheatgrass	35
		Normal	1,300	Bluebunch wheatgrass	25
		Unfavorable	900	Green needlegrass	20
				Other perennial forbs	5
				Other shrubs	5
Zatoville	Clayey Saline, 10-14" Ppt Zone	Favorable	1,400	Western wheatgrass	30
		Normal	1,100	Green needlegrass	25
		Unfavorable	800	Big sagebrush	5
				Other perennial forbs	5
55---------- Kremlin	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	40
		Normal	1,500	Green needlegrass	20
		Unfavorable	1,000	Western wheatgrass	10
				Needleandthread	10
				Other perennial forbs	5
56---------- Kremlin	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	40
		Normal	1,500	Green needlegrass	20
		Unfavorable	1,000	Western wheatgrass	10
				Needleandthread	10
				Other perennial forbs	5
57---------- Marias	Clayey, 10-14" Ppt Zone	Favorable	1,400	Western wheatgrass	35
		Normal	1,100	Bluebunch wheatgrass	25
		Unfavorable	800	Green needlegrass	20
				Other perennial forbs	5
				Other shrubs	5

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
58---------- Marmarth	Sandy, 10-14" Ppt Zone--------	Favorable	1,900	Needleandthread----------	20
		Normal	1,500	Other perennial forbs----	10
		Unfavorable	1,000	Threadleaf sedge---------	5
				Other shrubs------------	5
59---------- Marvan	Clayey Saline, 10-14" Ppt Zone	Favorable	1,400	Western wheatgrass-------	30
		Normal	1,100	Green needlegrass--------	25
		Unfavorable	800	Big sagebrush------------	5
				Other perennial forbs----	5
60:					
Marvan--------	Clayey Saline, 10-14" Ppt Zone	Favorable	1,400	Western wheatgrass-------	30
		Normal	1,100	Green needlegrass--------	25
		Unfavorable	800	Big sagebrush------------	5
				Other perennial forbs----	5
Vanda---------	Saline Upland, 10-14" Ppt Zone	Favorable	600	Alkali sacaton-----------	30
		Normal	500	Western wheatgrass-------	25
		Unfavorable	350	Alkali bluegrass---------	5
				Other shrubs------------	5
61---------- Neldore	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass-------	30
		Normal	1,000	Bluebunch wheatgrass-----	30
		Unfavorable	700	Green needlegrass--------	25
				Big sagebrush------------	5
62:					
Neldore-------	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass-------	30
		Normal	1,000	Bluebunch wheatgrass-----	30
		Unfavorable	700	Green needlegrass--------	25
				Big sagebrush------------	5
Abor----------	Clayey, 10-14" Ppt Zone-------	Favorable	1,800	Western wheatgrass-------	35
		Normal	1,300	Bluebunch wheatgrass-----	25
		Unfavorable	900	Green needlegrass--------	20
				Other perennial forbs----	5
				Other shrubs------------	5
63:					
Neldore-------	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass-------	30
		Normal	1,000	Bluebunch wheatgrass-----	30
		Unfavorable	700	Green needlegrass--------	25
				Big sagebrush------------	5
Abor----------	Thin Clayey, 10-14" Ppt Zone--	Favorable	1,400	Bluebunch wheatgrass-----	40
		Normal	1,200	Green needlegrass--------	30
		Unfavorable	900	Western wheatgrass-------	25
				Big sagebrush------------	5
64:					
Neldore-------	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass-------	30
		Normal	1,000	Bluebunch wheatgrass-----	30
		Unfavorable	700	Green needlegrass--------	25
				Big sagebrush------------	5
Bascovy-------	Clayey, 10-14" Ppt Zone-------	Favorable	1,800	Western wheatgrass-------	35
		Normal	1,300	Bluebunch wheatgrass-----	25
		Unfavorable	900	Green needlegrass--------	20
				Other perennial forbs----	5
				Other shrubs------------	5
Rock outcrop.					

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
65:					
Neldore	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
Neldore, saline	Dense Clay, 10-14" Ppt Zone---	Favorable	800	Western wheatgrass	40
		Normal	700	Green needlegrass	25
		Unfavorable	600	Big sagebrush	5
				Sandberg bluegrass	5
				Other perennial forbs	5
				Other shrubs	5
66:					
Neldore	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
Rock outcrop.					
67:					
Neldore	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
Volborg	Coarse Clay, 10-14" Ppt Zone--	Favorable	1,000	Western wheatgrass	10
		Normal	800	Rubber rabbitbrush	5
		Unfavorable	400		
68:					
Neldore	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
Weingart	Claypan, 10-14" Ppt Zone------	Favorable	1,000	Western wheatgrass	20
		Normal	700	Green needlegrass	15
		Unfavorable	500	Big sagebrush	5
				Other perennial forbs	5
				Alkali sacaton	5
				Other shrubs	5
69:					
Neldore	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
Yawdim	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
70:					
Neldore, moist.					

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
70:					
Bascovy	Clayey, 10-14" Ppt Zone	Favorable	1,800	Western wheatgrass	35
		Normal	1,300	Bluebunch wheatgrass	25
		Unfavorable	900	Green needlegrass	20
				Other perennial forbs	5
				Other shrubs	5
Neldore, south.					
71:					
Nobe	Saline Upland, 10-14" Ppt Zone	Favorable	600	Alkali sacaton	30
		Normal	500	Western wheatgrass	25
		Unfavorable	350	Inland saltgrass	10
				Alkali bluegrass	5
				Other shrubs	5
Absher	Saline Upland, 10-14" Ppt Zone	Favorable	600	Western wheatgrass	25
		Normal	500	Inland saltgrass	10
		Unfavorable	350	Alkali bluegrass	5
				Other shrubs	5
75, Tanna	Clayey, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	35
		Normal	1,300	Green needlegrass	25
		Unfavorable	900	Western wheatgrass	20
				Big sagebrush	5
				Other perennial forbs	5
76:					
Tanna	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	40
		Normal	1,300	Green needlegrass	20
		Unfavorable	900	Other perennial forbs	5
				Other shrubs	5
Weingart	Claypan, 10-14" Ppt Zone	Favorable	1,000	Western wheatgrass	20
		Normal	700	Green needlegrass	15
		Unfavorable	500	Big sagebrush	5
				Other perennial forbs	5
				Alkali sacaton	5
				Other shrubs	5
77, Teigen	Clayey, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	35
		Normal	1,300	Green needlegrass	25
		Unfavorable	900	Western wheatgrass	20
				Big sagebrush	5
				Other perennial forbs	5
78, Twilight	Sandy, 10-14" Ppt Zone	Favorable	1,900	Indian ricegrass	15
		Normal	1,500	Needleandthread	15
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Other perennial forbs	5
79:					
Twilight	Sandy, 10-14" Ppt Zone	Favorable	1,900	Indian ricegrass	15
		Normal	1,500	Needleandthread	15
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Other perennial forbs	5
Blackhall	Shallow, 10-14" Ppt Zone	Favorable	1,100	Bluebunch wheatgrass	40
		Normal	900	Needleandthread	20
		Unfavorable	600	Sedge	5
				Other perennial forbs	5
				Skunkbush sumac	5

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
80:					
Twilight	Sandy, 10-14" Ppt Zone	Favorable	1,900	Indian ricegrass	15
		Normal	1,500	Needleandthread	15
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Other perennial forbs	5
Blackhall	Shallow, 10-14" Ppt Zone	Favorable	1,100	Bluebunch wheatgrass	40
		Normal	900	Needleandthread	20
		Unfavorable	600	Sedge	5
				Other perennial forbs	5
				Skunkbush sumac	5
Rock outcrop.					
84 Vaeda	Dense Clay, 10-14" Ppt Zone	Favorable	900	Western wheatgrass	45
		Normal	700	Green needlegrass	10
		Unfavorable	600	Big sagebrush	5
				Sandberg bluegrass	5
				Other perennial forbs	5
				Other perennial grasses	5
85 Vanda	Dense Clay, 10-14" Ppt Zone	Favorable	900	Western wheatgrass	50
		Normal	700	Big sagebrush	10
		Unfavorable	600	Other perennial forbs	5
				Other perennial grasses	5
				Nuttall alkaligrass	5
				Alkali sacaton	5
				Green needlegrass	5
86:					
Vanda	Dense Clay, 10-14" Ppt Zone	Favorable	900	Western wheatgrass	50
		Normal	700	Big sagebrush	10
		Unfavorable	600	Other perennial forbs	5
				Other perennial grasses	5
				Nuttall alkaligrass	5
				Alkali sacaton	5
				Green needlegrass	5
Harlem	Overflow, 10-14" Ppt Zone	Favorable	3,000	Green needlegrass	40
		Normal	2,500	Western wheatgrass	35
		Unfavorable	2,000	Other perennial forbs	10
				Other perennial grasses	5
				Rose	1
				Common snowberry	1
Marvan	Clayey Saline, 10-14" Ppt Zone	Favorable	1,800	Western wheatgrass	30
		Normal	1,300	Green needlegrass	30
		Unfavorable	900	Big sagebrush	5
				Other perennial forbs	5
				Other perennial grasses	5
87 Verson	Clayey, 10-14" Ppt Zone	Favorable	1,800	Green needlegrass	35
		Normal	1,300	Bluebunch wheatgrass	25
		Unfavorable	900	Western wheatgrass	20
				Other perennial forbs	5
				Other perennial grasses	5
				Other shrubs	5
89:					
Volborg	Coarse Clay, 10-14" Ppt Zone	Favorable	1,000	Western wheatgrass	10
		Normal	800	Rubber rabbitbrush	5
		Unfavorable	400		

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
89:					
Volborg, eroded	Shale, 10-14" Ppt Zone	Favorable	500	Western wheatgrass	30
		Normal	400	Alkali sacaton	15
		Unfavorable	300	Rubber rabbitbrush	10
Julin	Coarse Clay, 10-14" Ppt Zone	Favorable	1,000	Western wheatgrass	10
		Normal	800	Rubber rabbitbrush	5
		Unfavorable	400		
90:					
Volborg	Shale, 10-14" Ppt Zone	Favorable	500	Western wheatgrass	30
		Normal	400	Alkali sacaton	15
		Unfavorable	300	Rubber rabbitbrush	5
Rock outcrop.					
Julin	Coarse Clay, 10-14" Ppt Zone	Favorable	1,000	Western wheatgrass	10
		Normal	800	Rubber rabbitbrush	5
		Unfavorable	400	Other perennial forbs	5
				Other perennial grasses	5
				Rose	5
91--Weingart	Claypan, 10-14" Ppt Zone	Favorable	1,000	Western wheatgrass	20
		Normal	700	Green needlegrass	15
		Unfavorable	500	Big sagebrush	5
				Other perennial forbs	5
				Alkali sacaton	5
				Other shrubs	5
92:					
Weingart	Claypan, 10-14" Ppt Zone	Favorable	1,000	Western wheatgrass	20
		Normal	700	Green needlegrass	15
		Unfavorable	500	Big sagebrush	5
				Other perennial forbs	5
				Alkali sacaton	5
				Other shrubs	5
Warhorse	Shallow Clay, 10-14" Ppt Zone	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
93--Yamac	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	40
		Normal	1,500	Needleandthread	15
		Unfavorable	1,000	Green needlegrass	15
				Western wheatgrass	10
				Other perennial forbs	5
94--Yamac	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	40
		Normal	1,500	Needleandthread	15
		Unfavorable	1,000	Green needlegrass	15
				Western wheatgrass	10
				Other perennial forbs	5
95--Yamac	Clayey, 10-14" Ppt Zone	Favorable	1,800	Western wheatgrass	35
		Normal	1,300	Bluebunch wheatgrass	25
		Unfavorable	900	Green needlegrass	20
				Other perennial forbs	5
				Other shrubs	5

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
96 Yamac	Clayey, 10-14" Ppt Zone	Favorable	1,800	Western wheatgrass	35
		Normal	1,300	Bluebunch wheatgrass	25
		Unfavorable	900	Green needlegrass	20
				Other perennial forbs	5
				Other shrubs	5
97:					
Yamac	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	40
		Normal	1,500	Needleandthread	15
		Unfavorable	1,000	Green needlegrass	15
				Western wheatgrass	10
				Other perennial forbs	5
Busby	Sandy, 10-14" Ppt Zone	Favorable	2,000	Indian ricegrass	15
		Normal	1,600	Needleandthread	15
		Unfavorable	1,000	Bluebunch wheatgrass	10
				Other perennial forbs	5
98:					
Yamac	Silty, 10-14" Ppt Zone	Favorable	1,800	Bluebunch wheatgrass	40
		Normal	1,500	Needleandthread	15
		Unfavorable	1,000	Green needlegrass	15
				Western wheatgrass	10
				Other perennial forbs	5
Delpoint	Silty, 10-14" Ppt Zone	Favorable	1,700	Bluebunch wheatgrass	40
		Normal	1,400	Needleandthread	15
		Unfavorable	1,000	Green needlegrass	15
				Western wheatgrass	10
				Other perennial forbs	5
99 Yawdim	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
100:					
Yawdim	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
Crago	Gravel, 10-14" Ppt Zone	Favorable	800	Bluebunch wheatgrass	40
		Normal	600	Western wheatgrass	15
		Unfavorable	400	Needleandthread	15
				Rubber rabbitbrush	5
				Other perennial forbs	5
				Other shrubs	5
101:					
Yawdim	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
Orinoco	Clayey Saline, 10-14" Ppt Zone	Favorable	1,300	Western wheatgrass	30
		Normal	1,000	Green needlegrass	25
		Unfavorable	800	Big sagebrush	5
				Other perennial forbs	5
				Other shrubs	5

TABLE 7.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry Weight		
			Lb/acre		Pct
102:					
Yawdim	Shallow Clay, 10-14" Ppt Zone-	Favorable	1,200	Western wheatgrass	30
		Normal	1,000	Bluebunch wheatgrass	30
		Unfavorable	700	Green needlegrass	25
				Big sagebrush	5
Orinoco	Clayey Saline, 10-14" Ppt Zone	Favorable	1,300	Western wheatgrass	30
		Normal	1,000	Green needlegrass	25
		Unfavorable	800	Other perennial forbs	5
				Other shrubs	5
103---------- Zatoville	Clayey Saline, 10-14" Ppt Zone	Favorable	1,400	Western wheatgrass	30
		Normal	1,100	Green needlegrass	25
		Unfavorable	800	Big sagebrush	5
				Other perennial forbs	5
104:					
Zatoville	Clayey Saline, 10-14" Ppt Zone	Favorable	1,400	Western wheatgrass	30
		Normal	1,100	Green needlegrass	25
		Unfavorable	800	Other perennial forbs	5
Orinoco	Clayey Saline, 10-14" Ppt Zone	Favorable	1,300	Western wheatgrass	30
		Normal	1,000	Green needlegrass	25
		Unfavorable	800	Big sagebrush	5
				Other perennial forbs	5
				Other shrubs	5

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1---------- Abor	Nanking cherry, western sandcherry.	Siberian peashrub, common chokecherry, ponderosa pine, green ash, blue spruce, lilac, Siberian crabapple, Rocky Mountain juniper.	Russian olive, Siberian elm.	---	---
2*: Abor----------	Nanking cherry, western sandcherry.	Siberian peashrub, common chokecherry, ponderosa pine, green ash, blue spruce, lilac, Siberian crabapple, Rocky Mountain juniper.	Russian olive, Siberian elm.	---	---
Neldore----------	Western sandcherry, skunkbush sumac.	Siberian peashrub, Rocky Mountain juniper, Russian olive, ponderosa pine.	Siberian elm------	---	---
3, 4. Amherst					
5*: Amherst.					
Delplain.					
6---------- Attewan	Western sandcherry, Nanking cherry.	Siberian peashrub, lilac, ponderosa pine, Tatarian honeysuckle, common chokecherry, blue spruce, green ash, Rocky Mountain juniper.	Russian olive, Siberian elm.	---	---
7*. Badland					
8*: Bascovy----------	Western sandcherry, Siberian crabapple.	Siberian peashrub, Russian olive, ponderosa pine, Rocky Mountain juniper.	Siberian elm------	---	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
8*:					
Neldore	Western sandcherry, skunkbush sumac.	Siberian peashrub, Rocky Mountain juniper, Russian olive, ponderosa pine.	Siberian elm	---	---
9*:					
Bascovy	Western sandcherry, Siberian crabapple.	Siberian peashrub, Russian olive, ponderosa pine, Rocky Mountain juniper.	Siberian elm	---	---
Neldore.					
Neldore, moist.					
10*:					
Blackhall.					
Rock outcrop.					
Twilight	Western sandcherry, skunkbush sumac.	Siberian peashrub, Rocky Mountain juniper, Russian olive, ponderosa pine.	Siberian elm	---	---
11	Western sandcherry, Nanking cherry.	Siberian peashrub, lilac, Siberian crabapple, green ash, ponderosa pine, Rocky Mountain juniper, common chokecherry, blue spruce.	Russian olive, Siberian elm.	---	---
Busby					
12*:					
Busby	Western sandcherry, Nanking cherry.	Siberian peashrub, lilac, Siberian crabapple, green ash, ponderosa pine, Rocky Mountain juniper, common chokecherry, blue spruce.	Russian olive, Siberian elm.	---	---
Blackhall.					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
13*:					
Busby	Western sandcherry, Nanking cherry.	Siberian peashrub, lilac, Siberian crabapple, green ash, ponderosa pine, Rocky Mountain juniper, common chokecherry, blue spruce.	Russian olive, Siberian elm.	---	---
Twilight	Western sandcherry, skunkbush sumac.	Siberian peashrub, Rocky Mountain juniper, Russian olive, ponderosa pine.	Siberian elm	---	---
14. Cabbart					
15*: Cabbart.					
Crago.					
Delpoint	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, Rocky Mountain juniper, ponderosa pine.	Siberian elm	---	---
16*: Cabbart.					
Delpoint	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, Rocky Mountain juniper, ponderosa pine.	Siberian elm	---	---
17*: Cabbart.					
Delpoint	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, Rocky Mountain juniper, ponderosa pine.	Siberian elm	---	---
Cabbart, moist.					
18*: Cabbart.					
Delpoint	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, Rocky Mountain juniper, ponderosa pine.	Siberian elm	---	---
Rock outcrop.					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
19*:					
Cabbart.					
Rock outcrop.					
Blackhall.					
20*:					
Cabbart.					
Yawdim.					
Delpoint.					
21*:					
Cabbart.					
Yawdim.					
Rock outcrop.					
22*:					
Cabbart.					
Cabbart.					
23*:					
Cabbart, high precipitation.					
Blackhall, moist.					
Delpoint	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, Rocky Mountain juniper, ponderosa pine.	Siberian elm	---	---
24 Chinook	Skunkbush sumac, western sandcherry.	Siberian peashrub, common chokecherry, ponderosa pine, Tatarian honeysuckle, green ash, Rocky Mountain juniper, lilac, blue spruce.	Russian olive, Siberian elm.	---	---
25 Crago	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, ponderosa pine, Rocky Mountain juniper.	Siberian elm	---	---
26. Crago					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
27*:					
Crago	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, ponderosa pine, Rocky Mountain juniper.	Siberian elm	---	---
Musselshell	Skunkbush sumac	Siberian peashrub, Russian olive, Siberian crabapple, ponderosa pine, Tatarian honeysuckle, silver buffaloberry, Rocky Mountain juniper, green ash, common chokecherry, blue spruce.	Siberian elm	---	---
Crago	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, ponderosa pine, Rocky Mountain juniper.	Siberian elm	---	---
28*:					
Crago	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, ponderosa pine, Rocky Mountain juniper.	Siberian elm	---	---
Musselshell	Skunkbush sumac	Siberian peashrub, Russian olive, Siberian crabapple, ponderosa pine, Tatarian honeysuckle, silver buffaloberry, Rocky Mountain juniper, green ash, common chokecherry, blue spruce.	Siberian elm	---	---
Attewan	Western sandcherry, Nanking cherry.	Siberian peashrub, lilac, ponderosa pine, Tatarian honeysuckle, common chokecherry, blue spruce, green ash, Rocky Mountain juniper.	Russian olive, Siberian elm.	---	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
29*:					
Creed	Skunkbush sumac	Siberian peashrub, silver buffaloberry, common chokecherry, ponderosa pine, Rocky Mountain juniper.	Russian olive, Siberian elm.	---	---
Gerdrum	Skunkbush sumac	Siberian peashrub, silver buffaloberry, common chokecherry, Rocky Mountain juniper, ponderosa pine.	Russian olive, Siberian elm.	---	---
30--- Delpoint	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, Rocky Mountain juniper, ponderosa pine.	Siberian elm	---	---
31*:					
Delpoint	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, Rocky Mountain juniper, ponderosa pine.	Siberian elm	---	---
Cabbart.					
32*:					
Delpoint	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, Rocky Mountain juniper, ponderosa pine.	Siberian elm	---	---
Cabbart.					
Yamac	Nanking cherry, western sandcherry.	Siberian peashrub, Siberian crabapple, Rocky Mountain juniper, common chokecherry, silver buffaloberry, blue spruce.	Russian olive, green ash, ponderosa pine, Siberian elm.	---	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
33, 34---------- Ethridge	Western sandcherry, Nanking cherry.	Siberian peashrub, ponderosa pine, Tatarian honeysuckle, common chokecherry, Rocky Mountain juniper, lilac, green ash, blue spruce.	Siberian elm, Russian olive.	---	---
35, 36---------- Evanston	Western sandcherry, skunkbush sumac.	Blue spruce, Siberian crabapple, common chokecherry, Siberian peashrub, silver buffaloberry, Tatarian honeysuckle, Rocky Mountain juniper.	Green ash, Russian olive, Siberian elm.	---	---
37*: Evanston---------	Western sandcherry, skunkbush sumac.	Blue spruce, Siberian crabapple, common chokecherry, Siberian peashrub, silver buffaloberry, Tatarian honeysuckle, Rocky Mountain juniper.	Green ash, Russian olive, Siberian elm.	---	---
Attewan----------	Western sandcherry, Nanking cherry.	Siberian peashrub, lilac, ponderosa pine, Tatarian honeysuckle, common chokecherry, blue spruce, green ash, Rocky Mountain juniper.	Russian olive, Siberian elm.	---	---
38*: Gerdrum----------	Skunkbush sumac---	Siberian peashrub, silver buffaloberry, common chokecherry, Rocky Mountain juniper, ponderosa pine.	Russian olive, Siberian elm.	---	---
Bascovy----------	Western sandcherry, Siberian crabapple.	Siberian peashrub, Russian olive, ponderosa pine, Rocky Mountain juniper.	Siberian elm------	---	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
39*:					
Gerdrum	Skunkbush sumac	Siberian peashrub, silver buffaloberry, common chokecherry, Rocky Mountain juniper, ponderosa pine.	Russian olive, Siberian elm.	---	---
Creed	Skunkbush sumac	Siberian peashrub, silver buffaloberry, common chokecherry, ponderosa pine, Rocky Mountain juniper.	Russian olive, Siberian elm.	---	---
40*:					
Gerdrum	Skunkbush sumac	Siberian peashrub, silver buffaloberry, common chokecherry, Rocky Mountain juniper, ponderosa pine.	Russian olive, Siberian elm.	---	---
Vanda.					
41*:					
Gerdrum	Skunkbush sumac	Siberian peashrub, silver buffaloberry, common chokecherry, Rocky Mountain juniper, ponderosa pine.	Russian olive, Siberian elm.	---	---
Vanda.					
Creed	Skunkbush sumac	Siberian peashrub, silver buffaloberry, common chokecherry, ponderosa pine, Rocky Mountain juniper.	Russian olive, Siberian elm.	---	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
42, 43---------- Harlem	Western sandcherry, Nanking cherry.	Siberian crabapple, lilac, ponderosa pine, green ash, Siberian peashrub, Rocky Mountain juniper, common chokecherry, blue spruce.	Siberian elm, Russian olive.	---	---
44---------- Harlem	Silver buffaloberry.	Russian olive-----	---	---	---
45*, 46*: Harlem----------	Western sandcherry, Nanking cherry.	Siberian crabapple, lilac, ponderosa pine, green ash, Siberian peashrub, Rocky Mountain juniper, common chokecherry, blue spruce.	Siberian elm, Russian olive.	---	---
Havre----------	Skunkbush sumac, western sandcherry.	Siberian peashrub, common chokecherry, blue spruce, lilac, Rocky Mountain juniper.	Siberian elm, ponderosa pine, Russian olive, golden willow.	---	Plains cottonwood.
47*: Harlem----------	Silver buffaloberry.	Russian olive-----	---	---	---
Havre----------	Silver buffaloberry.	Russian olive-----	---	---	---
48, 49---------- Havre	Skunkbush sumac, western sandcherry.	Siberian peashrub, common chokecherry, blue spruce, lilac, Rocky Mountain juniper.	Siberian elm, ponderosa pine, Russian olive, golden willow.	---	Plains cottonwood.
50*, 51*: Havre----------	Skunkbush sumac, western sandcherry.	Siberian peashrub, common chokecherry, blue spruce, lilac, Rocky Mountain juniper.	Siberian elm, ponderosa pine, Russian olive, golden willow.	---	Plains cottonwood.

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
50*, 51*:					
Glendive	Skunkbush sumac	Siberian peashrub, ponderosa pine, Tatarian honeysuckle, green ash, silver buffaloberry, Rocky Mountain juniper, lilac, common chokecherry, blue spruce.	Siberian elm, Russian olive.	---	---
52*:					
Havre	Tatarian honeysuckle, American plum, Peking cotoneaster.	Green ash, blue spruce, Manchurian crabapple, common chokecherry, eastern redcedar, Siberian peashrub.	Golden willow, ponderosa pine.	Cottonwood	---
Harlem	Western sandcherry, Nanking cherry.	Siberian crabapple, lilac, ponderosa pine, green ash, Siberian peashrub, Rocky Mountain juniper, common chokecherry, blue spruce.	Siberian elm, Russian olive.	---	---
53*:					
Havre	Skunkbush sumac, western sandcherry.	Siberian peashrub, common chokecherry, blue spruce, lilac, Rocky Mountain juniper.	Siberian elm, ponderosa pine, Russian olive, golden willow.	---	---
Yamac	Nanking cherry, western sandcherry.	Siberian peashrub, Siberian crabapple, Rocky Mountain juniper, common chokecherry, silver buffaloberry, blue spruce.	Russian olive, green ash, ponderosa pine, Siberian elm.	---	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
54*:					
Kobar	Western sandcherry, Nanking cherry.	Siberian peashrub, green ash, ponderosa pine, Tatarian honeysuckle, Siberian crabapple, Rocky Mountain juniper, lilac, blue spruce.	Russian olive, Siberian elm.	---	---
Zatoville	Silver buffaloberry.	Russian olive	---	---	---
55, 56 Kremlin	Western sandcherry, Nanking cherry.	Siberian peashrub, lilac, blue spruce, common chokecherry, Tatarian honeysuckle, Rocky Mountain juniper.	Russian olive, ponderosa pine, green ash, Siberian elm.	---	---
57 Marias	Nanking cherry, western sandcherry.	Siberian peashrub, green ash, blue spruce, lilac, Siberian crabapple, ponderosa pine, Tatarian honeysuckle, Rocky Mountain juniper.	Russian olive, Siberian elm.	---	---
58 Marmarth	Western sandcherry, Nanking cherry, western sandcherry.	Siberian peashrub, lilac, common chokecherry, green ash, ponderosa pine, blue spruce, Rocky Mountain juniper.	Siberian elm, Russian olive.	---	---
59 Marvan	Skunkbush sumac	Siberian peashrub, ponderosa pine, common chokecherry, silver buffaloberry, Rocky Mountain juniper.	Russian olive, Siberian elm.	---	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
60*:					
Marvan	Skunkbush sumac	Siberian peashrub, ponderosa pine, common chokecherry, silver buffaloberry, Rocky Mountain juniper.	Russian olive, Siberian elm.	---	---
Vanda.					
61---------- Neldore	Western sandcherry, skunkbush sumac.	Siberian peashrub, Rocky Mountain juniper, Russian olive, ponderosa pine.	Siberian elm	---	---
62*:					
Neldore	Western sandcherry, skunkbush sumac.	Siberian peashrub, Rocky Mountain juniper, Russian olive, ponderosa pine.	Siberian elm	---	---
Abor	Nanking cherry, western sandcherry.	Siberian peashrub, common chokecherry, ponderosa pine, green ash, blue spruce, lilac, Siberian crabapple, Rocky Mountain juniper.	Russian olive, Siberian elm.	---	---
63*:					
Neldore.					
Abor.					
64*:					
Neldore.					
Bascovy	Western sandcherry, Siberian crabapple.	Siberian peashrub, Russian olive, ponderosa pine, Rocky Mountain juniper.	Siberian elm	---	---
Rock outcrop.					
65*:					
Neldore	Western sandcherry, skunkbush sumac.	Siberian peashrub, Rocky Mountain juniper, Russian olive, ponderosa pine.	Siberian elm	---	---
Neldore, saline.					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
66*:					
Neldore.					
Rock outcrop.					
67*:					
Neldore	Western sandcherry, skunkbush sumac.	Siberian peashrub, Rocky Mountain juniper, Russian olive, ponderosa pine.	Siberian elm	---	---
Volborg.					
68*:					
Neldore	Western sandcherry, skunkbush sumac.	Siberian peashrub, Rocky Mountain juniper, Russian olive, ponderosa pine.	Siberian elm	---	---
Weingart	Silver buffaloberry.	Russian olive	---	---	---
69*:					
Neldore	Western sandcherry, skunkbush sumac.	Siberian peashrub, Rocky Mountain juniper, Russian olive, ponderosa pine.	Siberian elm	---	---
Yawdim.					
70*:					
Neldore, moist.					
Bascovy	Western sandcherry, Siberian crabapple.	Siberian peashrub, Russian olive, ponderosa pine, Rocky Mountain juniper.	Siberian elm	---	---
Neldore, south.					
71*:					
Nobe.					
Absher.					
72*:					
Pinebreaks.					
Neldore.					
73*.					
Riverwash					
74*.					
Rock outcrop					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
75---------- Tanna	Skunkbush sumac, western sandcherry.	Siberian peashrub, Russian olive, Rocky Mountain juniper, ponderosa pine.	Siberian elm------	---	---
76*: Tanna----------	Skunkbush sumac, western sandcherry.	Siberian peashrub, Russian olive, Rocky Mountain juniper, ponderosa pine.	Siberian elm------	---	---
Weingart---------	Silver buffaloberry.	Russian olive-----	---	---	---
77---------- Teigen	Nanking cherry, western sandcherry.	Siberian peashrub, common chokecherry, blue spruce, lilac, Siberian crabapple, Rocky Mountain juniper.	Ponderosa pine, Russian olive, green ash, Siberian elm.	---	---
78---------- Twilight	Western sandcherry, skunkbush sumac.	Siberian peashrub, Rocky Mountain juniper, Russian olive, ponderosa pine.	Siberian elm------	---	---
79*: Twilight---------	Western sandcherry, skunkbush sumac.	Siberian peashrub, Rocky Mountain juniper, Russian olive, ponderosa pine.	Siberian elm------	---	---
Blackhall.					
80*: Twilight---------	Western sandcherry, skunkbush sumac.	Siberian peashrub, Rocky Mountain juniper, Russian olive, ponderosa pine.	Siberian elm------	---	---
Blackhall.					
Rock outcrop.					
81, 82, 83. Ustic Torriorthents					
84. Vaeda					
85. Vanda					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
86*: Vanda.					
Harlem	Western sandcherry, Nanking cherry.	Siberian crabapple, lilac, ponderosa pine, green ash, Siberian peashrub, Rocky Mountain juniper, common chokecherry, blue spruce.	Siberian elm, Russian olive.	---	---
Marvan	Skunkbush sumac	Siberian peashrub, ponderosa pine, common chokecherry, silver buffaloberry, Rocky Mountain juniper.	Russian olive, Siberian elm.	---	---
87 Verson	Western sandcherry, Nanking cherry.	Siberian peashrub, green ash, ponderosa pine, Siberian crabapple, Rocky Mountain juniper, lilac, common chokecherry, blue spruce.	Russian olive, Siberian elm.	---	---
88. Volborg					
89*: Volborg.					
Volborg, eroded.					
Julin	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, ponderosa pine, Rocky Mountain juniper.	Siberian elm	---	---
90*: Volborg.					
Rock outcrop.					
Julin	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, ponderosa pine, Rocky Mountain juniper.	Siberian elm	---	---
91 Weingart	Silver buffaloberry.	Russian olive	---	---	---

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
92*:					
Weingart	Silver buffaloberry.	Russian olive	---	---	---
Warhorse.					
93, 94, 95, 96---- Yamac	Nanking cherry, western sandcherry.	Siberian peashrub, Siberian crabapple, Rocky Mountain juniper, common chokecherry, silver buffaloberry, blue spruce.	Russian olive, green ash, ponderosa pine, Siberian elm.	---	---
97*:					
Yamac	Nanking cherry, western sandcherry.	Siberian peashrub, Siberian crabapple, Rocky Mountain juniper, common chokecherry, silver buffaloberry, blue spruce.	Russian olive, green ash, ponderosa pine, Siberian elm.	---	---
Busby	Western sandcherry, Nanking cherry.	Siberian peashrub, lilac, Siberian crabapple, green ash, ponderosa pine, Rocky Mountain juniper, common chokecherry, blue spruce.	Russian olive, Siberian elm.	---	---
98*:					
Yamac	Nanking cherry, western sandcherry.	Siberian peashrub, Siberian crabapple, Rocky Mountain juniper, common chokecherry, silver buffaloberry, blue spruce.	Russian olive, green ash, ponderosa pine, Siberian elm.	---	---
Delpoint	Western sandcherry, skunkbush sumac.	Siberian peashrub, Russian olive, Rocky Mountain juniper, ponderosa pine.	Siberian elm	---	---
99. Yawdim					
100*: Yawdim.					
Crago.					

See footnote at end of table.

TABLE 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
101*:					
Yawdim.					
Orinoco	Silver buffaloberry.	Russian olive	---	---	---
102*:					
Yawdim.					
Orinoco.					
103 Zatoville	Silver buffaloberry.	Russian olive	---	---	---
104*:					
Zatoville	Silver buffaloberry.	Russian olive	---	---	---
Orinoco	Silver buffaloberry.	Russian olive	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
1 Abor	Moderate: percs slowly.	Moderate: too clayey, percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.
2*: Abor	Moderate: percs slowly.	Moderate: too clayey, percs slowly.	Moderate: slope, percs slowly.	Severe: erodes easily.
Neldore	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: too clayey.
3 Amherst	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight.
4 Amherst	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
5*: Amherst	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Delplain	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight.
6 Attewan	Slight	Slight	Moderate: slope, small stones.	Moderate: dusty.
7*. Badland				
8*: Bascovy	Moderate: slope, percs slowly.	Moderate: slope, too clayey.	Severe: slope.	Severe: erodes easily.
Neldore	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
9*: Bascovy	Moderate: slope, percs slowly.	Moderate: slope, too clayey.	Severe: slope.	Severe: erodes easily.
Neldore	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
9*:				
Neldore, moist	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
10*:				
Blackhall	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop.				
Twilight	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
11 Busby	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
12*:				
Busby	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Blackhall	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
13*:				
Busby	Slight	Slight	Moderate: slope.	Slight.
Twilight	Slight	Slight	Moderate: slope.	Slight.
14 Cabbart	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
15*:				
Cabbart	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Crago	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Delpoint	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
16*:				
Cabbart	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Delpoint	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Severe: erodes easily.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
17*:				
Cabbart	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Delpoint	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
Cabbart, moist	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
18*:				
Cabbart	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Delpoint	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
Rock outcrop.				
19*:				
Cabbart	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop.				
Blackhall	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
20*:				
Cabbart	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Yawdim	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Delpoint	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
21*:				
Cabbart	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Yawdim	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Rock outcrop.				

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
22*:				
Cabbart, high precipitation	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Cabbart, moist	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
23*:				
Cabbart	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Blackhall	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Delpoint	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
24--Chinook	Slight	Slight	Moderate: slope.	Slight.
25--Crago	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: dusty.
26--Crago	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.
27*:				
Crago	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Severe: erodes easily.
Musselshell	Moderate: dusty.	Moderate: dusty.	Moderate: small stones, dusty.	Severe: erodes easily.
Crago	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: dusty.
28*:				
Crago	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: dusty.
Musselshell	Moderate: dusty.	Moderate: dusty.	Moderate: small stones, dusty.	Severe: erodes easily.
Attewan	Slight	Slight	Moderate: small stones.	Moderate: dusty.
29*:				
Creed	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
29*:				
Gerdrum	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
30 Delpoint	Moderate: dusty.	Moderate: dusty.	Moderate: slope.	Severe: erodes easily.
31*:				
Delpoint	Moderate: dusty.	Moderate: dusty.	Moderate: slope.	Severe: erodes easily.
Cabbart	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: erodes easily.
32*:				
Delpoint	Moderate: slope, dusty.	Moderate: slope, dusty.	Severe: slope.	Severe: erodes easily.
Cabbart	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
Yamac	Moderate: dusty.	Moderate: dusty.	Severe: slope.	Severe: erodes easily.
33 Ethridge	Slight	Slight	Slight	Severe: erodes easily.
34 Ethridge	Slight	Slight	Moderate: slope.	Severe: erodes easily.
35 Evanston	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.
36 Evanston	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.
37*:				
Evanston	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.
Attewan	Slight	Slight	Moderate: small stones.	Moderate: dusty.
38*:				
Gerdrum	Severe: excess sodium.	Severe: excess sodium.	Severe: slope, excess sodium.	Severe: erodes easily.
Bascovy	Moderate: slope, percs slowly.	Moderate: slope, too clayey.	Severe: slope.	Severe: erodes easily.
39*:				
Gerdrum	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
39*:				
Creed	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
40*:				
Gerdrum	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
Vanda	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Moderate: too clayey.
41*:				
Gerdrum	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
Vanda	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Moderate: too clayey.
Creed	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
42--- Harlem	Severe: flooding.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
43--- Harlem	Severe: flooding.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
44--- Harlem	Severe: flooding.	Moderate: too clayey, excess salt.	Moderate: too clayey, excess salt.	Moderate: too clayey.
45*:				
Harlem	Severe: flooding.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
Havre	Severe: flooding.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
46*:				
Harlem	Severe: flooding.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
Havre	Severe: flooding.	Moderate: dusty.	Moderate: flooding.	Moderate: dusty.
47*:				
Harlem	Severe: flooding.	Moderate: too clayey, excess salt.	Moderate: too clayey, excess salt.	Moderate: too clayey.
Havre	Severe: flooding.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
48--- Havre	Severe: flooding.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
49--- Havre	Severe: flooding.	Moderate: dusty.	Moderate: flooding.	Moderate: dusty.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
50*:				
Havre	Severe: flooding.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.
Glendive	Severe: flooding.	Slight	Slight	Slight.
51*:				
Havre	Severe: flooding.	Moderate: dusty.	Moderate: flooding.	Moderate: dusty.
Glendive	Severe: flooding.	Slight	Moderate: flooding.	Slight.
52*:				
Havre	Severe: flooding.	Moderate: dusty.	Moderate: flooding.	Moderate: dusty.
Harlem	Severe: flooding.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
53*:				
Havre	Severe: flooding.	Moderate: dusty.	Moderate: flooding.	Moderate: dusty.
Yamac	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Severe: erodes easily.
54*:				
Kobar	Slight	Slight	Moderate: slope.	Severe: erodes easily.
Zatoville	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
55--- Kremlin	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Severe: erodes easily.
56--- Kremlin	Moderate: dusty.	Moderate: dusty.	Moderate: slope, dusty.	Severe: erodes easily.
57--- Marias	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: slope, too clayey.	Severe: erodes easily.
58--- Marmarth	Slight	Slight	Moderate: slope, depth to rock.	Slight.
59--- Marvan	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: slope, too clayey.	Moderate: too clayey.
60*:				
Marvan	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: slope, too clayey.	Moderate: too clayey.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
60*:				
Vanda	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Moderate: too clayey.
61	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: too clayey.
Neldore				
62*:				
Neldore	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: too clayey.
Abor	Moderate: slope.	Moderate: slope, too clayey.	Severe: slope.	Severe: erodes easily.
63*:				
Neldore	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Abor	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.
64*:				
Neldore	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Bascovy	Moderate: slope, percs slowly.	Moderate: slope, too clayey.	Severe: slope.	Severe: erodes easily.
Rock outcrop.				
65*:				
Neldore	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: too clayey.
Neldore, saline	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: too clayey.
66*:				
Neldore	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop.				
67*:				
Neldore	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: too clayey.
Volborg	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
68*:				
Neldore	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: too clayey.
Weingart	Severe: excess sodium.	Severe: excess sodium.	Severe: slope, excess sodium.	Slight.
69*:				
Neldore	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Moderate: too clayey.
Yawdim	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.
70*:				
Neldore, moist	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Bascovy	Moderate: slope, percs slowly.	Moderate: slope, too clayey.	Severe: slope.	Severe: erodes easily.
Neldore, south	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
71*:				
Nobe	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Moderate: too clayey.
Absher	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Moderate: too clayey.
72*:				
Pinebreaks	Severe: slope, depth to rock, too clayey.	Severe: slope, depth to rock, too clayey.	Severe: slope, depth to rock, too clayey.	Severe: slope, too clayey.
Neldore	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
73*. Riverwash				
74*. Rock outcrop				
75 Tanna	Slight	Slight	Moderate: slope.	Severe: erodes easily.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
76*:				
Tanna	Moderate: dusty.	Moderate: dusty.	Moderate: slope.	Severe: erodes easily.
Weingart	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
77--Teigen	Slight	Slight	Moderate: slope.	Slight.
78--Twilight	Slight	Slight	Moderate: slope.	Slight.
79*:				
Twilight	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Blackhall	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
80*:				
Twilight	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Blackhall	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Rock outcrop.				
81, 82, 83. Ustic Torriorthents				
84--Vaeda	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: slope, small stones.	Moderate: too clayey.
85--Vanda	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Moderate: too clayey.
86*:				
Vanda	Severe: excess salt.	Severe: excess salt.	Severe: excess salt.	Moderate: too clayey.
Harlem	Severe: flooding.	Moderate: too clayey.	Moderate: slope, too clayey.	Moderate: too clayey.
Marvan	Moderate: percs slowly, too clayey.	Moderate: too clayey, percs slowly.	Moderate: slope, too clayey.	Moderate: too clayey.
87--Verson	Slight	Slight	Moderate: slope, small stones.	Slight.
88--Volborg	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
89*:				
Volborg	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Volborg, eroded	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Julin	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.
90*:				
Volborg	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Rock outcrop.				
Julin	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Slight.
91 Weingart	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
92*:				
Weingart	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Severe: erodes easily.
Warhorse	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: erodes easily.
93 Yamac	Moderate: dusty.	Moderate: dusty.	Moderate: small stones, dusty.	Severe: erodes easily.
94 Yamac	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Severe: erodes easily.
95 Yamac	Slight	Slight	Moderate: small stones.	Slight.
96 Yamac	Slight	Slight	Moderate: slope, small stones.	Slight.
97*:				
Yamac	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Severe: erodes easily.
Busby	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
98*:				
Yamac	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Severe: erodes easily.
Delpoint	Moderate: dusty.	Moderate: dusty.	Moderate: slope.	Severe: erodes easily.
99--- Yawdim	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
100*:				
Yawdim	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.
Crago	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, dusty.
101*:				
Yawdim	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight.
Orinoco	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
102*:				
Yawdim	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Orinoco	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
103--- Zatoville	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
104*:				
Zatoville	Severe: excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight.
Orinoco	Slight---	Slight---	Moderate: slope.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1 Abor	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
2*: Abor	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
Neldore	Moderate: too clayey.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: depth to rock, too clayey.
3 Amherst	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
4 Amherst	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
5*: Amherst	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Delplain	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
6 Attewan	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
7*. Badland						
8*: Bascovy	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: too clayey.
Neldore	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: depth to rock, too clayey.
9*: Bascovy	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: too clayey.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
9*:						
Neldore	Severe: slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: depth to rock, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: slope, depth to rock, too clayey.
Neldore, moist	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, depth to rock, too clayey.
10*:						
Blackhall	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Rock outcrop.						
Twilight	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
11	Severe:	Moderate:	Moderate:	Severe:	Moderate:	Moderate:
Busby	cutbanks cave.	slope.	slope.	slope.	slope, frost action.	slope.
12*:						
Busby	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Blackhall	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: droughty.
13*:						
Busby	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
Twilight	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
14	Moderate:	Moderate:	Moderate:	Severe:	Moderate:	Severe:
Cabbart	slope.	shrink-swell, slope.	shrink-swell, slope.	slope.	shrink-swell, slope.	droughty.
15*:						
Cabbart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Crago	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Delpoint	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
16*:						
Cabbart	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: shrink-swell, slope.	Severe: droughty.
Delpoint	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength, frost action.	Slight.
17*:						
Cabbart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Delpoint	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
Cabbart, moist	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
18*:						
Cabbart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Delpoint	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
Rock outcrop.						
19*:						
Cabbart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Rock outcrop.						
Blackhall	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
20*:						
Cabbart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Yawdim	Severe: slippage, slope.	Severe: slippage, shrink-swell, slope.	Severe: slippage, slope, shrink-swell.	Severe: slippage, shrink-swell, slope.	Severe: slippage, slope, shrink-swell.	Severe: droughty, slope, too clayey.
Delpoint	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
21*:						
Cabbart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Yawdim	Severe: slippage, slope.	Severe: slippage, shrink-swell, slope.	Severe: slippage, slope, shrink-swell.	Severe: slippage, shrink-swell, slope.	Severe: slippage, slope, shrink-swell.	Severe: droughty, slope, too clayey.
Rock outcrop.						
22*:						
Cabbart, high precipitation	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Cabbart, moist	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
23*:						
Cabbart	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Blackhall	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Delpoint	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
24--Chinook	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
25--Crago	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: small stones, large stones.
26--Crago	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
27*:						
Crago	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
Musselshell	Slight	Slight	Slight	Slight	Moderate: frost action.	Moderate: large stones.
Crago	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: small stones, large stones.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
28*:						
Crago	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: small stones, large stones.
Musselshell	Slight	Slight	Slight	Slight	Moderate: frost action.	Moderate: large stones.
Attewan	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
29*:						
Creed	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Severe: excess sodium.
Gerdrum	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess sodium.
30--Delpoint	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength, frost action.	Slight.
31*:						
Delpoint	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength, frost action.	Slight.
Cabbart	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Severe: droughty.
32*:						
Delpoint	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
Cabbart	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Moderate: shrink-swell, slope.	Severe: droughty.
Yamac	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
33, 34--Ethridge	Moderate: too clayey.	Severe: shrink-swell.	Moderate: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
35--Evanston	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action.	Slight.
36--Evanston	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
37*:						
Evanston	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, frost action.	Slight.
Attewan	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: droughty.
38*:						
Gerdrum	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Severe: excess sodium, too clayey.
Bascovy	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: too clayey.
39*:						
Gerdrum	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess sodium.
Creed	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Severe: excess sodium.
40*:						
Gerdrum	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess sodium.
Vanda	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess salt, too clayey.
41*:						
Gerdrum	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess sodium.
Vanda	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess salt, too clayey.
Creed	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Severe: excess sodium.
42--Harlem	Moderate: too clayey.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
43--Harlem	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: too clayey.
44--Harlem	Moderate: too clayey.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
45*:						
Harlem	Moderate: too clayey.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
Havre	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
46*:						
Harlem	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: too clayey.
Havre	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
47*:						
Harlem	Moderate: too clayey.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
Havre	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: low strength, flooding, frost action.	Slight.
48 Havre	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
49 Havre	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
50*:						
Havre	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
Glendive	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
51*:						
Havre	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Glendive	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
52*:						
Havre	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Harlem	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: too clayey.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
53*:						
Havre	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Yamac	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.	Slight.
54*:						
Kobar	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
Zatoville	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Severe: excess sodium.
55--- Kremlin	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.	Slight.
56--- Kremlin	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
57--- Marias	Severe: cutbanks cave.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
58--- Marmarth	Moderate: depth to rock.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Moderate: depth to rock.
59--- Marvan	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
60*:						
Marvan	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
Vanda	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess salt, too clayey.
61--- Neldore	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: depth to rock, too clayey.
62*:						
Neldore	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: depth to rock, too clayey.
Abor	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: too clayey.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
63*:						
Neldore	Severe: slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: depth to rock, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: slope, depth to rock, too clayey.
Abor	Severe: slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: slope, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: low strength, slope, slippage.	Severe: slope, too clayey.
64*:						
Neldore	Severe: slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: depth to rock, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: slope, depth to rock, too clayey.
Bascovy	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: too clayey.
Rock outcrop.						
65*:						
Neldore	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: depth to rock, too clayey.
Neldore, saline	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: depth to rock, too clayey.
66*:						
Neldore	Severe: slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: depth to rock, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: slope, depth to rock, too clayey.
Rock outcrop.						
67*:						
Neldore	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: depth to rock, too clayey.
Volborg	Severe: slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: depth to rock, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, slope, slippage.	Severe: slope, droughty.
68*:						
Neldore	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: depth to rock, too clayey.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
68*:						
Weingart	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess sodium.
69*:						
Neldore	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: depth to rock, too clayey.
Yawdim	Severe: slippage.	Severe: slippage, shrink-swell.	Severe: slippage, shrink-swell.	Severe: slippage, shrink-swell, slope.	Severe: slippage, shrink-swell, low strength.	Severe: droughty.
70*:						
Neldore, moist	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, depth to rock, too clayey.
Bascovy	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: too clayey.
Neldore, south	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, depth to rock, too clayey.
71*:						
Nobe	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey, excess salt.
Absher	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess sodium, too clayey.
72*:						
Pinebreaks	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, depth to rock, too clayey.
Neldore	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, depth to rock, too clayey.
73*. Riverwash						
74*. Rock outcrop						
75 Tanna	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
76*:						
Tanna	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
Weingart	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess sodium.
77--- Teigen	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
78--- Twilight	Slight---	Slight---	Slight---	Moderate: slope.	Moderate: frost action.	Slight.
79*:						
Twilight	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Blackhall	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: droughty.
80*:						
Twilight	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
Blackhall	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Severe: droughty.
Rock outcrop.						
81, 82, 83. Ustic Torriorthents						
84--- Vaeda	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
85--- Vanda	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess salt, too clayey.
86*:						
Vanda	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess salt, too clayey.
Harlem	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: too clayey.
Marvan	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
87---------- Verson	Moderate: too clayey.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell.	Severe: low strength.	Slight.
88---------- Volborg	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: too clayey, droughty.
89*:						
Volborg----------	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: too clayey, droughty.
Volborg, eroded--	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: too clayey, droughty.
Julin----------	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: too clayey.
90*:						
Volborg----------	Severe: slippage.	Severe: shrink-swell, slippage.	Severe: depth to rock, shrink-swell, slippage.	Severe: shrink-swell, slope, slippage.	Severe: shrink-swell, low strength, slippage.	Severe: too clayey, droughty.
Rock outcrop.						
Julin----------	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: too clayey.
91---------- Weingart	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess sodium.
92*:						
Weingart---------	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: excess sodium.
Warhorse---------	Slight---------	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: droughty.
93---------- Yamac	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.	Slight.
94---------- Yamac	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
95---------- Yamac	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, frost action.	Slight.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
96---------- Yamac	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
97*: Yamac----------	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
Busby----------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
98*: Yamac----------	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
Delpoint---------	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength, frost action.	Slight.
99---------- Yawdim	Severe: slippage.	Severe: slippage, shrink-swell.	Severe: slippage, shrink-swell.	Severe: slippage, shrink-swell, slope.	Severe: slippage, shrink-swell, low strength.	Severe: droughty, too clayey.
100*: Yawdim----------	Severe: slippage, slope.	Severe: slippage, shrink-swell, slope.	Severe: slippage, slope, shrink-swell.	Severe: slippage, shrink-swell, slope.	Severe: slippage, slope, shrink-swell.	Severe: droughty, slope, too clayey.
Crago----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
101*: Yawdim----------	Severe: slippage.	Severe: slippage, shrink-swell.	Severe: slippage, shrink-swell.	Severe: slippage, shrink-swell, slope.	Severe: slippage, shrink-swell, low strength.	Severe: droughty, too clayey.
Orinoco----------	Severe: slippage.	Severe: slippage.	Severe: slippage.	Severe: slope, slippage.	Severe: low strength, slippage.	Moderate: slope.
102*: Yawdim----------	Severe: slippage, slope.	Severe: slippage, shrink-swell, slope.	Severe: slippage, slope, shrink-swell.	Severe: slippage, shrink-swell, slope.	Severe: slippage, slope, shrink-swell.	Severe: droughty, slope, too clayey.
Orinoco----------	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Severe: low strength, slope, slippage.	Severe: slope.

See footnote at end of table.

TABLE 10.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
103---------- Zatoville	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Severe: excess sodium.
104*: Zatoville--------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Severe: excess sodium.
Orinoco----------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1 Abor	Severe: depth to rock, percs slowly.	Severe: seepage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
2*: Abor	Severe: depth to rock, percs slowly.	Severe: seepage.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Neldore	Severe: depth to rock, percs slowly.	Severe: seepage.	Severe: depth to rock.	Slight	Poor: depth to rock, hard to pack.
3 Amherst	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
4 Amherst	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
5*: Amherst	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Delplain	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
6 Attewan	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight	Poor: seepage, too sandy, small stones.
7*. Badland					
8*: Bascovy	Severe: depth to rock, slippage, percs slowly.	Severe: depth to rock, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
Neldore	Severe: depth to rock, slippage, percs slowly.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
9*: Bascovy	Severe: depth to rock, slippage, percs slowly.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
9*:					
Neldore	Severe: depth to rock, slope, slippage.	Severe: slope, slippage, seepage.	Severe: slope, slippage.	Severe: slope, slippage.	Poor: hard to pack, slope, thin layer.
Neldore, moist	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, hard to pack, slope.
10*:					
Blackhall	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
Rock outcrop.					
Twilight	Moderate: percs slowly, slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.
11					
Busby	Moderate: slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
12*:					
Busby	Moderate: slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Blackhall	Moderate: percs slowly, slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.
13*:					
Busby	Slight	Severe: seepage.	Slight	Slight	Good.
Twilight	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Poor: thin layer.
14					
Cabbart	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.
15*:					
Cabbart	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
Crago	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.
Delpoint	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
16*:					
Cabbart	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.
Delpoint	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: thin layer.
17*:					
Cabbart	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
Delpoint	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.
Cabbart, moist	Severe: percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
18*:					
Cabbart	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
Delpoint	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.
Rock outcrop.					
19*:					
Cabbart	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
Rock outcrop.					
Blackhall	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
20*:					
Cabbart	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
Yawdim	Severe: slippage, depth to rock, slope.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage, slope.	Poor: thin layer, hard to pack, slope.
Delpoint	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
21*:					
Cabbart	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
21*:					
Yawdim	Severe: slippage, depth to rock, slope.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage, slope.	Poor: thin layer, hard to pack, slope.
Rock outcrop.					
22*:					
Cabbart, high precipitation	Severe: percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
Cabbart, moist	Severe: percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
23*:					
Cabbart	Severe: percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
Blackhall	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
Delpoint	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.
24--Chinook	Slight	Severe: seepage.	Slight	Slight	Good.
25--Crago	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Poor: seepage, small stones.
26--Crago	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.
27*:					
Crago	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Poor: seepage, small stones.
Musselshell	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Poor: small stones.
Crago	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Poor: seepage, small stones.
28*:					
Crago	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Poor: seepage, small stones.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
28*:					
Musselshell	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Poor: small stones.
Attewan	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight	Poor: seepage, too sandy, small stones.
29*:					
Creed	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
Gerdrum	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: hard to pack.
30--- Delpoint	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: thin layer.
31*:					
Delpoint	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: thin layer.
Cabbart	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: thin layer.
32*:					
Delpoint	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.
Cabbart	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.
Yamac	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
33--- Ethridge	Severe: percs slowly.	Slight	Slight	Slight	Good.
34--- Ethridge	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
35--- Evanston	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
36--- Evanston	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
37*:					
Evanston	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Attewan	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight	Poor: seepage, too sandy, small stones.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
38*:					
Gerdrum	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: hard to pack.
Bascovy	Severe: depth to rock, slippage, percs slowly.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
39*:					
Gerdrum	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: hard to pack.
Creed	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
40*:					
Gerdrum	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: hard to pack.
Vanda	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight	Poor: hard to pack.
41*:					
Gerdrum	Severe: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Poor: hard to pack.
Vanda	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight	Poor: hard to pack.
Creed	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
42 Harlem	Severe: percs slowly.	Slight	Moderate: flooding.	Moderate: flooding.	Poor: hard to pack.
43 Harlem	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.
44 Harlem	Severe: percs slowly.	Slight	Moderate: flooding.	Moderate: flooding.	Poor: hard to pack.
45*:					
Harlem	Severe: percs slowly.	Slight	Moderate: flooding.	Moderate: flooding.	Poor: hard to pack.
Havre	Moderate: flooding, percs slowly.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Good.
46*:					
Harlem	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
46*:					
Havre	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
47*:					
Harlem	Severe: percs slowly.	Slight	Moderate: flooding.	Moderate: flooding.	Poor: hard to pack.
Havre	Moderate: flooding, percs slowly.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Good.
48--- Havre	Moderate: flooding, percs slowly.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Good.
49--- Havre	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
50*:					
Havre	Moderate: flooding, percs slowly.	Moderate: seepage.	Moderate: flooding.	Moderate: flooding.	Good.
Glendive	Moderate: flooding.	Severe: seepage.	Moderate: flooding, too sandy.	Moderate: flooding.	Fair: too sandy.
51*:					
Havre	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
Glendive	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding.	Severe: flooding.	Fair: too sandy.
52*:					
Havre	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
Harlem	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.
53*:					
Havre	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
Yamac	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
54*:					
Kobar	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
Zatoville	Severe: percs slowly.	Severe: seepage.	Severe: excess salt.	Slight	Fair: thin layer.
55--- Kremlin	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
56--Kremlin	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
57--Marias	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
58--Marmarth	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock.
59--Marvan	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: hard to pack.
60*:					
Marvan	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: hard to pack.
Vanda	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight	Poor: hard to pack.
61--Neldore	Severe: depth to rock, slippage, percs slowly.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
61--Neldore	Severe: depth to rock, slippage, percs slowly.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
62*:					
Neldore	Severe: depth to rock, slippage, percs slowly.	Severe: slope, seepage, slippage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
Abor	Severe: depth to rock, percs slowly, slippage.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
63*:					
Neldore	Severe: depth to rock, slope, slippage.	Severe: slope, slippage, seepage.	Severe: slope, slippage.	Severe: slope, slippage.	Poor: hard to pack, slope, thin layer.
Abor	Severe: depth to rock, slope, slippage.	Severe: slope, slippage, seepage.	Severe: slope, slippage.	Severe: slope, slippage.	Poor: hard to pack, slope, thin layer.
64*:					
Neldore	Severe: depth to rock, slope, slippage.	Severe: slope, slippage, seepage.	Severe: slope, slippage.	Severe: slope, slippage.	Poor: hard to pack, slope, thin layer.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
64*:					
Bascovy	Severe: depth to rock, slippage, percs slowly.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
Rock outcrop.					
65*:					
Neldore	Severe: depth to rock, slippage, percs slowly.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
Neldore, saline	Severe: depth to rock, slippage, percs slowly.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
66*:					
Neldore	Severe: depth to rock, slope, slippage.	Severe: slope, slippage, seepage.	Severe: slope, slippage.	Severe: slope, slippage.	Poor: hard to pack, slope, thin layer.
Rock outcrop.					
67*:					
Neldore	Severe: depth to rock, slippage, percs slowly.	Severe: slippage, slope, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
Volborg	Severe: depth to rock, slope, slippage.	Severe: seepage, slope, slippage.	Severe: slope, slippage.	Severe: slope, slippage.	Poor: slope, thin layer.
68*:					
Neldore	Severe: depth to rock, slippage, percs slowly.	Severe: slippage, slope, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
Weingart	Severe: depth to rock, percs slowly.	Severe: seepage.	Slight	Slight	Poor: hard to pack, thin layer.
69*:					
Neldore	Severe: depth to rock, slippage, percs slowly.	Severe: slippage, slope, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
Yawdim	Severe: slippage, depth to rock, percs slowly.	Severe: slippage, seepage, slope.	Severe: slippage.	Severe: slippage.	Poor: thin layer, hard to pack.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
70*:					
Neldore, moist	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, hard to pack, slope.
Bascovy	Severe: depth to rock, slippage, percs slowly.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: hard to pack, thin layer.
Neldore, south	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, hard to pack, slope.
71*:					
Nobe	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight	Poor: hard to pack.
Absher	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight	Poor: hard to pack.
72*:					
Pinebreaks	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Neldore	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, hard to pack, slope.
73*. Riverwash					
74*. Rock outcrop					
75 Tanna	Severe: depth to rock, percs slowly.	Severe: seepage.	Slight	Slight	Poor: area reclaim, too clayey.
76*:					
Tanna	Severe: depth to rock, percs slowly.	Severe: seepage.	Slight	Slight	Poor: area reclaim, too clayey.
Weingart	Severe: depth to rock, percs slowly.	Severe: seepage.	Slight	Slight	Poor: hard to pack, thin layer.
77 Teigen	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Poor: hard to pack.
78 Twilight	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Poor: thin layer.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
79*:					
Twilight	Moderate: percs slowly, slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.
Blackhall	Moderate: percs slowly, slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.
80*:					
Twilight	Moderate: percs slowly, slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.
Blackhall	Moderate: percs slowly, slope.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Poor: thin layer.
Rock outcrop.					
81, 82, 83. Ustic Torriorthents					
84 Vaeda	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Poor: hard to pack.
85 Vanda	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight	Poor: hard to pack.
86*:					
Vanda	Severe: percs slowly.	Moderate: slope.	Severe: excess salt.	Slight	Poor: hard to pack.
Harlem	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.
Marvan	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
87 Verson	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage, small stones.
88 Volborg	Severe: depth to rock, slippage, percs slowly.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: depth to rock.
89*:					
Volborg	Severe: depth to rock, slippage, percs slowly.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: depth to rock.
Volborg, eroded	Severe: depth to rock, slippage, percs slowly.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: depth to rock.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
89*:					
Julin	Severe: depth to rock, percs slowly, slippage.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: depth to rock, hard to pack.
90*:					
Volborg	Severe: depth to rock, slippage, percs slowly.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: thin layer.
Rock outcrop.					
Julin	Severe: depth to rock, percs slowly.	Severe: slope, slippage, seepage.	Slight	Slight	Poor: slope, hard to pack, thin layer.
91--- Weingart	Severe: depth to rock, percs slowly.	Severe: seepage.	Slight	Slight	Poor: hard to pack, thin layer.
92*:					
Weingart	Severe: depth to rock, percs slowly.	Severe: seepage.	Slight	Slight	Poor: hard to pack, thin layer.
Warhorse	Severe: depth to rock, percs slowly.	Severe: seepage.	Slight	Slight	Poor: thin layer.
93, 94, 95, 96--- Yamac	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
97*:					
Yamac	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
Busby	Slight	Severe: seepage.	Slight	Slight	Good.
98*:					
Yamac	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
Delpoint	Severe: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Poor: thin layer.
99--- Yawdim	Severe: slippage, depth to rock, percs slowly.	Severe: slippage, seepage, slope.	Severe: slippage.	Severe: slippage.	Poor: thin layer, hard to pack.
100*:					
Yawdim	Severe: slippage, depth to rock, slope.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage, slope.	Poor: thin layer, hard to pack, slope.

See footnote at end of table.

TABLE 11.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
100*:					
Crago	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.
101*:					
Yawdim	Severe: slippage, depth to rock, percs slowly.	Severe: slippage, seepage, slope.	Severe: slippage.	Severe: slippage.	Poor: thin layer, hard to pack.
Orinoco	Severe: depth to rock, percs slowly, slippage.	Severe: slope, slippage, seepage.	Severe: slippage.	Severe: slippage.	Poor: thin layer.
102*:					
Yawdim	Severe: slippage, depth to rock, slope.	Severe: slippage, seepage, slope.	Severe: slippage, slope.	Severe: slippage, slope.	Poor: thin layer, hard to pack, slope.
Orinoco	Severe: depth to rock, slope, slippage.	Severe: slope, slippage, seepage.	Severe: slope, slippage.	Severe: slope, slippage.	Poor: slope, thin layer.
103 Zatoville	Severe: percs slowly.	Severe: seepage.	Severe: excess salt.	Slight	Fair: thin layer.
104*:					
Zatoville	Severe: percs slowly.	Severe: seepage.	Severe: excess salt.	Slight	Fair: thin layer.
Orinoco	Severe: depth to rock, percs slowly.	Severe: seepage.	Slight	Slight	Poor: thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1---- Abor	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
2*: Abor----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Neldore----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
3---- Amherst	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
4---- Amherst	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
5*: Amherst----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Delplain----	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
6---- Attewan	Good----	Probable----	Probable----	Poor: too sandy, small stones, area reclaim.
7*. Badland				
8*: Bascovy----	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Neldore----	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
9*:				
Bascovy	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Neldore	Poor: depth to rock, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, thin layer.
Neldore, moist	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
10*:				
Blackhall	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Rock outcrop.				
Twilight	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, slope.
11 Busby	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
12*:				
Busby	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope.
Blackhall	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
13*:				
Busby	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Twilight	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
14 Cabbart	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
15*:				
Cabbart	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
Crago	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Delpoint	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope, thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
16*:				
Cabbart	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Delpoint	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
17*:				
Cabbart	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
Delpoint	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope, thin layer.
Cabbart, moist	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
18*:				
Cabbart	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
Delpoint	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope, thin layer.
Rock outcrop.				
19*:				
Cabbart	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
Rock outcrop.				
Blackhall	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
20*:				
Cabbart	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
Yawdim	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, thin layer.
Delpoint	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
21*:				
Cabbart	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
Yawdim	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer, slope.
Rock outcrop.				
22*:				
Cabbart, high precipitation	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
Cabbart, moist	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
23*:				
Cabbart	Poor: slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
Blackhall	Poor: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Delpoint	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope, thin layer.
24 Chinook	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
25 Crago	Good	Probable	Probable	Poor: small stones, area reclaim.
26 Crago	Fair: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
27*:				
Crago	Good	Probable	Probable	Poor: small stones, area reclaim.
Musselshell	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Crago	Good	Probable	Probable	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
28*:				
Crago	Good	Probable	Probable	Poor: small stones, area reclaim.
Musselshell	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Attewan	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
29*:				
Creed	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Gerdrum	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
30--- Delpoint	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
31*:				
Delpoint	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
Cabbart	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
32*:				
Delpoint	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope, thin layer.
Cabbart	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Yamac	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
33, 34--- Ethridge	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
35, 36--- Evanston	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, large stones.
37*:				
Evanston	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, large stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
37*:				
Attewan	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
38*:				
Gerdrum	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Bascovy	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
39*:				
Gerdrum	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Creed	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
40*:				
Gerdrum	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Vanda	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
41*:				
Gerdrum	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Vanda	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
Creed	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
42, 43 Harlem	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
44 Harlem	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
45*, 46*:				
Harlem	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Havre	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
47*:				
Harlem	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
Havre	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt.
48, 49-- Havre	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
50*:				
Havre	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Glendive	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
51*:				
Havre	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Glendive	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
52*:				
Havre	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Harlem	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
53*:				
Havre	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Yamac	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
54*:				
Kobar	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Zatoville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
55, 56-- Kremlin	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
57-- Marias	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
58-- Marmarth	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
59---------- Marvan	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
60*:				
Marvan----------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Vanda----------	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
61---------- Neldore	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
62*:				
Neldore----------	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Abor----------	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
63*:				
Neldore----------	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, thin layer.
Abor----------	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
64*:				
Neldore----------	Poor: depth to rock, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, thin layer.
Bascovy----------	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Rock outcrop.				
65*:				
Neldore----------	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
65*:				
Neldore, saline	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
66*:				
Neldore	Poor: depth to rock, shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, thin layer.
Rock outcrop.				
67*:				
Neldore	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Volborg	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, thin layer.
68*:				
Neldore	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Weingart	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
69*:				
Neldore	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Yawdim	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
70*:				
Neldore, moist	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Bascovy	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
70*:				
Neldore, south	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
71*:				
Nobe	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Absher	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
72*:				
Pinebreaks	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Neldore	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
73*. Riverwash				
74*. Rock outcrop				
75 Tanna	Poor: low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
76*:				
Tanna	Poor: low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
Weingart	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
77 Teigen	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
78 Twilight	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
79*:				
Twilight	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, slope.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
79*:				
Blackhall	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
80*:				
Twilight	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, slope.
Blackhall	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Rock outcrop.				
81, 82, 83. Ustic Torriorthents				
84 Vaeda	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
85 Vanda	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
86*:				
Vanda	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
Harlem	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Marvan	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
87 Verson	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
88 Volborg	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
89*:				
Volborg	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Volborg, eroded	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
89*:				
Julin	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
90*:				
Volborg	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Rock outcrop.				
Julin	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
91--- Weingart	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
92*:				
Weingart	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Warhorse	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
93, 94, 95, 96--- Yamac	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
97*:				
Yamac	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Busby	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
98*:				
Yamac	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Delpoint	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
99--- Yawdim	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
100*:				
Yawdim	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer, slope.
Crago	Fair: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
101*:				
Yawdim	Poor: shrink-swell, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer.
Orinoco	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
102*:				
Yawdim	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, thin layer, slope.
Orinoco	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, slope.
103 Zatoville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
104*:				
Zatoville	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
Orinoco	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1---- Abor	Severe: seepage.	Severe: hard to pack, thin layer.	Deep to water	Slope, slow intake, percs slowly.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
2*:						
Abor----	Severe: seepage.	Severe: hard to pack, thin layer.	Deep to water	Slope, slow intake, percs slowly.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Neldore----	Severe: seepage.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Depth to rock	Depth to rock.
3---- Amherst	Severe: depth to rock.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Depth to rock	Depth to rock.
4---- Amherst	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
5*:						
Amherst----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
Delplain----	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, depth to rock.	Depth to rock, slope, droughty.
6---- Attewan	Severe: seepage.	Severe: seepage.	Deep to water	Droughty----	Erodes easily, too sandy.	Too arid, erodes easily, droughty.
7*. Badland						
8*:						
Bascovy----	Severe: slope, seepage, slippage.	Severe: hard to pack, thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Neldore----	Severe: slope, slippage, seepage.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Slope, depth to rock.
9*:						
Bascovy----	Severe: slope, slippage, seepage.	Severe: hard to pack, thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
9*:						
Neldore	Severe: slope, slippage, seepage.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Slope, depth to rock.
Neldore, moist	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Too arid, slope.
10*:						
Blackhall	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Rock outcrop.						
Twilight	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
11 Busby	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Slope.
12*:						
Busby	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Slope.
Blackhall	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
13*:						
Busby	Severe: seepage.	Severe: piping.	Deep to water	Slope, soil blowing.	Soil blowing---	Favorable.
Twilight	Severe: seepage.	Severe: thin layer, piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, soil blowing.	Depth to rock.
14 Cabbart	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
15*:						
Cabbart	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
Crago	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope---	Slope, droughty.
Delpoint	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
16*:						
Cabbart	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Delpoint	Moderate: seepage, slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
17*:						
Cabbart	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
Delpoint	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
Cabbart, moist	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
18*:						
Cabbart	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
Delpoint	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
Rock outcrop.						
19*:						
Cabbart	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
Rock outcrop.						
Blackhall	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
20*:						
Cabbart	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
Yawdim	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slope, droughty, slow intake.	Slope, depth to rock.	Slope, droughty, depth to rock.
Delpoint	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
21*:						
Cabbart	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
Yawdim	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slope, droughty, slow intake.	Slope, depth to rock.	Slope, droughty, depth to rock.
Rock outcrop.						
22*:						
Cabbart, high precipitation	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
Cabbart, moist	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
23*:						
Cabbart	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
Blackhall	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Delpoint	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
24--- Chinook	Severe: seepage.	Severe: piping.	Deep to water	Slope, soil blowing.	Soil blowing, slope.	Favorable.
25--- Crago	Severe: seepage.	Severe: seepage.	Deep to water	Slope, droughty.	Favorable	Droughty.
26--- Crago	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope	Droughty, slope.
27*:						
Crago	Severe: seepage.	Severe: seepage.	Deep to water	Droughty, rooting depth.	Erodes easily	Too arid, erodes easily.
Musselshell	Severe: seepage.	Severe: seepage.	Deep to water	Rooting depth, erodes easily.	Favorable	Favorable.
Crago	Severe: seepage.	Severe: seepage.	Deep to water	Droughty	Favorable	Droughty.
28*:						
Crago	Severe: seepage.	Severe: seepage.	Deep to water	Droughty	Favorable	Droughty.
Musselshell	Severe: seepage.	Severe: seepage.	Deep to water	Rooting depth, erodes easily.	Favorable	Favorable.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
28*:						
Attewan	Severe: seepage.	Severe: seepage.	Deep to water	Droughty	Erodes easily, too sandy.	Too arid, erodes easily, droughty.
29*:						
Creed	Moderate: slope.	Severe: excess sodium.	Deep to water	Slope, droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily.
Gerdrum	Moderate: seepage, slope.	Severe: excess sodium.	Deep to water	Slope, droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily.
30--- Delpoint	Moderate: seepage, slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
31*:						
Delpoint	Moderate: seepage, slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
Cabbart	Moderate: seepage, slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
32*:						
Delpoint	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
Cabbart	Severe: slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
Yamac	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
33--- Ethridge	Slight	Moderate: piping.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
34--- Ethridge	Moderate: slope.	Moderate: piping.	Deep to water	Slope, percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
35--- Evanston	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
36--- Evanston	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
37*:						
Evanston	Moderate: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
37*:						
Attewan	Severe: seepage.	Severe: seepage.	Deep to water	Droughty	Erodes easily, too sandy.	Too arid, erodes easily, droughty.
38*:						
Gerdrum	Severe: slope.	Severe: excess sodium.	Deep to water	Slope, droughty, slow intake.	Slope, erodes easily, percs slowly.	Slope, excess sodium, erodes easily.
Bascovy	Severe: slope, slippage, seepage.	Severe: hard to pack, thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
39*:						
Gerdrum	Moderate: seepage, slope.	Severe: excess sodium.	Deep to water	Slope, droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily.
Creed	Moderate: slope.	Severe: excess sodium.	Deep to water	Slope, droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily.
40*:						
Gerdrum	Moderate: seepage, slope.	Severe: excess sodium.	Deep to water	Slope, droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily.
Vanda	Moderate: slope.	Severe: hard to pack, excess salt.	Deep to water	Slope, droughty, slow intake.	Erodes easily, percs slowly.	Excess salt, erodes easily.
41*:						
Gerdrum	Moderate: seepage, slope.	Severe: excess sodium.	Deep to water	Slope, droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily.
Vanda	Moderate: slope.	Severe: hard to pack, excess salt.	Deep to water	Slope, droughty, slow intake.	Erodes easily, percs slowly.	Excess salt, erodes easily.
Creed	Moderate: slope.	Severe: excess sodium.	Deep to water	Slope, droughty, percs slowly.	Erodes easily, percs slowly.	Excess sodium, erodes easily.
42--Harlem	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
43--Harlem	Slight	Moderate: thin layer, hard to pack.	Deep to water	Slow intake, percs slowly, flooding.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
44--Harlem	Slight	Moderate: hard to pack, excess salt.	Deep to water	Slow intake, percs slowly, excess salt.	Percs slowly	Excess salt.
45*:						
Harlem	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
45*:						
Havre	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
46*:						
Harlem	Slight	Moderate: thin layer, hard to pack.	Deep to water	Slow intake, percs slowly, flooding.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Havre	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Favorable	Favorable.
47*:						
Harlem	Slight	Moderate: hard to pack, excess salt.	Deep to water	Slow intake, percs slowly, excess salt.	Percs slowly	Excess salt.
Havre	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, excess salt.	Erodes easily	Erodes easily.
48--Havre	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
49--Havre	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Favorable	Favorable.
50*:						
Havre	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
Glendive	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing	Soil blowing	Favorable.
51*:						
Havre	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Favorable	Favorable.
Glendive	Severe: seepage.	Severe: piping.	Deep to water	Soil blowing, flooding.	Soil blowing	Favorable.
52*:						
Havre	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Favorable	Favorable.
Harlem	Slight	Moderate: thin layer, hard to pack.	Deep to water	Slow intake, percs slowly, flooding.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
53*:						
Havre	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Favorable	Favorable.
Yamac	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
54*:						
Kobar	Moderate: slope.	Slight	Deep to water	Slope, percs slowly, erodes easily.	Erodes easily, percs slowly.	Percs slowly, erodes easily.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
54*:						
Zatoville	Severe: seepage.	Severe: excess salt, excess sodium.	Deep to water	Slope, percs slowly, erodes easily.	Erodes easily, percs slowly.	Excess sodium, erodes easily, percs slowly.
55--- Kremlin	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
56--- Kremlin	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
57--- Marias	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
58--- Marmarth	Moderate: seepage, depth to rock, slope.	Severe: piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock	Depth to rock.
59--- Marvan	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope, slow intake, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
60*:						
Marvan	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope, slow intake, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Vanda	Moderate: slope.	Severe: hard to pack, excess salt.	Deep to water	Slope, droughty, slow intake.	Erodes easily, percs slowly.	Erodes easily, excess salt.
61--- Neldore	Severe: slope, slippage, seepage.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Depth to rock, slope.
62*, 63*:						
Neldore	Severe: seepage, slope, slippage.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Depth to rock, slope.
Abor	Severe: slope, slippage, seepage.	Severe: hard to pack, thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
64*:						
Neldore	Severe: slope, slippage, seepage.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Depth to rock, slope.
Bascovy	Severe: slope, slippage, seepage.	Severe: hard to pack, thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
Rock outcrop.						

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
65*:						
Neldore	Severe: slope, seepage, slippage.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Depth to rock, slope.
Neldore, saline--	Severe: slope, seepage, slippage.	Severe: hard to pack, thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.
66*:						
Neldore	Severe: slope, slippage, seepage.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Slope, depth to rock.
Rock outcrop.						
67*:						
Neldore	Severe: slope, seepage, slippage.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Depth to rock, slope.
Volborg	Severe: slope, seepage, slippage.	Severe: thin layer.	Deep to water	Slope, slow intake, soil blowing.	Slope, depth to rock, soil blowing.	Depth to rock, slope.
68*:						
Neldore	Severe: slope, seepage, slippage.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Depth to rock, slope.
Weingart	Severe: seepage.	Severe: excess sodium.	Deep to water	Slope, percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, excess sodium, depth to rock.
69*:						
Neldore	Severe: slope, seepage, slippage.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Depth to rock, slope.
Yawdim	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slope, droughty, percs slowly.	Slope, depth to rock.	Slope, droughty, depth to rock.
70*:						
Neldore, moist---	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Too arid, slope.
Bascovy	Severe: slope, slippage, seepage.	Severe: hard to pack, thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
70*:						
Neldore, south	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Too arid, slope.
71*:						
Nobe	Slight	Severe: excess salt, excess sodium.	Deep to water	Droughty, slow intake, percs slowly.	Erodes easily, percs slowly.	Excess sodium, excess salt, erodes easily.
Absher	Slight	Severe: excess sodium, excess salt.	Deep to water	Droughty, slow intake, percs slowly.	Erodes easily, percs slowly.	Excess salt, excess sodium.
72*:						
Pinebreaks	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, droughty, slow intake.	Slope, depth to rock.	Slope, droughty.
Neldore	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock.	Too arid, slope.
73*. Riverwash						
74*. Rock outcrop						
75--Tanna	Severe: seepage.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Depth to rock, erodes easily.	Depth to rock, erodes easily.
76*:						
Tanna	Severe: seepage.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Depth to rock, erodes easily.	Depth to rock, erodes easily.
Weingart	Severe: seepage.	Severe: excess sodium.	Deep to water	Slope, percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, excess sodium, depth to rock.
77--Teigen	Moderate: slope.	Moderate: hard to pack.	Deep to water	Slope, percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
78--Twilight	Severe: seepage.	Severe: thin layer, piping.	Deep to water	Soil blowing, depth to rock, slope.	Depth to rock, soil blowing.	Depth to rock.
79*:						
Twilight	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Blackhall	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
80*:						
Twilight	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water	Soil blowing, depth to rock, slope.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Blackhall	Severe: seepage, slope.	Severe: thin layer, piping.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Rock outcrop.						
81, 82, 83. Ustic Torriorthents						
84---------- Vaeda	Moderate: slope.	Moderate: hard to pack, excess salt.	Deep to water	Slope, slow intake, percs slowly.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
85---------- Vanda	Slight	Severe: hard to pack, excess salt.	Deep to water	Droughty, slow intake, percs slowly.	Erodes easily, percs slowly.	Erodes easily, excess salt.
86*:						
Vanda	Slight	Severe: hard to pack, excess salt.	Deep to water	Droughty, slow intake, percs slowly.	Erodes easily, percs slowly.	Erodes easily, excess salt.
Harlem	Slight	Moderate: thin layer, hard to pack.	Deep to water	Slow intake, percs slowly, flooding.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Marvan	Slight	Severe: hard to pack.	Deep to water	Slow intake, percs slowly, erodes easily.	Erodes easily, percs slowly.	Erodes easily, percs slowly.
87---------- Verson	Severe: seepage.	Severe: seepage.	Deep to water	Percs slowly, droughty.	Erodes easily	Droughty, erodes easily, percs slowly.
88---------- Volborg	Severe: slope, seepage, slippage.	Severe: thin layer.	Deep to water	Slope, slow intake, soil blowing.	Slope, depth to rock, soil blowing.	Depth to rock, slope.
89*:						
Volborg	Severe: slope, seepage, slippage.	Severe: thin layer.	Deep to water	Slope, slow intake, soil blowing.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Volborg, eroded	Severe: slope, seepage, slippage.	Severe: thin layer.	Deep to water	Slope, slow intake, soil blowing.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Julin	Severe: slope, slippage, seepage.	Moderate: thin layer, hard to pack.	Deep to water	Slope, slow intake, percs slowly.	Slope, depth to rock, percs slowly.	Slope, depth to rock, percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
90*:						
Volborg	Severe: slope, seepage, slippage.	Severe: thin layer.	Deep to water	Slope, slow intake, soil blowing.	Slope, depth to rock, soil blowing.	Slope, depth to rock.
Rock outcrop.						
Julin	Severe: seepage.	Moderate: thin layer, hard to pack.	Deep to water	Slope, percs slowly, depth to rock.	Depth to rock, percs slowly.	Depth to rock, percs slowly.
91--- Weingart	Severe: seepage.	Severe: excess sodium.	Deep to water	Slope, percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, excess sodium, depth to rock.
92*:						
Weingart	Severe: seepage.	Severe: excess sodium.	Deep to water	Slope, percs slowly, depth to rock.	Depth to rock, erodes easily.	Depth to rock, excess sodium, erodes easily.
Warhorse	Severe: seepage.	Severe: thin layer.	Deep to water	Slope, percs slowly, droughty.	Depth to rock	Depth to rock, droughty.
93--- Yamac	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
94--- Yamac	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
95--- Yamac	Moderate: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily	Erodes easily.
96--- Yamac	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Erodes easily	Erodes easily.
97*:						
Yamac	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
Busby	Severe: seepage.	Severe: piping.	Deep to water	Slope, soil blowing.	Soil blowing	Favorable.
98*:						
Yamac	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
Delpoint	Moderate: seepage, slope.	Severe: piping, thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
99--- Yawdim	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slope, droughty, slow intake.	Slope, depth to rock.	Slope, droughty, depth to rock.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
100*:						
Yawdim	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slope, droughty, slow intake.	Slope, depth to rock.	Slope, droughty, depth to rock.
Crago	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope	Droughty, slope.
101*, 102*:						
Yawdim	Severe: slippage, seepage, slope.	Severe: thin layer.	Deep to water	Slope, droughty, slow intake.	Slope, depth to rock.	Slope, droughty, depth to rock.
Orinoco	Severe: slope, slippage, seepage.	Moderate: thin layer, excess salt.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Depth to rock, slope, erodes easily.
103--Zatoville	Severe: seepage.	Severe: excess salt, excess sodium.	Deep to water	Slope, percs slowly, erodes easily.	Erodes easily, percs slowly.	Excess sodium, erodes easily, percs slowly.
104*:						
Zatoville	Severe: seepage.	Severe: excess salt, excess sodium.	Deep to water	Slope, percs slowly, erodes easily.	Erodes easily, percs slowly.	Excess sodium, erodes easily, percs slowly.
Orinoco	Severe: seepage.	Moderate: thin layer, excess salt.	Deep to water	Slope, percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
1----------	0-2	Silty clay-------	CL, CH	A-7	0	95-100	90-100	80-100	75-95	40-60	20-35
Abor	2-32	Silty clay, clay, silty clay loam.	CL, CH	A-6, A-7	0	80-100	75-100	65-100	60-95	35-65	20-45
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
2*:											
Abor----------	0-2	Silty clay-------	CL, CH	A-7	0	95-100	90-100	80-100	75-95	40-60	20-35
	2-32	Silty clay, clay, silty clay loam.	CL, CH	A-6, A-7	0	80-100	75-100	65-100	60-95	35-65	20-45
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Neldore---------	0-2	Silty clay-------	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	2-9	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	70-95	65-90	40-60	20-40
	9-17	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
3, 4----------	0-8	Clay loam--------	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	65-85	60-80	25-40	5-15
Amherst	8-12	Gravelly clay, gravelly clay loam, channery clay.	CL, CH, SC, GC	A-6, A-7	0-10	60-85	55-80	50-70	45-65	35-55	15-30
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
5*:											
Amherst---------	0-8	Clay loam--------	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	65-85	60-80	25-40	5-15
	8-12	Gravelly clay, gravelly clay loam, channery clay.	CL, CH, SC, GC	A-6, A-7	0-10	60-85	55-80	50-70	45-65	35-55	15-30
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Delplain--------	0-3	Channery clay loam.	GC, SC, CL	A-6	0-10	55-80	50-70	40-60	35-55	30-40	10-20
	3-12	Very channery clay loam, very channery clay, extremely channery clay loam.	GC, GP-GC	A-2	0-10	20-55	10-45	5-40	5-30	35-50	15-25
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
6----------	0-3	Loam----------	ML, CL-ML	A-4	0-5	85-100	80-100	70-90	55-75	20-30	NP-10
Attewan	3-12	Clay loam, sandy clay loam, gravelly loam.	CL, SC	A-6	0-5	75-100	70-100	55-85	35-70	30-40	10-20
	12-30	Clay loam, gravelly loam, sandy clay loam.	CL, SC, GC	A-6	0-5	70-100	75-100	50-85	35-65	30-40	10-20
	30-60	Very gravelly loamy sand, extremely gravelly loamy sand, very gravelly sand.	GP, GP-GM, GM, SM	A-1	0-15	25-55	15-50	5-20	0-15	---	NP
7*. Badland											
8*:											
Bascovy----------	0-2	Silty clay-------	CH, CL	A-7	0	90-100	75-100	70-95	60-95	40-60	20-35
	2-10	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	10-20	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	20-34	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Neldore----------	0-2	Silty clay-------	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	2-9	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	70-95	65-90	40-60	20-40
	9-17	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
9*:											
Bascovy----------	0-2	Silty clay-------	CH, CL	A-7	0	90-100	75-100	70-95	60-95	40-60	20-35
	2-10	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	10-20	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	20-34	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Neldore----------	0-2	Silty clay-------	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	2-13	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	70-95	65-90	40-60	20-40
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Neldore, moist--	0-2	Silty clay-------	CL, CH	A-7	0-10	95-100	90-100	80-100	75-95	40-55	20-30
	2-15	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	75-100	70-95	40-60	20-40
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
10*:											
Blackhall-------	0-2	Fine sandy loam	SM, ML	A-4	0-5	90-100	85-100	60-85	35-55	15-25	NP-5
	2-13	Fine sandy loam, sandy loam, very fine sandy loam.	SM	A-4	0-5	90-100	85-100	60-80	35-50	15-25	NP-5
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
10*:											
Twilight	0-3	Sandy loam	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	3-11	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	11-29	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	29	Weathered bedrock	---	---	---	---	---	---	---	---	---
11	0-3	Fine sandy loam	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
Busby	3-14	Fine sandy loam, sandy loam, loam.	SM, ML	A-4	0	100	100	60-90	35-75	20-25	NP-5
	14-60	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
12*:											
Busby	0-3	Fine sandy loam	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
	3-14	Fine sandy loam, sandy loam, loam.	SM, ML	A-4	0	100	100	60-90	35-75	20-25	NP-5
	14-60	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
Blackhall	0-2	Fine sandy loam	SM, ML	A-4	0-5	90-100	85-100	60-85	35-55	15-25	NP-5
	2-13	Fine sandy loam, sandy loam, very fine sandy loam.	SM	A-4	0-5	90-100	85-100	60-80	35-50	15-25	NP-5
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
13*:											
Busby	0-3	Fine sandy loam	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
	3-14	Fine sandy loam, sandy loam, loam.	SM, ML	A-4	0	100	100	60-90	35-75	20-25	NP-5
	14-60	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
Twilight	0-3	Sandy loam	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	3-11	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	11-29	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	29	Weathered bedrock	---	---	---	---	---	---	---	---	---
14	0-3	Loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
Cabbart	3-17	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
15*:											
Cabbart	0-3	Loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	3-15	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
15*:											
Crago	0-6	Gravelly loam	GM-GC, GM, CL-ML, SC-SM	A-4	0-10	60-75	55-70	50-65	35-55	20-30	NP-10
	6-18	Gravelly loam, gravelly clay loam, very gravelly clay loam.	GC, GM-GC	A-2, A-4, A-6	0-15	40-65	35-60	30-55	20-45	25-35	5-15
	18-60	Extremely gravelly loamy sand, extremely gravelly sandy loam, very gravelly sandy loam.	GP, GP-GM, GM	A-1	0-15	30-50	15-35	5-20	0-15	15-25	NP-5
Delpoint	0-3	Loam	CL-ML	A-4	0	95-100	90-100	75-90	55-75	20-30	5-10
	3-12	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	12-28	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
16*:											
Cabbart	0-3	Loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	3-17	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Delpoint	0-3	Loam	CL-ML	A-4	0	95-100	90-100	75-90	55-75	20-30	5-10
	3-12	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	12-28	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
17*:											
Cabbart	0-3	Loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	3-13	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Delpoint	0-3	Loam	CL-ML	A-4	0	95-100	90-100	75-90	55-75	20-30	5-10
	3-12	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	12-28	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cabbart, moist	0-3	Loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	3-13	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	13	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
18*:											
Cabbart	0-3	Loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	3-15	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Delpoint	0-3	Loam	CL-ML	A-4	0	95-100	90-100	75-90	55-75	20-30	5-10
	3-11	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	11-28	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
19*:											
Cabbart	0-3	Loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	3-15	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Blackhall	0-2	Sandy loam	SM	A-4, A-2	0-5	90-100	85-100	50-70	25-40	15-25	NP-5
	2-13	Fine sandy loam, sandy loam, very fine sandy loam.	SM	A-4	0-5	90-100	85-100	60-80	35-50	15-25	NP-5
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
20*:											
Cabbart	0-3	Loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	3-15	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Yawdim	0-2	Silty clay	CL, CH	A-7	0	100	100	95-100	80-95	40-55	20-35
	2-16	Silty clay loam, clay loam, clay.	CL, CH	A-7	0	100	100	90-100	70-95	40-60	15-35
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
Delpoint	0-3	Loam	CL-ML	A-4	0	95-100	90-100	75-90	55-75	20-30	5-10
	3-11	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	11-28	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
21*:											
Cabbart	0-3	Loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	3-15	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
21*:											
Yawdim	0-2	Silty clay	CL, CH	A-7	0	100	100	95-100	80-95	40-55	20-35
	2-16	Silty clay loam, clay loam, clay.	CL, CH	A-7	0	100	100	90-100	70-95	40-60	15-35
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
Rock outcrop.											
22*:											
Cabbart, high precipitation	0-3	Fine sandy loam	ML, SM	A-4, A-2	0	95-100	85-100	70-90	30-55	15-25	NP-5
	3-16	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
Cabbart, moist	0-4	Loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	4-16	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
23*:											
Cabbart	0-2	Loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	2-12	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	12	Weathered bedrock	---	---	---	---	---	---	---	---	---
Blackhall	0-2	Fine sandy loam	SM, ML	A-4	0-5	90-100	85-100	60-85	35-55	15-25	NP-5
	2-13	Fine sandy loam, sandy loam, very fine sandy loam.	SM	A-4	0-5	90-100	85-100	60-80	35-50	15-25	NP-5
	13	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Delpoint	0-3	Loam	CL-ML	A-4	0	95-100	90-100	75-90	55-75	20-30	5-10
	3-12	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	12-28	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
24 Chinook	0-4	Fine sandy loam	SM	A-4, A-2	0	80-100	75-100	65-85	30-50	15-25	NP-5
	4-60	Fine sandy loam, sandy loam.	SM	A-4, A-2	0	80-100	75-100	55-85	30-50	15-25	NP-5
25, 26 Crago	0-6	Gravelly loam	GM-GC, GM, CL-ML, SC-SM	A-4	0-10	60-75	55-70	50-65	35-55	20-30	NP-10
	6-18	Gravelly loam, gravelly clay loam, very gravelly clay loam.	GC, GM-GC	A-2, A-4, A-6	0-15	40-65	35-60	30-55	20-45	25-35	5-15
	18-60	Extremely gravelly loamy sand, extremely gravelly sandy loam, very gravelly sandy loam.	GP, GP-GM, GM	A-1	0-15	30-50	15-35	5-20	0-15	15-25	NP-5

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
27*:											
Crago	0-7	Loam	CL-ML	A-4	0-5	85-100	80-100	70-95	50-75	20-30	5-10
	7-19	Extremely gravelly loam, very gravelly sandy loam, very gravelly clay loam.	GM, GM-GC, GP-GM	A-1, A-2	0-15	25-45	15-35	10-25	5-20	20-30	NP-10
	19-60	Extremely gravelly loamy sand, extremely gravelly sandy loam, very gravelly sandy loam.	GP, GP-GM, GM	A-1	0-15	30-50	15-35	5-20	0-15	15-25	NP-5
Musselshell	0-4	Loam	CL-ML	A-4	0-10	90-100	85-100	60-80	55-75	25-30	5-10
	4-13	Loam, gravelly loam.	CL-ML, GM-GC, SM-SC	A-4	0-10	60-100	85-100	50-80	40-75	25-30	5-10
	13-25	Gravelly loam, loam.	CL-ML, GM, GM-GC, ML	A-4	0-15	65-100	85-100	45-80	40-70	15-25	NP-10
	25-60	Very gravelly sandy loam, very gravelly fine sandy loam, very gravelly loam.	GM-GC, GM	A-2, A-1	10-15	40-60	30-55	25-45	10-30	15-25	NP-10
Crago	0-6	Gravelly loam	GM-GC, GM, CL-ML, SC-SM	A-4	0-10	60-75	55-70	50-65	35-55	20-30	NP-10
	6-18	Gravelly loam, gravelly clay loam, very gravelly clay loam.	GC, GM-GC	A-2, A-4, A-6	0-15	40-65	35-60	30-55	20-45	25-35	5-15
	18-60	Extremely gravelly loamy sand, extremely gravelly sandy loam, very gravelly sandy loam.	GP, GP-GM, GM, GM-GC	A-1	0-15	30-50	15-35	5-20	0-15	15-25	NP-5
28*:											
Crago	0-6	Gravelly loam	GM-GC, GM, CL-ML, SC-SM	A-4	0-10	60-75	55-70	50-65	35-55	20-30	NP-10
	6-18	Gravelly loam, gravelly clay loam, very gravelly clay loam.	GC, GM-GC	A-2, A-4, A-6	0-15	40-65	35-60	30-55	20-45	25-35	5-15
	18-60	Extremely gravelly loamy sand, extremely gravelly sandy loam, very gravelly sandy loam.	GP, GP-GM, GM	A-1	0-15	30-50	15-35	5-20	0-15	15-25	NP-5

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
28*:											
Musselshell-----	0-4	Loam----------	CL-ML	A-4	0-10	90-100	85-100	60-80	55-75	25-30	5-10
	4-13	Loam, gravelly loam.	CL-ML, GM-GC, SM-SC	A-4	0-10	60-100	85-100	50-80	40-75	25-30	5-10
	13-25	Gravelly loam, loam.	CL-ML, GM, GM-GC, ML	A-4	0-15	65-100	85-100	45-80	40-70	15-25	NP-10
	25-60	Very gravelly sandy loam, very gravelly fine sandy loam, very gravelly loam.	GM-GC, GM	A-2, A-1	10-15	40-60	30-55	25-45	10-30	15-25	NP-10
Attewan---------	0-3	Loam----------	ML, CL-ML	A-4	0-5	85-100	80-100	70-90	55-75	20-30	NP-10
	3-12	Clay loam, sandy clay loam, gravelly loam.	CL, SC	A-6	0-5	75-100	70-100	55-85	35-70	30-40	10-20
	12-30	Clay loam, gravelly loam, sandy clay loam.	CL, SC, GC	A-6	0-5	70-100	65-100	50-85	35-65	30-40	10-20
	30-60	Very gravelly loamy sand, extremely gravelly loamy sand, very gravelly sand.	GP, GP-GM, GM, SM	A-1	0-15	25-55	15-50	5-20	0-15	---	NP
29*:											
Creed-----------	0-6	Loam----------	CL-ML, SC-SM	A-4	0	90-100	75-100	65-95	45-75	20-30	5-10
	6-20	Silty clay, clay, silty clay loam.	CL, CH	A-6, A-7	0	90-100	75-100	70-100	60-95	35-60	15-35
	20-31	Silty clay loam, clay loam, clay.	CL, SC	A-6, A-7	0	90-100	75-100	60-100	35-90	30-50	15-25
	31-60	Stratified loam to silty clay loam.	CL	A-6, A-7	0	90-100	75-100	65-100	50-90	30-45	10-20
Gerdrum---------	0-6	Clay loam--------	CL	A-6	0	80-100	75-100	65-95	60-90	25-40	10-20
	6-15	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	90-100	90-100	85-100	75-95	40-60	20-40
	15-60	Clay loam, sandy clay loam, clay.	CL, SC, CH	A-6, A-7	0	90-100	90-100	80-95	45-75	35-55	15-35
30----------	0-3	Loam----------	CL-ML	A-4	0	95-100	90-100	75-90	55-75	20-30	5-10
Delpoint	3-12	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	12-30	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
31*:											
Delpoint--------	0-3	Loam----------	CL-ML	A-4	0	95-100	90-100	75-90	55-75	20-30	5-10
	3-12	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	12-30	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
31*:											
Cabbart	0-3	Loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	3-17	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
32*:											
Delpoint	0-3	Loam	CL-ML	A-4	0	95-100	90-100	75-90	55-75	20-30	5-10
	3-12	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	12-28	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cabbart	0-3	Loam	CL-ML	A-4	0	90-100	85-100	65-85	55-75	25-30	5-10
	3-16	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	90-100	85-100	60-90	55-85	25-35	5-15
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Yamac	0-3	Loam	CL-ML	A-4	0-5	85-100	80-100	60-85	55-75	25-30	5-10
	3-12	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	65-90	60-80	25-35	5-15
	12-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	60-85	55-75	25-35	5-15
33, 34	0-4	Clay loam	CL	A-6	0	100	95-100	85-100	70-80	25-40	10-20
Ethridge	4-27	Silty clay, silty clay loam, clay.	CL	A-7	0	100	95-100	95-100	90-95	40-50	20-30
	27-60	Silty clay loam, clay loam, silt loam.	CL	A-6, A-7	0	100	95-100	90-100	85-95	30-50	10-25
35, 36	0-4	Loam	CL, CL-ML	A-4, A-6	0-5	85-100	95-100	85-90	65-70	25-35	5-15
Evanston	4-16	Clay loam, loam, silty clay loam.	CL	A-6	0-5	85-100	95-100	85-100	65-85	25-35	10-15
	16-60	Loam, clay loam, fine sandy loam.	CL	A-6	0-5	85-100	95-100	70-90	50-75	25-35	10-15
37*:											
Evanston	0-4	Loam	CL, CL-ML	A-4, A-6	0-5	85-100	95-100	85-90	65-70	25-35	5-15
	4-16	Clay loam, loam, silty clay loam.	CL	A-6	0-5	85-100	95-100	85-100	65-85	25-35	10-15
	16-60	Loam, clay loam, fine sandy loam.	CL	A-6	0-5	85-100	95-100	70-90	50-75	25-35	10-15
Attewan	0-3	Loam	ML, CL-ML	A-4	0-5	85-100	80-100	70-90	55-75	20-30	NP-10
	3-12	Clay loam, sandy clay loam, gravelly loam.	CL, SC	A-6	0-5	75-100	70-100	55-85	35-70	30-40	10-20
	12-30	Clay loam, gravelly loam, sandy clay loam.	CL, SC, GC	A-6	0-5	70-100	75-100	50-85	35-65	30-40	10-20
	30-60	Very gravelly loamy sand, extremely gravelly loamy sand, very gravelly sand.	GP, GP-GM, GM, SM	A-1	0-15	25-55	15-50	5-20	0-15	---	NP

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
38*:											
Gerdrum	0-5	Clay	CL, CH	A-7	0	90-100	90-100	85-100	75-95	40-55	15-30
	5-15	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	90-100	90-100	85-100	75-95	40-60	20-40
	15-60	Clay loam, sandy clay loam, clay.	CL, SC, CH	A-6, A-7	0	90-100	90-100	80-95	45-75	35-55	15-35
Bascovy	0-2	Clay	CH, CL	A-7	0	90-100	75-100	70-95	60-95	40-60	20-35
	2-10	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	10-20	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	20-34	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
39*:											
Gerdrum	0-6	Clay loam	CL	A-6	0	80-100	75-100	65-95	60-90	25-40	10-20
	6-15	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	90-100	90-100	85-100	75-95	40-60	20-40
	15-60	Clay loam, sandy clay loam, clay.	CL, SC, CH	A-6, A-7	0	90-100	90-100	80-95	45-75	35-55	15-35
Creed	0-7	Loam	CL-ML, SC-SM	A-4	0	90-100	75-100	65-95	45-75	20-30	5-10
	7-20	Silty clay, clay, silty clay loam.	CL, CH	A-6, A-7	0	90-100	75-100	70-100	60-95	35-60	15-35
	20-31	Silty clay loam, clay loam, clay.	CL, SC	A-6, A-7	0	90-100	75-100	60-100	35-90	30-50	15-25
	31-60	Stratified loam to silty clay loam.	CL	A-6, A-7	0	90-100	75-100	65-100	50-90	30-45	10-20
40*:											
Gerdrum	0-6	Clay loam	CL	A-6	0	80-100	75-100	65-95	60-90	25-40	10-20
	6-15	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	90-100	90-100	85-100	75-95	40-60	20-40
	15-60	Clay loam, sandy clay loam, clay.	CL, SC, CH	A-6, A-7	0	90-100	90-100	80-95	45-75	35-55	15-35
Vanda	0-7	Silty clay	CL, CH	A-7	0	100	100	95-100	75-95	40-65	20-45
	7-60	Clay, silty clay, silty clay loam.	CL, CH	A-7, A-6	0	100	100	95-100	80-95	35-65	15-45
41*:											
Gerdrum	0-6	Clay loam	CL	A-6	0	80-100	75-100	65-95	60-90	25-40	10-20
	6-15	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	90-100	90-100	85-100	75-95	40-60	20-40
	15-60	Clay loam, sandy clay loam, clay.	CL, SC, CH	A-6, A-7	0	90-100	90-100	80-95	45-75	35-55	15-35
Vanda	0-7	Silty clay	CL, CH	A-7	0	100	100	95-100	75-95	40-65	20-45
	7-60	Clay, silty clay, silty clay loam.	CL, CH	A-7, A-6	0	100	100	95-100	80-95	35-65	15-45

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
41*:											
Creed	0-6	Loam	CL-ML, SC-SM	A-4	0	90-100	75-100	65-95	45-75	20-30	5-10
	6-20	Silty clay, clay, silty clay loam.	CL, CH	A-6, A-7	0	90-100	75-100	70-100	60-95	35-60	15-35
	20-31	Silty clay loam, clay loam, clay.	CL, SC	A-6, A-7	0	90-100	75-100	60-100	35-90	30-50	15-25
	31-60	Stratified loam to silty clay loam.	CL	A-6, A-7	0	90-100	75-100	65-100	50-90	30-45	10-20
42	0-3	Silty clay	CL, CH	A-7	0	100	100	90-100	75-90	40-65	20-40
Harlem	3-60	Stratified clay to silt loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-70	15-45
43	0-3	Silty clay	CH, CL	A-7	0	100	100	90-100	75-95	40-65	20-40
Harlem	3-60	Stratified clay to silt loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-65	20-40
44	0-10	Silty clay	CL, CH	A-7	0	100	100	90-100	80-95	40-65	20-40
Harlem	10-60	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	100	90-100	80-95	40-65	20-40
45*:											
Harlem	0-3	Silty clay	CL, CH	A-7	0	100	100	90-100	75-90	40-65	20-40
	3-60	Stratified clay to silt loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-70	15-45
Havre	0-6	Loam	CL-ML	A-4	0	100	100	80-95	60-90	20-30	5-10
	6-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	80-95	60-80	20-35	5-15
46*:											
Harlem	0-3	Silty clay	CH, CL	A-7	0	100	100	90-100	75-95	40-65	20-40
	3-60	Stratified clay to silt loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-65	20-40
Havre	0-6	Loam	ML, CL-ML	A-4	0	100	100	80-95	60-75	20-30	NP-10
	6-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	80-95	50-70	20-35	5-15
47*:											
Harlem	0-10	Silty clay	CL, CH	A-7	0	100	100	90-100	80-95	40-65	20-40
	10-60	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	100	90-100	80-95	40-65	20-40
Havre	0-3	Loam	CL-ML	A-4	0	100	100	85-95	60-75	25-30	5-10
	3-10	Loam, clay loam	CL-ML, CL	A-4, A-6	0	100	100	85-95	60-80	25-40	5-15
	10-60	Loam, clay loam	CL-ML, CL	A-4, A-6	0	100	100	85-95	55-80	25-40	5-15
48	0-6	Loam	CL-ML	A-4	0	100	100	80-95	60-90	20-30	5-10
Havre	6-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	80-95	60-80	20-35	5-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
49----------	0-7	Loam----------	ML, CL-ML	A-4	0	100	100	80-95	60-75	20-30	NP-10
Havre	7-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	80-95	50-70	20-35	5-15
50*:											
Havre----------	0-6	Loam----------	CL-ML	A-4	0	100	100	80-95	60-90	20-30	5-10
	6-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	80-95	60-80	20-35	5-15
Glendive--------	0-4	Fine sandy loam	SM, ML	A-2, A-4	0	100	100	65-85	30-55	15-20	NP-5
	4-45	Loam, silt loam, sandy loam.	ML, CL-ML, SM, SC-SM	A-4	0	100	100	65-95	40-70	15-25	NP-10
	45-60	Stratified loamy fine sand to clay loam.	SM, SC-SM	A-2, A-4	0	95-100	75-100	60-90	25-50	15-25	NP-10
51*:											
Havre----------	0-7	Loam----------	ML, CL-ML	A-4	0	100	100	80-95	60-75	20-30	NP-10
	7-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	80-95	50-70	20-35	5-15
Glendive--------	0-4	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-4, A-2	0	100	100	65-85	30-55	20-30	NP-10
	4-45	Loam, silt loam, sandy loam.	ML, CL-ML, SM, SC-SM	A-4	0	100	100	65-95	40-70	15-30	NP-10
	45-60	Stratified loamy fine sand to silt loam.	SM, SC-SM	A-2, A-4	0	95-100	75-100	60-80	25-50	15-25	NP-10
52*:											
Havre----------	0-6	Loam----------	ML, CL-ML	A-4	0	100	100	80-95	60-75	20-30	NP-10
	6-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	80-95	50-70	20-35	5-15
Harlem----------	0-3	Silty clay-------	CH, CL	A-7	0	100	100	90-100	75-95	40-65	20-40
	3-60	Stratified clay to silt loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-65	20-40
53*:											
Havre----------	0-6	Loam----------	ML, CL-ML	A-4	0	100	100	80-95	60-75	20-30	NP-10
	6-60	Stratified fine sandy loam to clay loam.	CL-ML, CL	A-4, A-6	0	100	100	80-95	50-70	20-35	5-15
Yamac----------	0-3	Loam----------	CL-ML	A-4	0-5	85-100	80-100	60-85	55-75	25-30	5-10
	3-12	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	65-90	60-80	25-35	5-15
	12-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	60-85	55-75	25-35	5-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
54*:											
Kobar	0-5	Silty clay loam	CL	A-7, A-6	0	95-100	90-100	85-100	80-95	30-45	10-20
	5-16	Silty clay loam, silty clay, clay.	CL	A-7, A-6	0	95-100	90-100	85-100	75-95	35-50	15-25
	16-60	Silty clay loam, silty clay, clay.	CL	A-7, A-6	0	95-100	90-100	85-100	75-95	35-50	15-25
Zatoville	0-3	Silty clay loam	CL	A-6	0	100	100	90-100	85-100	30-40	10-20
	3-17	Silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	90-100	85-100	35-45	15-25
	17-23	Silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	90-100	85-100	35-45	15-25
	23-60	Silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	90-100	85-100	35-45	15-25
55, 56	0-6	Loam	CL-ML	A-4	0	95-100	90-100	75-95	50-75	25-30	5-10
Kremlin	6-14	Loam, silt loam, clay loam.	CL-ML, CL	A-4, A-6	0	95-100	90-100	75-95	55-80	25-35	5-15
	14-60	Loam, silt loam, clay loam.	CL-ML, CL	A-4, A-6	0	95-100	90-100	75-95	55-80	25-35	5-15
57	0-2	Silty clay	CL, CH	A-7	0	100	100	95-100	90-95	40-60	20-40
Marias	2-28	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-95	40-70	25-50
	28-60	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-95	40-70	25-50
58	0-6	Fine sandy loam	SM, SC-SM	A-2, A-4	0	100	100	60-75	30-45	20-25	NP-5
Marmarth	6-16	Clay loam, loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0	100	100	90-100	60-80	25-40	5-20
	16-27	Loam, fine sandy loam, clay loam.	CL-ML, CL	A-4, A-6	0	100	100	90-100	60-80	25-35	5-15
	27	Weathered bedrock	---	---	---	---	---	---	---	---	---
59	0-3	Silty clay	CL, CH	A-7	0	100	100	95-100	85-100	40-65	20-45
Marvan	3-35	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-100	45-70	25-50
	35-60	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-100	45-70	25-50
60*:											
Marvan	0-3	Silty clay	CL, CH	A-7	0	100	100	95-100	85-100	40-65	20-45
	3-35	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-100	45-70	25-50
	35-60	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-100	45-70	25-50
Vanda	0-7	Silty clay	CL, CH	A-7	0	100	100	95-100	75-95	40-65	20-45
	7-60	Clay, silty clay, silty clay loam.	CL, CH	A-7, A-6	0	100	100	95-100	80-95	35-65	15-45
61	0-2	Silty clay	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
Neldore	2-9	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	70-95	65-90	40-60	20-40
	9-17	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
62*:											
Neldore	0-2	Silty clay	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	2-9	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	70-95	65-90	40-60	20-40
	9-17	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
62*:											
Abor	0-2	Silty clay	CL, CH	A-7	0	95-100	90-100	80-100	75-95	40-60	20-35
	2-32	Silty clay, clay, silty clay loam.	CL, CH	A-6, A-7	0	80-100	75-100	65-100	60-95	35-65	20-45
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
63*:											
Neldore	0-2	Silty clay	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	2-9	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	70-95	65-90	40-60	20-40
	9-17	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Abor	0-2	Silty clay	CL, CH	A-7	0	95-100	90-100	80-100	75-95	40-60	20-35
	2-24	Silty clay, clay, silty clay loam.	CL, CH	A-6, A-7	0	80-100	75-100	65-100	60-95	35-65	20-45
	24	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
64*:											
Neldore	0-2	Silty clay	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	2-9	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	70-95	65-90	40-60	20-40
	9-17	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bascovy	0-2	Silty clay	CH, CL	A-7	0	90-100	75-100	70-95	60-95	40-60	20-35
	2-10	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	10-20	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	20-34	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
65*:											
Neldore	0-2	Silty clay	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	2-9	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	70-95	65-90	40-60	20-40
	9-17	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Neldore, saline-	0-4	Silty clay	CL, CH	A-7	0	100	100	95-100	85-100	45-65	25-45
	4-18	Silty clay, clay	CL, CH	A-7	0	100	100	95-100	80-95	45-65	25-45
	18	Weathered bedrock	---	---	---	---	---	---	---	---	---
66*:											
Neldore	0-2	Silty clay	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	2-9	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	70-95	65-90	40-60	20-40
	9-15	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
67*:											
Neldore	0-2	Silty clay	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	2-9	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	70-95	65-90	40-60	20-40
	9-17	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Volborg	0-3	Silty clay	CL	A-7	0	100	100	95-100	80-95	40-50	20-30
	3-14	Silty clay, silty clay loam, clay.	CL	A-6, A-7	0	100	100	95-100	85-95	35-50	15-30
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
68*:											
Neldore	0-2	Silty clay	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	2-9	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	70-95	65-90	40-60	20-40
	9-17	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Weingart	0-7	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	65-90	60-85	30-45	10-25
	7-11	Clay, silty clay	CL, CH	A-7	0	90-100	90-100	80-100	75-95	40-65	20-40
	11-18	Clay, silty clay, clay loam.	CL, CH	A-6, A-7	0	90-100	90-100	75-100	70-90	35-60	15-35
	18-29	Shaly clay, silty clay, clay loam.	CL, CH, SC, GC	A-6, A-7	0	60-95	55-90	50-85	45-80	35-60	15-35
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
69*:											
Neldore	0-2	Silty clay	CL, CH	A-7	0-10	95-100	90-100	75-100	70-95	40-55	20-30
	2-9	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	70-95	65-90	40-60	20-40
	9-17	Clay, silty clay	CL, CH	A-7	0-5	85-100	80-100	65-95	60-90	40-60	20-40
	17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Yawdim	0-2	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-90	30-45	10-20
	2-16	Silty clay loam, clay loam, clay.	CL, CH	A-7	0	100	100	90-100	70-95	40-60	15-35
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
70*:											
Neldore, moist	0-2	Silty clay	CL, CH	A-7	0-10	95-100	90-100	80-100	75-95	40-55	20-30
	2-15	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	75-100	70-95	40-60	20-40
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Bascovy	0-2	Silty clay	CH, CL	A-7	0	90-100	75-100	70-95	60-95	40-60	20-35
	2-10	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	10-20	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	20-34	Clay, silty clay	CH	A-7	0	90-100	75-100	70-95	60-95	50-70	25-45
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Neldore, south	0-2	Silty clay	CL, CH	A-7	0-10	95-100	90-100	80-100	75-95	40-55	20-30
	2-15	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	75-100	70-95	40-60	20-40
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
71*:											
Nobe	0-4	Silty clay	CL, CH	A-7	0	100	100	90-100	80-95	40-55	15-30
	4-60	Silty clay, clay, silty clay loam.	CL, CH	A-7	0	100	100	95-100	90-95	40-60	20-35
Absher	0-6	Silty clay	CL, CH	A-7	0	95-100	75-100	70-100	60-95	40-60	20-35
	6-12	Silty clay, clay, clay loam.	CL, CH	A-7	0	95-100	75-100	70-100	60-95	40-60	20-40
	12-60	Clay loam, clay, silty clay.	CL, CH	A-7	0	95-100	75-100	70-100	60-95	40-55	20-35
72*:											
Pinebreaks	0-3	Silty clay	CL, CH	A-7	0	100	100	90-100	75-95	40-55	20-30
	3-8	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-95	40-60	20-40
	8-18	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-95	40-60	20-40
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Neldore	0-2	Silty clay	CL, CH	A-7	0-10	95-100	90-100	80-100	75-95	40-55	20-30
	2-15	Clay, silty clay	CL, CH	A-7	0	90-100	85-100	75-100	70-95	40-60	20-40
	15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
73*. Riverwash											
74*. Rock outcrop											
75 Tanna	0-7	Clay loam	CL	A-6	0-5	90-100	90-100	85-95	70-80	25-40	10-20
	7-32	Clay loam, clay, silty clay loam.	CL	A-6, A-7	0-5	90-100	90-100	80-95	75-90	35-45	15-25
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
76*:											
Tanna	0-7	Loam	CL-ML	A-4	0-5	95-100	90-100	80-95	60-85	20-30	5-10
	7-32	Clay loam, clay, silty clay loam.	CL	A-6, A-7	0-5	90-100	90-100	80-95	75-90	35-45	15-25
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Weingart	0-7	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	65-90	60-85	30-45	10-25
	7-11	Clay, silty clay	CL, CH	A-7	0	90-100	90-100	80-100	75-95	40-65	20-40
	11-18	Clay, silty clay, clay loam.	CL, CH	A-6, A-7	0	90-100	90-100	75-100	70-90	35-60	15-35
	18-29	Shaly clay, silty clay, clay loam.	CL, CH, SC, GC	A-6, A-7	0	60-95	55-90	50-85	45-80	35-60	15-35
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
77 Teigen	0-3	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	85-100	80-95	30-45	10-20
	3-35	Silty clay loam, clay loam, silty clay.	CL, CH	A-6, A-7	0	90-100	90-100	75-95	70-90	30-55	15-35
	35-60	Silty clay loam, clay loam, silty clay.	CL, CH	A-6, A-7	0	90-100	90-100	75-90	60-90	30-55	15-35

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
78----------	0-3	Sandy loam-------	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
Twilight	3-11	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	11-29	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	29	Weathered bedrock	---	---	---	---	---	---	---	---	---
79*:											
Twilight--------	0-3	Sandy loam-------	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	3-11	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	11-29	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	29	Weathered bedrock	---	---	---	---	---	---	---	---	---
Blackhall-------	0-2	Sandy loam-------	SM	A-4, A-2	0-5	90-100	85-100	50-70	25-40	15-25	NP-5
	2-16	Fine sandy loam, sandy loam, very fine sandy loam.	SM	A-4	0-5	90-100	85-100	60-80	35-50	15-25	NP-5
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
80*:											
Twilight--------	0-3	Sandy loam-------	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	3-11	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	11-29	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-90	35-50	20-30	NP-5
	29	Weathered bedrock	---	---	---	---	---	---	---	---	---
Blackhall-------	0-2	Sandy loam-------	SM	A-4, A-2	0-5	90-100	85-100	50-70	25-40	15-25	NP-5
	2-16	Fine sandy loam, sandy loam, very fine sandy loam.	SM	A-4	0-5	90-100	85-100	60-80	35-50	15-25	NP-5
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
81, 82, 83. Ustic Torriorthents											
84----------	0-3	Silty clay-------	CH	A-7	0	95-100	75-100	70-95	65-90	50-60	25-35
Vaeda	3-60	Silty clay, clay, silty clay loam.	CL, CH	A-7	0	95-100	75-100	70-95	55-90	45-65	20-40
85----------	0-7	Silty clay-------	CL, CH	A-7	0	100	100	95-100	75-95	40-65	20-45
Vanda	7-60	Clay, silty clay, silty clay loam.	CL, CH	A-7, A-6	0	100	100	95-100	80-95	35-65	15-45
86*:											
Vanda----------	0-7	Silty clay-------	CL, CH	A-7	0	100	100	95-100	75-95	40-65	20-45
	7-60	Clay, silty clay, silty clay loam.	CL, CH	A-7, A-6	0	100	100	95-100	80-95	35-65	15-45
Harlem----------	0-3	Silty clay-------	CH, CL	A-7	0	100	100	90-100	75-95	40-65	20-40
	3-60	Stratified clay to silt loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-65	20-40

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>3 inches	4	10	40	200		
	In				Pct					Pct	
86*:											
Marvan	0-3	Silty clay	CL, CH	A-7	0	100	100	95-100	85-100	40-65	20-45
	3-35	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-100	45-70	25-50
	35-60	Clay, silty clay	CL, CH	A-7	0	100	100	90-100	75-100	45-70	25-50
87	0-5	Clay loam	CL, CL-ML	A-4, A-6	0-5	85-100	85-100	60-90	50-75	25-40	5-15
Verson	5-12	Silty clay loam, clay loam, clay.	CL, CH	A-6, A-7	0-5	90-100	85-100	70-95	65-90	35-55	15-30
	12-28	Silty clay loam, clay, gravelly clay loam.	CL	A-6, A-7	0-10	80-95	70-95	60-90	55-80	35-50	15-25
	28-60	Very gravelly sandy loam, very gravelly loam, extremely gravelly loam.	GM, GP-GM	A-1	10-15	20-50	15-40	10-30	5-25	20-25	NP-5
88	0-3	Silty clay	CL	A-7	0	100	100	95-100	80-95	40-50	20-30
Volborg	3-18	Silty clay, silty clay loam, clay.	CL	A-6, A-7	0	100	100	95-100	85-95	35-50	15-30
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
89*:											
Volborg	0-3	Silty clay	CL	A-7	0	100	100	95-100	80-95	40-50	20-30
	3-14	Silty clay, silty clay loam, clay.	CL	A-6, A-7	0	100	100	95-100	85-95	35-50	15-30
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Volborg, eroded	0-1	Silty clay	CL	A-7	0	100	100	95-100	80-95	40-50	20-30
	1-11	Silty clay, silty clay loam, clay.	CL	A-6, A-7	0	100	100	95-100	85-95	35-50	15-30
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Julin	0-4	Silty clay	CL, CH	A-7	0	80-100	75-90	65-85	65-85	40-55	20-30
	4-30	Silty clay, clay, shaly silty clay.	CL, CH	A-7	0	70-95	65-90	60-85	55-85	40-60	20-35
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
90*:											
Volborg	0-1	Silty clay	CL	A-7	0	100	100	95-100	80-95	40-50	20-30
	1-11	Silty clay, silty clay loam, clay.	CL	A-6, A-7	0	100	100	95-100	85-95	35-50	15-30
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Julin	0-4	Silty clay	CL, CH	A-7	0	80-100	75-90	65-85	65-85	40-55	20-30
	4-30	Silty clay, clay, shaly silty clay.	CL, CH	A-7	0	70-95	65-90	60-85	55-85	40-60	20-35
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
91----------	0-7	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	65-90	60-85	30-45	10-25
Weingart	7-11	Clay, silty clay	CL, CH	A-7	0	90-100	90-100	80-100	75-95	40-65	20-40
	11-18	Clay, silty clay, clay loam.	CL, CH	A-6, A-7	0	90-100	90-100	75-100	70-90	35-60	15-35
	18-29	Shaly clay, silty clay, clay loam.	CL, CH, SC, GC	A-6, A-7	0	60-95	55-90	50-85	45-80	35-60	15-35
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
92*:											
Weingart--------	0-7	Silty clay loam	CL	A-6, A-7	0	90-100	90-100	65-90	60-85	30-45	10-25
	7-11	Clay, silty clay	CL, CH	A-7	0	90-100	90-100	80-100	75-95	40-65	20-40
	11-18	Clay, silty clay, clay loam.	CL, CH	A-6, A-7	0	90-100	90-100	75-100	70-90	35-60	15-35
	18-29	Shaly clay, silty clay, clay loam.	CL, CH, SC, GC	A-6, A-7	0	60-95	55-90	50-85	45-80	35-60	15-35
	29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Warhorse--------	0-4	Loam----------	CL, CL-ML	A-4, A-6	0-10	90-100	85-100	70-95	50-75	25-35	5-15
	4-11	Clay loam, silty clay loam, silty clay.	CL	A-6, A-7	0	90-100	85-100	75-100	60-95	35-45	15-25
	11-18	Clay loam, silty clay loam, silty clay.	CL	A-6, A-7	0	90-100	85-100	75-100	60-95	30-45	10-25
	18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
93, 94----------	0-3	Loam----------	CL-ML	A-4	0-5	85-100	80-100	60-85	55-75	25-30	5-10
Yamac	3-12	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	65-90	60-80	25-35	5-15
	12-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	60-85	55-75	25-35	5-15
95, 96----------	0-7	Clay loam--------	CL	A-6	0-5	85-100	80-100	65-90	60-80	30-35	10-15
Yamac	7-14	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	65-90	60-80	25-35	5-15
	14-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	60-85	55-75	25-35	5-15
97*:											
Yamac----------	0-3	Loam----------	CL-ML	A-4	0-5	85-100	80-100	60-85	55-75	25-30	5-10
	3-12	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	65-90	60-80	25-35	5-15
	12-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	60-85	55-75	25-35	5-15
Busby----------	0-3	Fine sandy loam	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5
	3-14	Fine sandy loam, sandy loam, loam.	SM, ML	A-4	0	100	100	60-90	35-75	20-25	NP-5
	14-60	Fine sandy loam, sandy loam.	SM	A-4	0	100	100	60-85	35-50	20-25	NP-5

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
98*:											
Yamac	0-3	Loam	CL-ML	A-4	0-5	85-100	80-100	60-85	55-75	25-30	5-10
	3-12	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	65-90	60-80	25-35	5-15
	12-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-5	85-100	80-100	60-85	55-75	25-35	5-15
Delpoint	0-3	Loam	CL-ML	A-4	0	95-100	90-100	75-90	55-75	20-30	5-10
	3-12	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	12-30	Loam, clay loam, silty clay loam.	CL, CL-ML	A-4, A-6	0	95-100	90-100	85-95	65-85	20-40	5-20
	30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
99	0-2	Silty clay	CL, CH	A-7	0	100	100	95-100	80-95	40-55	20-35
Yawdim	2-16	Silty clay loam, clay loam, clay.	CL, CH	A-7	0	100	100	90-100	70-95	40-60	15-35
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
100*:											
Yawdim	0-2	Silty clay	CL, CH	A-7	0	100	100	95-100	80-95	40-55	20-35
	2-16	Silty clay loam, clay loam, clay.	CL, CH	A-7	0	100	100	90-100	70-95	40-60	15-35
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
Crago	0-6	Gravelly loam	GM-GC, GM, CL-ML, SC-SM	A-4	0-10	60-75	55-70	50-65	35-55	20-30	NP-10
	6-18	Gravelly loam, gravelly clay loam, very gravelly clay loam.	GC, GM-GC	A-2, A-4, A-6	0-15	40-65	35-60	30-55	20-45	25-35	5-15
	18-60	Extremely gravelly loamy sand, extremely gravelly sandy loam, very gravelly sandy loam.	GP, GP-GM, GM	A-1	0-15	30-50	15-35	5-20	0-15	15-25	NP-5
101*:											
Yawdim	0-2	Silty clay	CL, CH	A-7	0	100	100	95-100	80-95	40-55	20-35
	2-16	Silty clay loam, clay loam, clay.	CL, CH	A-7	0	100	100	90-100	70-95	40-60	15-35
	16	Weathered bedrock	---	---	---	---	---	---	---	---	---
Orinoco	0-4	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
	4-16	Silty clay loam, silty clay, clay.	CL	A-6, A-7	0	100	100	90-100	85-95	35-45	15-25
	16-34	Silty clay loam, silty clay, clay.	CL	A-6, A-7	0	100	100	90-100	85-95	35-45	15-25
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
102*:											
Yawdim	0-2	Silty clay	CL, CH	A-7	0	100	100	95-100	80-95	40-55	20-35
	2-15	Silty clay loam, clay loam, clay.	CL, CH	A-7	0	100	100	90-100	70-95	40-60	15-35
	15	Weathered bedrock	---	---	---	---	---	---	---	---	---
Orinoco	0-3	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
	3-16	Silty clay loam, silty clay, clay.	CL	A-6, A-7	0	100	100	90-100	85-95	35-45	15-25
	16-28	Silty clay loam, silty clay, clay.	CL	A-6, A-7	0	100	100	90-100	85-95	35-45	15-25
	28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
103 Zatoville	0-3	Silty clay loam	CL	A-6	0	100	100	90-100	85-100	30-40	10-20
	3-12	Silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	90-100	85-100	35-45	15-25
	12-17	Silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	90-100	85-100	35-45	15-25
	17-60	Silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	90-100	85-100	35-45	15-25
104*:											
Zatoville	0-3	Silty clay loam	CL	A-6	0	100	100	90-100	85-100	30-40	10-20
	3-12	Silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	90-100	85-100	35-45	15-25
	12-17	Silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	90-100	85-100	35-45	15-25
	17-60	Silty clay loam, silty clay.	CL	A-6, A-7	0	100	100	90-100	85-100	35-45	15-25
Orinoco	0-4	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	30-40	10-20
	4-16	Silty clay loam, silty clay, clay.	CL	A-6, A-7	0	100	100	90-100	85-95	35-45	15-25
	16-34	Silty clay loam, silty clay, clay.	CL	A-6, A-7	0	100	100	90-100	85-95	35-45	15-25
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
1----------	0-2	40-55	0.2-0.6	0.14-0.18	7.4-8.4	<4	High------	0.37	2	4	1-2
Abor	2-32	35-60	<0.06	0.14-0.16	7.4-8.4	<4	High------	0.37			
	32	---	---	---	---	---	----------	----			
2*:											
Abor----------	0-2	40-55	0.2-0.6	0.14-0.18	7.4-8.4	<4	High------	0.37	2	4	1-2
	2-32	35-60	<0.06	0.14-0.16	7.4-8.4	<4	High------	0.37			
	32	---	---	---	---	---	----------	----			
Neldore---------	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High------	0.32	1	4	1-3
	2-9	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High------	0.32			
	9-17	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High------	0.32			
	17	---	---	---	---	---	----------	----			
3, 4----------	0-8	27-35	0.6-2.0	0.14-0.18	6.6-7.8	<2	Moderate	0.32	1	6	2-4
Amherst	8-12	35-50	0.2-0.6	0.12-0.15	6.6-7.8	<2	High------	0.20			
	12	---	---	---	---	---	----------	----			
5*:											
Amherst---------	0-8	27-35	0.6-2.0	0.14-0.18	6.6-7.8	<2	Moderate	0.32	1	6	2-4
	8-12	35-50	0.2-0.6	0.12-0.15	6.6-7.8	<2	High------	0.20			
	12	---	---	---	---	---	----------	----			
Delplain--------	0-3	27-40	0.6-2.0	0.12-0.14	6.6-7.8	<2	Moderate	0.17	1	6	.5-2
	3-12	35-45	0.2-0.6	0.06-0.07	6.6-7.8	<2	Moderate	0.10			
	12	---	---	---	---	---	----------	----			
6----------	0-3	10-20	0.6-2.0	0.16-0.20	6.1-7.3	<2	Low-------	0.37	3	5	1-3
Attewan	3-12	20-35	0.6-2.0	0.14-0.17	6.6-7.8	<2	Moderate	0.32			
	12-30	15-30	0.6-2.0	0.13-0.15	7.4-8.4	<2	Moderate	0.32			
	30-60	0-10	6.0-20	0.02-0.03	7.4-8.4	<2	Low-------	0.05			
7*.											
Badland											
8*:											
Bascovy---------	0-2	40-60	<0.06	0.14-0.18	6.6-8.4	2-4	High------	0.37	2	4	1-2
	2-10	40-60	<0.06	0.14-0.18	6.1-8.4	2-4	High------	0.37			
	10-20	40-60	<0.06	0.14-0.17	6.1-8.4	2-4	High------	0.37			
	20-34	40-60	<0.06	0.13-0.16	5.1-8.4	2-8	High------	0.37			
	34	---	---	---	---	---	----------	----			
Neldore---------	0-2	40-50	0.06-0.2	0.14-0.18	5.6-7.8	<2	High------	0.32	1	4	1-3
	2-9	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High------	0.32			
	9-17	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High------	0.32			
	17	---	---	---	---	---	----------	----			
9*:											
Bascovy---------	0-2	40-60	<0.06	0.14-0.18	6.6-8.4	2-4	High------	0.37	2	4	1-2
	2-10	40-60	<0.06	0.14-0.18	6.1-8.4	2-4	High------	0.37			
	10-20	40-60	<0.06	0.14-0.17	6.1-8.4	2-4	High------	0.37			
	20-34	40-60	<0.06	0.13-0.16	5.1-8.4	2-8	High------	0.37			
	34	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
9*:											
Neldore	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.32	1	4	1-3
	2-13	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	13	---	---	---	---	---	---	---			
Neldore, moist	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.32	1	4	1-3
	2-15	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	15	---	---	---	---	---	---	---			
10*:											
Blackhall	0-2	5-15	2.0-6.0	0.13-0.16	7.4-8.4	<2	Low	0.20	2	3	1-2
	2-13	5-15	2.0-6.0	0.13-0.16	7.9-8.4	<2	Low	0.20			
	13	---	---	---	---	---	---	---			
Rock outcrop.											
Twilight	0-3	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low	0.20	3	3	1-3
	3-11	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low	0.20			
	11-29	5-18	2.0-6.0	0.12-0.15	7.4-8.4	<4	Low	0.20			
	29	---	---	---	---	---	---	---			
11	0-3	10-18	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low	0.20	5	3	1-2
Busby	3-14	10-18	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low	0.32			
	14-60	10-18	2.0-6.0	0.12-0.15	7.9-8.4	<2	Low	0.20			
12*:											
Busby	0-3	10-18	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low	0.20	5	3	1-2
	3-14	10-18	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low	0.32			
	14-60	10-18	2.0-6.0	0.12-0.15	7.9-8.4	<2	Low	0.20			
Blackhall	0-2	5-15	2.0-6.0	0.13-0.16	7.4-8.4	<2	Low	0.20	2	3	1-2
	2-13	5-15	2.0-6.0	0.13-0.16	7.9-8.4	<2	Low	0.20			
	13	---	---	---	---	---	---	---			
13*:											
Busby	0-3	10-18	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low	0.20	5	3	1-2
	3-14	10-18	2.0-6.0	0.12-0.16	7.4-8.4	<2	Low	0.32			
	14-60	10-18	2.0-6.0	0.12-0.15	7.9-8.4	<2	Low	0.20			
Twilight	0-3	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low	0.20	3	3	1-3
	3-11	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low	0.20			
	11-29	5-18	2.0-6.0	0.12-0.15	7.4-8.4	<4	Low	0.20			
	29	---	---	---	---	---	---	---			
14	0-3	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low	0.37	2	4L	1-2
Cabbart	3-17	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	17	---	---	---	---	---	---	---			
15*:											
Cabbart	0-3	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low	0.37	2	4L	1-2
	3-15	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	---	---			
Crago	0-6	15-27	0.6-2.0	0.10-0.12	7.4-8.4	<2	Low	0.20	3	4L	1-3
	6-18	20-35	0.6-2.0	0.07-0.08	7.4-8.4	<2	Low	0.15			
	18-60	0-20	6.0-20	0.02-0.03	7.4-8.4	<2	Low	0.05			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
15:											
Delpoint--------	0-3	20-27	0.6-2.0	0.16-0.20	6.6-8.4	<4	Low-------	0.37	3	6	1-3
	3-12	18-35	0.6-2.0	0.14-0.18	6.6-8.4	<4	Low-------	0.37			
	12-28	18-35	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
	28	---	---	---	---	---	----------	----			
16*:											
Cabbart---------	0-3	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low-------	0.37	2	4L	1-2
	3-17	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	17	---	---	---	---	---	----------	----			
Delpoint--------	0-3	20-27	0.6-2.0	0.16-0.20	6.6-8.4	<4	Low-------	0.37	3	6	1-3
	3-12	18-35	0.6-2.0	0.14-0.18	6.6-8.4	<4	Low-------	0.37			
	12-28	18-35	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
	28	---	---	---	---	---	----------	----			
17*:											
Cabbart---------	0-3	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low-------	0.37	2	4L	1-2
	3-13	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	13	---	---	---	---	---	----------	----			
Delpoint--------	0-3	20-27	0.6-2.0	0.16-0.20	6.6-8.4	<4	Low-------	0.37	3	6	1-3
	3-12	18-35	0.6-2.0	0.14-0.18	6.6-8.4	<4	Low-------	0.37			
	12-28	18-35	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
	28	---	---	---	---	---	----------	----			
Cabbart, moist--	0-3	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low-------	0.37	2	4L	1-2
	3-13	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	13	---	---	---	---	---	----------	----			
18*:											
Cabbart---------	0-3	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low-------	0.37	2	4L	1-2
	3-15	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	----------	----			
Delpoint--------	0-3	20-27	0.6-2.0	0.16-0.20	6.6-8.4	<4	Low-------	0.37	3	6	1-3
	3-11	18-35	0.6-2.0	0.14-0.18	6.6-8.4	<4	Low-------	0.37			
	11-28	18-35	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
	28	---	---	---	---	---	----------	----			
Rock outcrop.											
19*:											
Cabbart---------	0-3	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low-------	0.37	2	4L	1-2
	3-15	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	----------	----			
Rock outcrop.											
Blackhall-------	0-2	5-15	2.0-6.0	0.12-0.15	7.4-8.4	<2	Low-------	0.20	2	3	1-2
	2-13	5-15	2.0-6.0	0.13-0.16	7.9-8.4	<2	Low-------	0.20			
	13	---	---	---	---	---	----------	----			
20*:											
Cabbart---------	0-3	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low-------	0.37	2	4L	1-2
	3-15	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
20*:											
Yawdim	0-2	40-50	0.06-0.2	0.15-0.18	6.6-7.8	<2	High	0.32	1	4	<1
	2-16	35-50	0.06-0.2	0.15-0.18	7.4-8.4	<2	High	0.32			
	16	---	0.01-0.2	---	---	---	---	---			
Delpoint	0-3	20-27	0.6-2.0	0.16-0.20	6.6-8.4	<4	Low	0.37	3	6	1-3
	3-11	18-35	0.6-2.0	0.14-0.18	6.6-8.4	<4	Low	0.37			
	11-28	18-35	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
	28	---	---	---	---	---	---	---			
21*:											
Cabbart	0-3	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low	0.37	2	4L	1-2
	3-15	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	15	---	---	---	---	---	---	---			
Yawdim	0-2	40-50	0.06-0.2	0.15-0.18	6.6-7.8	<2	High	0.32	1	4	<1
	2-16	35-50	0.06-0.2	0.15-0.18	7.4-8.4	<2	High	0.32			
	16	---	0.01-0.2	---	---	---	---	---			
Rock outcrop.											
22*:											
Cabbart, high precipitation	0-3	10-20	0.6-2.0	0.14-0.18	7.4-8.4	<4	Low	0.37	2	3	1-2
	3-16	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	16	---	---	---	---	---	---	---			
Cabbart, moist	0-4	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low	0.37	2	4L	1-2
	4-16	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	16	---	---	---	---	---	---	---			
23*:											
Cabbart	0-2	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low	0.37	2	4L	1-2
	2-12	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	12	---	---	---	---	---	---	---			
Blackhall	0-2	5-15	2.0-6.0	0.13-0.16	7.4-8.4	<2	Low	0.20	2	3	1-2
	2-13	5-15	2.0-6.0	0.13-0.16	7.9-8.4	<2	Low	0.20			
	13	---	---	---	---	---	---	---			
Delpoint	0-3	20-27	0.6-2.0	0.16-0.20	6.6-8.4	<4	Low	0.37	3	6	1-3
	3-12	18-35	0.6-2.0	0.14-0.18	6.6-8.4	<4	Low	0.37			
	12-28	18-35	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
	28	---	---	---	---	---	---	---			
24	0-4	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low	0.20	5	3	1-2
Chinook	4-60	5-18	2.0-6.0	0.12-0.15	6.6-9.0	<2	Low	0.20			
25, 26	0-6	15-27	0.6-2.0	0.10-0.12	7.4-8.4	<2	Low	0.20	3	4L	1-3
Crago	6-18	20-35	0.6-2.0	0.07-0.08	7.4-8.4	<2	Low	0.15			
	18-60	0-20	6.0-20	0.02-0.03	7.4-8.4	<2	Low	0.05			
27*:											
Crago	0-7	15-27	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low	0.37	3	4L	1-3
	7-19	18-30	0.6-2.0	0.03-0.04	7.4-8.4	<2	Low	0.10			
	19-60	0-20	6.0-20	0.02-0.03	7.4-8.4	<2	Low	0.05			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
27*:											
Musselshell-----	0-4	20-27	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low	0.37	3	4L	1-3
	4-13	10-27	0.6-2.0	0.14-0.18	7.9-9.0	<2	Low	0.20			
	13-25	10-18	0.6-2.0	0.14-0.18	7.9-9.0	<2	Low	0.20			
	25-60	10-18	2.0-6.0	0.06-0.10	7.9-9.0	<2	Low	0.05			
Crago-----------	0-6	15-27	0.6-2.0	0.10-0.12	7.4-8.4	<2	Low	0.20	3	4L	1-3
	6-18	20-35	0.6-2.0	0.07-0.08	7.4-8.4	<2	Low	0.15			
	18-60	0-20	6.0-20	0.02-0.03	7.4-8.4	<2	Low	0.05			
28*:											
Crago-----------	0-6	15-27	0.6-2.0	0.10-0.12	7.4-8.4	<2	Low	0.20	3	4L	1-3
	6-18	20-35	0.6-2.0	0.07-0.08	7.4-8.4	<2	Low	0.15			
	18-60	0-20	6.0-20	0.02-0.03	7.4-8.4	<2	Low	0.05			
Musselshell-----	0-4	20-27	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low	0.37	3	4L	1-3
	4-13	10-27	0.6-2.0	0.14-0.18	7.9-9.0	<2	Low	0.20			
	13-25	10-18	0.6-2.0	0.14-0.18	7.9-9.0	<2	Low	0.20			
	25-60	10-18	2.0-6.0	0.06-0.10	7.9-9.0	<2	Low	0.05			
Attewan---------	0-3	10-20	0.6-2.0	0.16-0.20	6.1-7.3	<2	Low	0.37	3	5	1-3
	3-12	20-35	0.6-2.0	0.14-0.17	6.6-7.8	<2	Moderate	0.32			
	12-30	15-30	0.6-2.0	0.13-0.15	7.4-8.4	<2	Moderate	0.32			
	30-60	0-10	6.0-20	0.02-0.03	7.4-8.4	<2	Low	0.05			
29*:											
Creed-----------	0-6	20-27	0.6-2.0	0.14-0.18	6.1-8.4	<4	Low	0.43	5	6	1-3
	6-20	35-55	0.06-0.2	0.10-0.14	6.6-9.0	4-8	High	0.32			
	20-31	27-45	0.06-0.2	0.08-0.12	7.9-9.0	4-8	Moderate	0.37			
	31-60	25-35	0.06-0.2	0.08-0.12	7.9-9.0	4-16	Moderate	0.37			
Gerdrum---------	0-6	27-40	0.2-0.6	0.14-0.18	6.6-7.8	<2	Moderate	0.43	5	6	1-3
	6-15	35-55	<0.06	0.10-0.13	7.4-9.0	2-8	High	0.37			
	15-60	30-50	<0.06	0.08-0.10	7.9-9.0	8-16	High	0.43			
30----------	0-3	20-27	0.6-2.0	0.16-0.20	6.6-8.4	<4	Low	0.37	3	6	1-3
Delpoint	3-12	18-35	0.6-2.0	0.14-0.18	6.6-8.4	<4	Low	0.37			
	12-30	18-35	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
	30	---	---	---	---	---					
31*:											
Delpoint--------	0-3	20-27	0.6-2.0	0.16-0.20	6.6-8.4	<4	Low	0.37	3	6	1-3
	3-12	18-35	0.6-2.0	0.14-0.18	6.6-8.4	<4	Low	0.37			
	12-30	18-35	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
	30	---	---	---	---	---					
Cabbart---------	0-3	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low	0.37	2	4L	1-2
	3-17	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	17	---	---	---	---	---					
32*:											
Delpoint--------	0-3	20-27	0.6-2.0	0.16-0.20	6.6-8.4	<4	Low	0.37	3	6	1-3
	3-12	18-35	0.6-2.0	0.14-0.18	6.6-8.4	<4	Low	0.37			
	12-28	18-35	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
	28	---	---	---	---	---					
Cabbart---------	0-3	18-27	0.6-2.0	0.17-0.21	7.4-8.4	<4	Low	0.37	2	4L	1-2
	3-16	18-35	0.6-2.0	0.15-0.19	7.4-9.0	2-8	Moderate	0.37			
	16	---	---	---	---	---					

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
32*:											
Yamac	0-3	18-27	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low	0.37	5	6	1-2
	3-12	18-30	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.37			
	12-60	18-30	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
33, 34	0-4	27-35	0.2-0.6	0.14-0.18	6.1-7.8	<2	Moderate	0.37	5	6	1-3
Ethridge	4-27	35-45	0.06-0.2	0.12-0.15	6.6-8.4	<2	High	0.32			
	27-60	25-40	0.06-0.2	0.16-0.20	7.4-9.0	2-4	Moderate	0.37			
35, 36	0-4	20-27	0.6-2.0	0.16-0.20	6.6-7.8	<2	Low	0.37	5	6	1-3
Evanston	4-16	25-35	0.6-2.0	0.14-0.18	7.4-8.4	<2	Moderate	0.37			
	16-60	15-30	0.6-2.0	0.16-0.18	7.9-9.0	<4	Moderate	0.37			
37*:											
Evanston	0-4	20-27	0.6-2.0	0.16-0.20	6.6-7.8	<2	Low	0.37	5	6	1-3
	4-16	25-35	0.6-2.0	0.14-0.18	7.4-8.4	<2	Moderate	0.37			
	16-60	15-30	0.6-2.0	0.16-0.18	7.9-9.0	<4	Moderate	0.37			
Attewan	0-3	10-20	0.6-2.0	0.16-0.20	6.1-7.3	<2	Low	0.37	3	5	1-3
	3-12	20-35	0.6-2.0	0.14-0.17	6.6-7.8	<2	Moderate	0.32			
	12-30	15-30	0.6-2.0	0.13-0.15	7.4-8.4	<2	Moderate	0.32			
	30-60	0-10	6.0-20	0.02-0.03	7.4-8.4	<2	Low	0.05			
38*:											
Gerdrum	0-5	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.37	5	4	1-3
	5-15	35-55	<0.06	0.10-0.13	7.4-9.0	2-8	High	0.37			
	15-60	30-50	<0.06	0.08-0.10	7.9-9.0	8-16	High	0.43			
Bascovy	0-2	40-60	<0.06	0.14-0.18	6.6-8.4	2-4	High	0.37	2	4	1-2
	2-10	40-60	<0.06	0.14-0.18	6.1-7.8	2-4	High	0.37			
	10-20	40-60	<0.06	0.14-0.17	6.1-7.8	2-4	High	0.37			
	20-34	40-60	<0.06	0.13-0.16	5.1-8.4	2-8	High	0.37			
	34	---	---	---	---	---	---	----			
39*:											
Gerdrum	0-6	27-40	0.2-0.6	0.14-0.18	6.6-7.8	<2	Moderate	0.43	5	6	1-3
	6-15	35-55	<0.06	0.10-0.13	7.4-9.0	2-8	High	0.37			
	15-60	30-50	<0.06	0.08-0.10	7.9-9.0	8-16	High	0.43			
Creed	0-7	20-27	0.6-2.0	0.14-0.18	6.1-8.4	<4	Low	0.43	5	6	1-3
	7-20	35-55	0.06-0.2	0.10-0.14	6.6-9.0	4-8	High	0.32			
	20-31	27-45	0.06-0.2	0.08-0.12	7.9-9.0	4-8	Moderate	0.37			
	31-60	25-35	0.06-0.2	0.08-0.12	7.9-9.0	4-16	Moderate	0.37			
40*:											
Gerdrum	0-6	27-40	0.2-0.6	0.14-0.18	6.6-7.8	<2	Moderate	0.43	5	6	1-3
	6-15	35-55	<0.06	0.10-0.13	7.4-9.0	2-8	High	0.37			
	15-60	30-50	<0.06	0.08-0.10	7.9-9.0	8-16	High	0.43			
Vanda	0-7	40-60	<0.06	0.08-0.12	>7.8	>8	High	0.37	5	4	.5-2
	7-60	35-60	<0.06	0.08-0.12	>7.8	>8	High	0.37			
41*:											
Gerdrum	0-6	27-40	0.2-0.6	0.14-0.18	6.6-7.8	<2	Moderate	0.43	5	6	1-3
	6-15	35-55	<0.06	0.10-0.13	7.4-9.0	2-8	High	0.37			
	15-60	30-50	<0.06	0.08-0.10	7.9-9.0	8-16	High	0.43			
Vanda	0-7	40-60	<0.06	0.08-0.12	>7.8	>8	High	0.37	5	4	.5-2
	7-60	35-60	<0.06	0.08-0.12	>7.8	>8	High	0.37			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
41*:											
Creed	0-6	20-27	0.6-2.0	0.14-0.18	6.1-8.4	<4	Low	0.43	5	6	1-3
	6-20	35-55	0.06-0.2	0.10-0.14	6.6-9.0	4-8	High	0.32			
	20-31	27-45	0.06-0.2	0.08-0.12	7.9-9.0	4-8	Moderate	0.37			
	31-60	25-35	0.06-0.2	0.08-0.12	7.9-9.0	4-16	Moderate	0.37			
42	0-3	40-55	0.06-0.2	0.14-0.18	6.6-8.4	<4	High	0.32	5	4	.5-1
Harlem	3-60	35-60	0.06-0.2	0.14-0.18	7.4-8.4	<4	High	0.37			
43	0-3	40-55	0.06-0.2	0.14-0.18	7.4-8.4	2-4	High	0.32	5	4	.5-1
Harlem	3-60	35-55	0.06-0.2	0.14-0.18	7.4-8.4	2-4	High	0.37			
44	0-10	40-55	0.06-0.2	0.12-0.15	7.4-8.4	4-8	High	0.32	5	4	1-3
Harlem	10-60	35-55	0.06-0.2	0.10-0.12	7.4-9.0	8-16	High	0.32			
45*:											
Harlem	0-3	40-55	0.06-0.2	0.14-0.18	6.6-8.4	<4	High	0.32	5	4	.5-1
	3-60	35-60	0.06-0.2	0.14-0.18	7.4-8.4	<4	High	0.37			
Havre	0-6	15-27	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low	0.37	5	5	.5-2
	6-60	18-35	0.6-2.0	0.14-0.18	7.4-9.0	<4	Low	0.28			
46*:											
Harlem	0-3	40-55	0.06-0.2	0.14-0.18	7.4-8.4	2-4	High	0.32	5	4	.5-1
	3-60	35-55	0.06-0.2	0.14-0.18	7.4-8.4	2-4	High	0.37			
Havre	0-6	10-22	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low	0.37	5	5	.5-2
	6-60	18-30	0.6-2.0	0.14-0.18	7.4-8.4	<4	Low	0.28			
47*:											
Harlem	0-10	40-55	0.06-0.2	0.12-0.15	7.4-8.4	4-8	High	0.32	5	4	1-3
	10-60	35-55	0.06-0.2	0.10-0.12	7.4-9.0	8-16	High	0.32			
Havre	0-3	15-27	0.6-2.0	0.15-0.19	7.4-8.4	<4	Low	0.37	5	5	.5-2
	3-10	18-35	0.6-2.0	0.13-0.16	7.4-9.0	4-8	Low	0.37			
	10-60	18-35	0.6-2.0	0.10-0.12	7.4-9.0	8-16	Low	0.37			
48	0-6	15-27	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low	0.37	5	5	.5-2
Havre	6-60	18-35	0.6-2.0	0.14-0.18	7.4-9.0	<4	Low	0.28			
49	0-7	10-22	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low	0.37	5	5	.5-2
Havre	7-60	18-30	0.6-2.0	0.14-0.18	7.4-8.4	<4	Low	0.28			
50*:											
Havre	0-6	15-27	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low	0.37	5	5	.5-2
	6-60	18-35	0.6-2.0	0.14-0.18	7.4-9.0	<4	Low	0.28			
Glendive	0-4	5-15	2.0-6.0	0.13-0.16	6.6-8.4	<4	Low	0.20	5	3	.5-2
	4-45	5-18	2.0-6.0	0.15-0.18	7.4-9.0	<4	Low	0.32			
	45-60	5-18	2.0-6.0	0.12-0.14	7.4-9.0	2-8	Low	0.20			
51*:											
Havre	0-7	10-22	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low	0.37	5	5	.5-2
	7-60	18-30	0.6-2.0	0.14-0.18	7.4-8.4	<4	Low	0.28			
Glendive	0-4	5-15	2.0-6.0	0.10-0.13	6.6-8.4	<4	Low	0.20	5	3	.5-2
	4-45	5-18	2.0-6.0	0.15-0.19	7.4-9.0	<4	Low	0.32			
	45-60	5-18	2.0-6.0	0.10-0.13	7.4-9.0	2-8	Low	0.20			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
52*:											
Havre	0-6	10-22	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low	0.37	5	5	.5-2
	6-60	18-30	0.6-2.0	0.14-0.18	7.4-8.4	<4	Low	0.28			
Harlem	0-3	40-55	0.06-0.2	0.14-0.18	7.4-8.4	2-4	High	0.32	5	4	.5-1
	3-60	35-55	0.06-0.2	0.14-0.18	7.4-8.4	2-4	High	0.37			
53*:											
Havre	0-6	10-22	0.6-2.0	0.16-0.20	7.4-8.4	<2	Low	0.37	5	5	.5-2
	6-60	18-30	0.6-2.0	0.14-0.18	7.4-8.4	<4	Low	0.28			
Yamac	0-3	18-27	0.6-2.0	0.16-0.20	6.6-8.4	<2	Low	0.37	5	6	1-2
	3-12	18-30	0.6-2.0	0.14-0.18	6.6-8.4	<2	Moderate	0.37			
	12-60	18-30	0.6-2.0	0.14-0.18	7.9-9.0	<4	Moderate	0.37			
54*:											
Kobar	0-5	27-40	0.2-0.6	0.16-0.20	6.6-8.4	<2	Moderate	0.37	5	7	1-2
	5-16	35-45	0.06-0.2	0.14-0.18	7.4-8.4	<2	High	0.37			
	16-60	35-45	0.06-0.2	0.14-0.18	7.9-9.0	<4	High	0.37			
Zatoville	0-3	30-40	0.2-0.6	0.16-0.19	7.4-9.0	<2	Moderate	0.37	3	4	1-3
	3-17	33-45	0.06-0.2	0.14-0.17	7.4-9.0	<4	Moderate	0.37			
	17-23	35-45	0.06-0.2	0.12-0.15	7.9-9.0	4-8	Moderate	0.37			
	23-60	35-45	0.06-0.2	0.10-0.13	7.9-9.0	8-16	Moderate	0.37			
55, 56 Kremlin	0-6	18-27	0.6-2.0	0.16-0.20	6.6-7.8	<2	Low	0.37	5	6	1-3
	6-14	18-30	0.6-2.0	0.16-0.20	6.6-7.8	<2	Moderate	0.37			
	14-60	18-30	0.6-2.0	0.16-0.20	7.4-8.4	<2	Moderate	0.37			
57 Marias	0-2	40-60	0.06-0.2	0.14-0.18	7.4-8.4	2-4	High	0.37	5	4	.5-2
	2-28	40-60	<0.06	0.12-0.16	7.9-9.0	2-4	High	0.37			
	28-60	40-60	<0.06	0.12-0.16	7.9-9.0	4-8	High	0.37			
58 Marmarth	0-6	10-18	2.0-6.0	0.13-0.16	6.1-7.3	<2	Low	0.20	3	3	1-3
	6-16	18-35	0.6-2.0	0.14-0.18	6.1-7.8	<2	Moderate	0.32			
	16-27	15-30	0.6-2.0	0.14-0.18	7.4-8.4	<2	Moderate	0.32			
	27	---	---	---	---	---	---	----			
59 Marvan	0-3	40-60	0.06-0.2	0.14-0.18	7.4-8.4	<4	High	0.37	5	4	.5-1
	3-35	45-60	<0.06	0.11-0.13	7.9-9.0	2-8	High	0.37			
	35-60	45-60	<0.06	0.09-0.11	7.9-9.0	8-16	High	0.37			
60*:											
Marvan	0-3	40-60	0.06-0.2	0.14-0.18	7.4-8.4	<4	High	0.37	5	4	.5-1
	3-35	45-60	<0.06	0.11-0.13	7.9-9.0	2-8	High	0.37			
	35-60	45-60	<0.06	0.09-0.11	7.9-9.0	8-16	High	0.37			
Vanda	0-7	40-60	<0.06	0.08-0.12	>7.8	>8	High	0.37	5	4	.5-2
	7-60	35-60	<0.06	0.08-0.12	>7.8	>8	High	0.37			
61 Neldore	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.32	1	4	1-3
	2-9	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	9-17	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	17	---	---	---	---	---	---	----			
62*:											
Neldore	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.32	1	4	1-3
	2-9	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	9-17	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	17	---	---	---	---	---	---	----			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
62*:											
Abor	0-2	40-55	0.2-0.6	0.14-0.18	7.4-8.4	<4	High	0.37	2	4	1-2
	2-32	35-60	<0.06	0.14-0.16	7.4-8.4	<4	High	0.37			
	32	---	---	---	---	---	---	---			
63*:											
Neldore	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.32	1	4	1-3
	2-9	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	9-17	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	17	---	---	---	---	---	---	---			
Abor	0-2	40-55	0.2-0.6	0.14-0.18	7.4-8.4	<4	High	0.37	2	4	1-2
	2-24	35-60	<0.06	0.14-0.16	7.4-8.4	<4	High	0.37			
	24	---	---	---	---	---	---	---			
64*:											
Neldore	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.32	1	4	1-3
	2-9	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	9-17	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	17	---	---	---	---	---	---	---			
Bascovy	0-2	40-60	<0.06	0.14-0.18	6.6-8.4	2-4	High	0.37	2	4	1-2
	2-10	40-60	<0.06	0.14-0.18	6.1-8.4	2-4	High	0.37			
	10-20	40-60	<0.06	0.14-0.17	6.1-8.4	2-4	High	0.37			
	20-34	40-60	<0.06	0.13-0.16	5.1-8.4	2-8	High	0.37			
	34	---	---	---	---	---	---	---			
Rock outcrop.											
65*:											
Neldore	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.32	1	4	1-3
	2-9	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	9-17	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	17	---	---	---	---	---	---	---			
Neldore, saline-	0-4	45-60	0.06-0.2	0.11-0.13	6.6-7.8	<4	High	0.32	1	4	1-2
	4-18	45-60	0.06-0.2	0.10-0.12	7.4-8.4	4-8	High	0.32			
	18	---	---	---	---	---	---	---			
66*:											
Neldore	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.32	1	4	1-3
	2-9	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	9-15	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	15	---	---	---	---	---	---	---			
Rock outcrop.											
67*:											
Neldore	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.32	1	4	1-3
	2-9	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	9-17	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	17	---	---	---	---	---	---	---			
Volborg	0-3	40-50	0.06-0.2	0.14-0.17	4.5-6.5	<4	High	0.32	1	2	1-2
	3-14	35-50	0.06-0.2	0.10-0.12	4.5-5.5	2-8	High	0.32			
	14	---	---	---	---	---	---	---			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
68*:											
Neldore	0-2	40-50	0.06-0.2	0.14-0.18	5.6-7.8	<2	High	0.32	1	4	1-3
	2-9	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	9-17	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	17	---	---	---	---	---	---	---			
Weingart	0-7	27-40	0.06-0.2	0.16-0.19	5.6-7.8	<2	Moderate	0.43	2	5	1-2
	7-11	40-60	<0.06	0.12-0.15	>6.5	2-8	High	0.37			
	11-18	35-55	<0.06	0.09-0.11	>7.8	8-16	High	0.37			
	18-29	35-55	<0.06	0.08-0.10	>7.8	8-16	High	0.37			
	29	---	---	---	---	---	---	---			
69*:											
Neldore	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.32	1	4	1-3
	2-9	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	9-17	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	17	---	---	---	---	---	---	---			
Yawdim	0-2	27-40	0.2-0.6	0.17-0.20	6.6-7.8	<2	Moderate	0.37	1	4	<1
	2-16	35-50	0.06-0.2	0.15-0.18	7.4-8.4	<2	High	0.32			
	16	---	---	---	---	---	---	---			
70*:											
Neldore, moist	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.32	1	4	1-3
	2-15	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	15	---	---	---	---	---	---	---			
Bascovy	0-2	40-60	<0.06	0.14-0.18	6.6-8.4	2-4	High	0.37	2	4	1-2
	2-10	40-60	<0.06	0.14-0.18	6.1-8.4	2-4	High	0.37			
	10-20	40-60	<0.06	0.14-0.17	6.1-8.4	2-4	High	0.37			
	20-34	40-60	<0.06	0.13-0.16	5.1-8.4	2-8	High	0.37			
	34	---	---	---	---	---	---	---			
Neldore, south	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.32	1	4	1-3
	2-15	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	15	---	---	---	---	---	---	---			
71*:											
Nobe	0-4	40-50	<0.06	0.13-0.16	6.6-8.4	4-8	High	0.37	5	4	.5-2
	4-60	35-60	<0.06	0.06-0.07	>7.8	>16	High	0.43			
Absher	0-6	40-55	<0.06	0.10-0.13	6.6-8.4	4-8	High	0.37	5	4	1-2
	6-12	35-60	<0.06	0.08-0.10	6.6-8.4	8-16	High	0.37			
	12-60	35-50	<0.06	0.05-0.07	>7.8	>16	High	0.43			
72*:											
Pinebreaks	0-3	40-50	0.06-0.2	0.14-0.18	5.6-7.8	<2	High	0.32	1	4	1-3
	3-8	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<2	High	0.32			
	8-18	40-60	0.06-0.2	0.06-0.08	4.5-5.5	<2	High	0.32			
	18	---	---	---	---	---	---	---			
Neldore	0-2	40-50	0.06-0.2	0.14-0.18	6.6-7.8	<2	High	0.32	1	4	1-3
	2-15	40-60	0.06-0.2	0.12-0.16	5.6-7.8	<4	High	0.32			
	15	---	---	---	---	---	---	---			
73*.											
Riverwash											
74*.											
Rock outcrop											

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
75----------	0-7	27-35	0.06-0.2	0.14-0.18	6.6-7.8	<2	Moderate	0.37	2	6	2-4
Tanna	7-32	35-45	0.06-0.2	0.14-0.17	6.6-8.4	<4	Moderate	0.37			
	32	---	---	---	---	---	---	---			
76*:											
Tanna----------	0-7	20-27	0.2-0.6	0.16-0.20	6.6-7.8	<2	Low-------	0.43	2	6	2-4
	7-32	35-45	0.06-0.2	0.14-0.17	6.6-8.4	<4	Moderate	0.37			
	32	---	---	---	---	---	---	---			
Weingart--------	0-7	27-40	0.06-0.2	0.16-0.19	5.6-7.8	<2	Moderate	0.43	2	5	1-2
	7-11	40-60	<0.06	0.12-0.15	>6.5	2-8	High------	0.37			
	11-18	35-55	<0.06	0.09-0.11	>7.8	8-16	High------	0.37			
	18-29	35-55	<0.06	0.08-0.10	>7.8	8-16	High------	0.37			
	29	---	---	---	---	---	---	---			
77----------	0-3	30-40	0.2-0.6	0.16-0.18	4.5-6.0	<2	Moderate	0.37	5	4	1-2
Teigen	3-35	35-55	0.06-0.2	0.15-0.18	4.5-6.5	<2	High------	0.37			
	35-60	35-55	0.06-0.2	0.15-0.18	4.5-6.5	<2	High------	0.37			
78----------	0-3	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low-------	0.20	3	3	1-3
Twilight	3-11	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low-------	0.20			
	11-29	5-18	2.0-6.0	0.12-0.15	7.4-8.4	<4	Low-------	0.20			
	29	---	---	---	---	---	---	---			
79*:											
Twilight--------	0-3	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low-------	0.20	3	3	1-3
	3-11	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low-------	0.20			
	11-29	5-18	2.0-6.0	0.12-0.15	7.4-8.4	<4	Low-------	0.20			
	29	---	---	---	---	---	---	---			
Blackhall-------	0-2	5-15	2.0-6.0	0.12-0.15	7.4-8.4	<2	Low-------	0.20	2	3	1-2
	2-16	5-15	2.0-6.0	0.13-0.16	7.9-8.4	<2	Low-------	0.20			
	16	---	---	---	---	---	---	---			
80*:											
Twilight--------	0-3	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low-------	0.20	3	3	1-3
	3-11	5-18	2.0-6.0	0.13-0.16	6.6-7.8	<2	Low-------	0.20			
	11-29	5-18	2.0-6.0	0.12-0.15	7.4-8.4	<4	Low-------	0.20			
	29	---	---	---	---	---	---	---			
Blackhall-------	0-2	5-15	2.0-6.0	0.12-0.15	7.4-8.4	<2	Low-------	0.20	2	3	1-2
	2-16	5-15	2.0-6.0	0.13-0.16	7.9-8.4	<2	Low-------	0.20			
	16	---	---	---	---	---	---	---			
Rock outcrop.											
81, 82, 83. Ustic Torriorthents											
84----------	0-3	40-55	<0.06	0.14-0.17	5.6-7.8	2-4	High------	0.37	5	4	.5-2
Vaeda	3-60	35-60	<0.06	0.09-0.12	5.1-7.8	8-16	High------	0.43			
85----------	0-7	40-60	<0.06	0.08-0.12	>7.8	>8	High------	0.37	5	4	.5-2
Vanda	7-60	35-60	<0.06	0.08-0.12	>7.8	>8	High------	0.37			
86*:											
Vanda----------	0-7	40-60	<0.06	0.08-0.12	>7.8	>8	High------	0.37	5	4	.5-2
	7-60	35-60	<0.06	0.08-0.12	>7.8	>8	High------	0.37			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
86*:											
Harlem	0-3	40-55	0.06-0.2	0.14-0.18	7.4-8.4	2-4	High	0.32	5	4	.5-1
	3-60	35-55	0.06-0.2	0.14-0.18	7.4-8.4	2-4	High	0.37			
Marvan	0-3	40-60	0.06-0.2	0.14-0.18	7.4-8.4	<4	High	0.37	5	4	.5-1
	3-35	45-60	<0.06	0.11-0.13	7.9-9.0	2-8	High	0.37			
	35-60	45-60	<0.06	0.09-0.11	7.9-9.0	8-16	High	0.37			
87	0-5	27-35	0.2-0.6	0.17-0.20	6.1-7.3	<2	Low	0.37	3	6	2-4
Verson	5-12	35-50	0.06-0.2	0.14-0.17	6.1-7.8	<2	Moderate	0.37			
	12-28	35-45	0.06-0.2	0.13-0.16	7.4-8.4	<2	Moderate	0.37			
	28-60	5-15	2.0-6.0	0.05-0.06	7.4-8.4	<2	Low	0.15			
88	0-3	40-50	0.06-0.2	0.14-0.17	4.5-6.5	<4	High	0.32	1	2	1-2
Volborg	3-18	35-50	0.06-0.2	0.10-0.12	4.5-5.5	2-8	High	0.32			
	18	---	---	---	---	---	---	---			
89*:											
Volborg	0-3	40-50	0.06-0.2	0.14-0.17	4.5-6.5	<4	High	0.32	1	2	1-2
	3-14	35-50	0.06-0.2	0.10-0.12	4.5-5.5	2-8	High	0.32			
	14	---	---	---	---	---	---	---			
Volborg, eroded	0-1	40-50	0.06-0.2	0.14-0.17	4.5-6.5	<4	High	0.32	1	2	1-2
	1-11	35-50	0.06-0.2	0.10-0.12	4.5-5.5	2-8	High	0.32			
	11	---	---	---	---	---	---	---			
Julin	0-4	40-50	0.2-0.6	0.14-0.18	3.6-5.5	<2	High	0.32	2	4	.5-2
	4-30	40-55	0.06-0.2	0.12-0.16	3.6-5.5	<2	High	0.32			
	30	---	---	---	---	---	---	---			
90*:											
Volborg	0-1	40-50	0.06-0.2	0.14-0.17	4.5-6.5	<4	High	0.32	1	2	1-2
	1-11	35-50	0.06-0.2	0.10-0.12	4.5-5.5	2-8	High	0.32			
	11	---	---	---	---	---	---	---			
Rock outcrop.											
Julin	0-4	40-50	0.2-0.6	0.14-0.18	3.6-5.5	<2	High	0.32	2	4	.5-2
	4-30	40-55	0.06-0.2	0.12-0.16	3.6-5.5	<2	High	0.32			
	30	---	---	---	---	---	---	---			
91	0-7	27-40	0.06-0.2	0.16-0.19	5.6-7.8	<2	Moderate	0.43	2	5	1-2
Weingart	7-11	40-60	<0.06	0.12-0.15	>6.5	2-8	High	0.37			
	11-18	35-55	<0.06	0.09-0.11	>7.8	8-16	High	0.37			
	18-29	35-55	<0.06	0.08-0.10	>7.8	8-16	High	0.37			
	29	---	---	---	---	---	---	---			
92*:											
Weingart	0-7	27-40	0.06-0.2	0.16-0.19	5.6-7.8	<2	Moderate	0.43	2	5	1-2
	7-11	40-60	<0.06	0.12-0.15	>6.5	2-8	High	0.37			
	11-18	35-55	<0.06	0.09-0.11	>7.8	8-16	High	0.37			
	18-29	35-55	<0.06	0.08-0.10	>7.8	8-16	High	0.37			
	29	---	---	---	---	---	---	---			
Warhorse	0-4	18-27	0.6-2.0	0.16-0.20	6.6-7.8	<2	Low	0.37	1	6	1-3
	4-11	35-45	0.06-0.2	0.15-0.19	6.6-7.8	<2	High	0.32			
	11-18	30-40	0.06-0.2	0.08-0.12	6.6-8.4	<4	High	0.32			
	18	---	---	---	---	---	---	---			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
93, 94---------- Yamac	0-3 3-12 12-60	18-27 18-30 18-30	0.6-2.0 0.6-2.0 0.6-2.0	0.16-0.20 0.14-0.18 0.14-0.18	6.6-8.4 6.6-8.4 7.9-9.0	<2 <2 <4	Low------- Moderate Moderate	0.37 0.37 0.37	5	6	1-2
95, 96---------- Yamac	0-7 7-14 14-60	27-30 18-30 18-30	0.6-2.0 0.6-2.0 0.6-2.0	0.14-0.18 0.14-0.18 0.14-0.18	6.6-8.4 6.6-8.4 7.9-9.0	<2 <2 <4	Moderate Moderate Moderate	0.32 0.37 0.37	5	6	1-2
97*:											
Yamac---------- Busby----------	0-3 3-12 12-60 0-3 3-14 14-60	18-27 18-30 18-30 10-18 10-18 10-18	0.6-2.0 0.6-2.0 0.6-2.0 2.0-6.0 2.0-6.0 2.0-6.0	0.16-0.20 0.14-0.18 0.14-0.18 0.12-0.16 0.12-0.16 0.12-0.15	6.6-8.4 6.6-8.4 7.9-9.0 7.4-8.4 7.4-8.4 7.9-8.4	<2 <2 <4 <2 <2 <2	Low------- Moderate Moderate Low------- Low------- Low-------	0.37 0.37 0.37 0.20 0.32 0.20	5 5 	6 3 	1-2 1-2
98*:											
Yamac---------- Delpoint--------	0-3 3-12 12-60 0-3 3-12 12-30 30	18-27 18-30 18-30 20-27 18-35 18-35 ---	0.6-2.0 0.6-2.0 0.6-2.0 0.6-2.0 0.6-2.0 0.6-2.0 ---	0.16-0.20 0.14-0.18 0.14-0.18 0.16-0.20 0.14-0.18 0.14-0.18 ---	6.6-8.4 6.6-8.4 7.9-9.0 6.6-8.4 6.6-8.4 7.9-9.0 ---	<2 <2 <4 <4 <4 <4 ---	Low------- Moderate Moderate Low------- Low------- Moderate ----------	0.37 0.37 0.37 0.37 0.37 0.37 ----	5 3 	6 6 	1-2 1-3
99---------- Yawdim	0-2 2-16 16	40-50 35-50 ---	0.06-0.2 0.06-0.2 ---	0.15-0.18 0.15-0.18 ---	6.6-7.8 7.4-8.4 ---	<2 <2 ---	High------ High------ ----------	0.32 0.32 ----	1	4	<1
100*:											
Yawdim---------- Crago----------	0-2 2-16 16 0-6 6-18 18-60	40-50 35-50 --- 15-27 20-35 0-20	0.06-0.2 0.06-0.2 --- 0.6-2.0 0.6-2.0 6.0-20	0.15-0.18 0.15-0.18 --- 0.10-0.12 0.07-0.08 0.02-0.03	6.6-7.8 7.4-8.4 --- 7.4-8.4 7.4-8.4 7.4-8.4	<2 <2 --- <2 <2 <2	High------ High------ ---------- Low------- Low------- Low-------	0.32 0.32 ---- 0.20 0.15 0.05	1 3 	4 4L 	<1 1-3
101*:											
Yawdim---------- Orinoco---------	0-2 2-16 16 0-4 4-16 16-34 34	40-50 35-50 --- 30-40 35-45 35-45 ---	0.06-0.2 0.06-0.2 --- 0.2-0.6 0.06-0.2 0.06-0.2 ---	0.15-0.18 0.15-0.18 --- 0.15-0.18 0.12-0.15 0.10-0.12 ---	6.6-7.8 7.4-8.4 --- 7.4-8.4 7.9-8.4 6.6-8.4 ---	<2 <2 --- <2 4-8 8-16 ---	High------ High------ ---------- Moderate Moderate Moderate ----------	0.32 0.32 ---- 0.32 0.37 0.37 ----	1 2 	4 4L 	<1 1-3
102*:											
Yawdim---------- Orinoco---------	0-2 2-15 15 0-3 3-16 16-28 28	40-50 35-50 --- 30-40 35-45 35-45 ---	0.06-0.2 0.06-0.2 --- 0.2-0.6 0.06-0.2 0.06-0.2 ---	0.15-0.18 0.15-0.18 --- 0.15-0.18 0.12-0.15 0.10-0.12 ---	6.6-7.8 7.4-8.4 --- 7.4-8.4 7.9-8.4 6.6-8.4 ---	<2 <2 --- <2 4-8 8-16 ---	High------ High------ ---------- Moderate Moderate Moderate ----------	0.32 0.32 ---- 0.32 0.37 0.37 ----	1 2 	4 4L 	<1 1-3

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	In/hr	In/in	pH	mmhos/cm					Pct
103----------	0-3	30-40	0.2-0.6	0.16-0.19	7.4-9.0	<2	Moderate	0.37	3	4	1-3
Zatoville	3-12	33-45	0.06-0.2	0.14-0.17	7.4-9.0	<4	Moderate	0.37			
	12-17	35-45	0.06-0.2	0.12-0.15	7.9-9.0	4-8	Moderate	0.37			
	17-60	35-45	0.06-0.2	0.10-0.13	7.9-9.0	8-16	Moderate	0.37			
104*:											
Zatoville-------	0-3	30-40	0.2-0.6	0.16-0.19	7.4-9.0	<2	Moderate	0.37	3	4	1-3
	3-12	33-45	0.06-0.2	0.14-0.17	7.4-9.0	<4	Moderate	0.37			
	12-17	35-45	0.06-0.2	0.12-0.15	7.9-9.0	4-8	Moderate	0.37			
	17-60	35-45	0.06-0.2	0.10-0.13	7.9-9.0	8-16	Moderate	0.37			
Orinoco---------	0-4	30-40	0.2-0.6	0.15-0.18	7.4-8.4	<2	Moderate	0.32	2	4L	1-3
	4-16	35-45	0.06-0.2	0.12-0.15	7.9-8.4	4-8	Moderate	0.37			
	16-34	35-45	0.06-0.2	0.10-0.12	6.6-8.4	8-16	Moderate	0.37			
	34	---	---	---	---	---	---	---			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," and "occasional" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
1---------- Abor	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Low.
2*:												
Abor----------	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Low.
Neldore----------	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
3, 4---------- Amherst	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Moderate	Low.
5*:												
Amherst----------	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Moderate	Low.
Delplain---------	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Moderate	Low.
6---------- Attewan	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
7*. Badland												
8*:												
Bascovy----------	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
Neldore----------	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
9*:												
Bascovy----------	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
Neldore----------	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
Neldore, moist---	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	---
10*:												
Blackhall--------	C	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Rock outcrop.												
Twilight---------	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
11---------- Busby	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
12*:												
Busby	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Blackhall	C	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
13*:												
Busby	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Twilight	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
14---------- Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
15*:												
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Crago	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Delpoint	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
16*:												
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Delpoint	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
17*:												
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Delpoint	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Cabbart, moist	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
18*:												
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Delpoint	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Rock outcrop.												
19*:												
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Rock outcrop.												
Blackhall	C	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
20*:												
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Yawdim	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
Delpoint	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
21*:												
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Yawdim	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
Rock outcrop.												
22*:												
Cabbart, high precipitation	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Cabbart, moist	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
23*:												
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Blackhall	C	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Delpoint	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
24--Chinook	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
25, 26--Crago	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
27*:												
Crago	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Musselshell	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Crago	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
28*:												
Crago	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Musselshell	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Attewan	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
29*:												
Creed	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Gerdrum	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
30--Delpoint	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
31*:												
Delpoint	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
32*:												
Delpoint	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Cabbart	D	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Yamac	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
33, 34--Ethridge	C	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
35, 36--Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
37*:												
Evanston	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Attewan	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
38*:												
Gerdrum	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Bascovy	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
39*:												
Gerdrum	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Creed	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
40*:												
Gerdrum	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Vanda	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
41*:												
Gerdrum	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
41*:												
Vanda	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Creed	C	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
42--Harlem	C	Rare	---	---	>6.0	---	---	>60	---	Low	High	Low.
43--Harlem	C	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Low	High	Low.
44--Harlem	C	Rare	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
45*:												
Harlem	C	Rare	---	---	>6.0	---	---	>60	---	Low	High	Low.
Havre	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
46*:												
Harlem	C	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Low	High	Low.
Havre	B	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Moderate	High	Low.
47*:												
Harlem	C	Rare	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Havre	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	High	Moderate.
48--Havre	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
49--Havre	B	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Moderate	High	Low.
50*:												
Havre	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Glendive	B	Rare	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
51*:												
Havre	B	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Moderate	High	Low.
Glendive	B	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Moderate	High	Low.
52*:												
Havre	B	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Moderate	High	Low.
Harlem	C	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Low	High	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
53*:												
Havre	B	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Moderate	High	Low.
Yamac	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
54*:												
Kobar	C	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Zatoville	C	None	---	---	>6.0	---	---	40-60	Soft	Low	High	Moderate.
55, 56--Kremlin	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
57--Marias	D	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
58--Marmarth	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
59--Marvan	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
60*:												
Marvan	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Vanda	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
61--Neldore	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
62*, 63*:												
Neldore	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
Abor	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Low.
64*:												
Neldore	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
Bascovy	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
Rock outcrop.												
65*:												
Neldore	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
Neldore, saline--	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
66*:												
Neldore	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
Rock outcrop.												
67*:												
Neldore	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
Volborg	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	High.
68*:												
Neldore	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
Weingart	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Moderate.
69*:												
Neldore	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Moderate.
Yawdim	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
70*:												
Neldore, moist	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	---
Bascovy	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
Neldore, south	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	---
71*:												
Nobe	D	None	---	---	>6.0	---	---	>60	---	Low	High	High.
Absher	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
72*:												
Pinebreaks	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	High.
Neldore	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	---
73*.												
Riverwash												
74*.												
Rock outcrop												
75	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Low.
Tanna												
76*:												
Tanna	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
76*:												
Weingart	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Moderate.
77 Teigen	C	None	---	---	>6.0	---	---	>60	---	Low	High	High.
78 Twilight	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
79*:												
Twilight	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Blackhall	C	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
80*:												
Twilight	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
Blackhall	C	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High	Low.
Rock outcrop.												
81, 82, 83. Ustic Torriorthents												
84 Vaeda	D	None	---	---	>6.0	---	---	>60	---	Low	High	High.
85 Vanda	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
86*:												
Vanda	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
Harlem	C	Occasional	Brief	Apr-Jun	>6.0	---	---	>60	---	Low	High	Low.
Marvan	D	None	---	---	>6.0	---	---	>60	---	Low	High	Moderate.
87 Verson	C	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
88 Volborg	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	High.
89*:												
Volborg	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	High.
Volborg, eroded	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
89*:												
Julin	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
90*:												
Volborg	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	High.
Rock outcrop.												
Julin	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
91---------- Weingart	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Moderate.
92*:												
Weingart	D	None	---	---	>6.0	---	---	20-40	Soft	Low	High	Moderate.
Warhorse	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
93, 94, 95, 96---- Yamac	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
97*:												
Yamac	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Busby	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
98*:												
Yamac	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
Delpoint	C	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High	Low.
99---------- Yawdim	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
100*:												
Yawdim	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
Crago	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
101*, 102*:												
Yawdim	D	None	---	---	>6.0	---	---	10-20	Soft	Low	High	Low.
Orinoco	C	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.
103---------- Zatoville	C	None	---	---	>6.0	---	---	40-60	Soft	Low	High	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
104*:												
Zatoville	C	None	---	---	>6.0	---	---	40-60	Soft	Low	High	Moderate.
Orinoco	C	None	---	---	>6.0	---	---	20-40	Soft	Low	High	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Abor	Fine, montmorillonitic, frigid Udorthentic Chromusterts
Absher	Fine, montmorillonitic Borollic Natrargids
Amherst	Clayey, montmorillonitic Lithic Argiborolls
Attewan	Fine-loamy over sandy or sandy-skeletal, mixed Aridic Argiborolls
Bascovy	Fine, montmorillonitic, frigid Udorthentic Chromusterts
Blackhall	Loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents
Busby	Coarse-loamy, mixed Borollic Camborthids
Cabbart	Loamy, mixed (calcareous), frigid, shallow Ustic Torriorthents
Chinook	Coarse-loamy, mixed Aridic Haploborolls
Crago	Loamy-skeletal, carbonatic Borollic Calciorthids
Creed	Fine, montmorillonitic Borollic Natrargids
Delplain	Clayey-skeletal, mixed, nonacid, frigid Lithic Ustic Torriorthents
Delpoint	Fine-loamy, mixed Borollic Camborthids
Ethridge	Fine, montmorillonitic Aridic Argiborolls
Evanston	Fine-loamy, mixed Aridic Argiborolls
Gerdrum	Fine, montmorillonitic Borollic Natrargids
Glendive	Coarse-loamy, mixed (calcareous), frigid Ustic Torrifluvents
Harlem	Fine, montmorillonitic, frigid Ustic Torrifluvents
Havre	Fine-loamy, mixed (calcareous), frigid Ustic Torrifluvents
Julin	Fine, montmorillonitic, acid, frigid Ustic Torriorthents
Kobar	Fine, montmorillonitic Borollic Camborthids
Kremlin	Fine-loamy, mixed Aridic Haploborolls
Marias	Fine, montmorillonitic, frigid Udorthentic Chromusterts
Marmarth	Fine-loamy, mixed Aridic Argiborolls
Maryan	Fine, montmorillonitic, frigid Udorthentic Chromusterts
Musselshell	Coarse-loamy, carbonatic Borollic Calciorthids
Neldore	Clayey, montmorillonitic, nonacid, frigid, shallow Ustic Torriorthents
Nobe	Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents
Orinoco	Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents
Pinebreaks	Clayey, montmorillonitic, acid, frigid, shallow Typic Ustorthents
Tanna	Fine, montmorillonitic Aridic Argiborolls
Teigen	Fine, montmorillonitic Borollic Camborthids
Twilight	Coarse-loamy, mixed Borollic Camborthids
Ustic Torriorthents	Ustic Torriorthents
Vaeda	Fine, montmorillonitic, nonacid, frigid Ustic Torriorthents
Vanda	Fine, montmorillonitic (calcareous), frigid Ustic Torriorthents
Verson	Clayey over loamy-skeletal, mixed Aridic Argiborolls
Volborg	Clayey, montmorillonitic, acid, frigid, shallow Ustic Torriorthents
Warhorse	Clayey, montmorillonitic, shallow Borollic Haplargids
Weingart	Fine, montmorillonitic Borollic Natrargids
Yamac	Fine-loamy, mixed Borollic Camborthids
Yawdim	Clayey, montmorillonitic (calcareous), frigid, shallow Ustic Torriorthents
Zatoville	Fine, montmorillonitic, frigid Cambic Gypsiorthids

SOIL LEGEND

DOMINANTLY NEARLY LEVEL AND GENTLY SLOPING, DEEP, MODERATELY COARSE, MEDIUM, AND FINE TEXTURED SOILS ON FLOOD PLAINS, TERRACES, AND ADJACENT FANS

- 247 Marvan-Vanda-Harlem
- 256 Havre-Harlem-Glendive

DOMINANTLY NEARLY LEVEL TO STRONGLY SLOPING, DEEP TO SHALLOW, FINE TEXTURED SOILS ON FANS, TERRACES, FOOT SLOPES, AND UPLANDS

- 225 Gerdrum-Ethridge-Marvan
- 621 Bascovy-Gerdrum-Neldore

DOMINANTY NEARLY LEVEL AND GENTLY SLOPING, DEEP, MODERATELY COARSE AND MEDIUM TEXTURED SOILS ON FANS, TERRACES, AND UPLANDS

- 145 Crago-Musselshell-Attewan

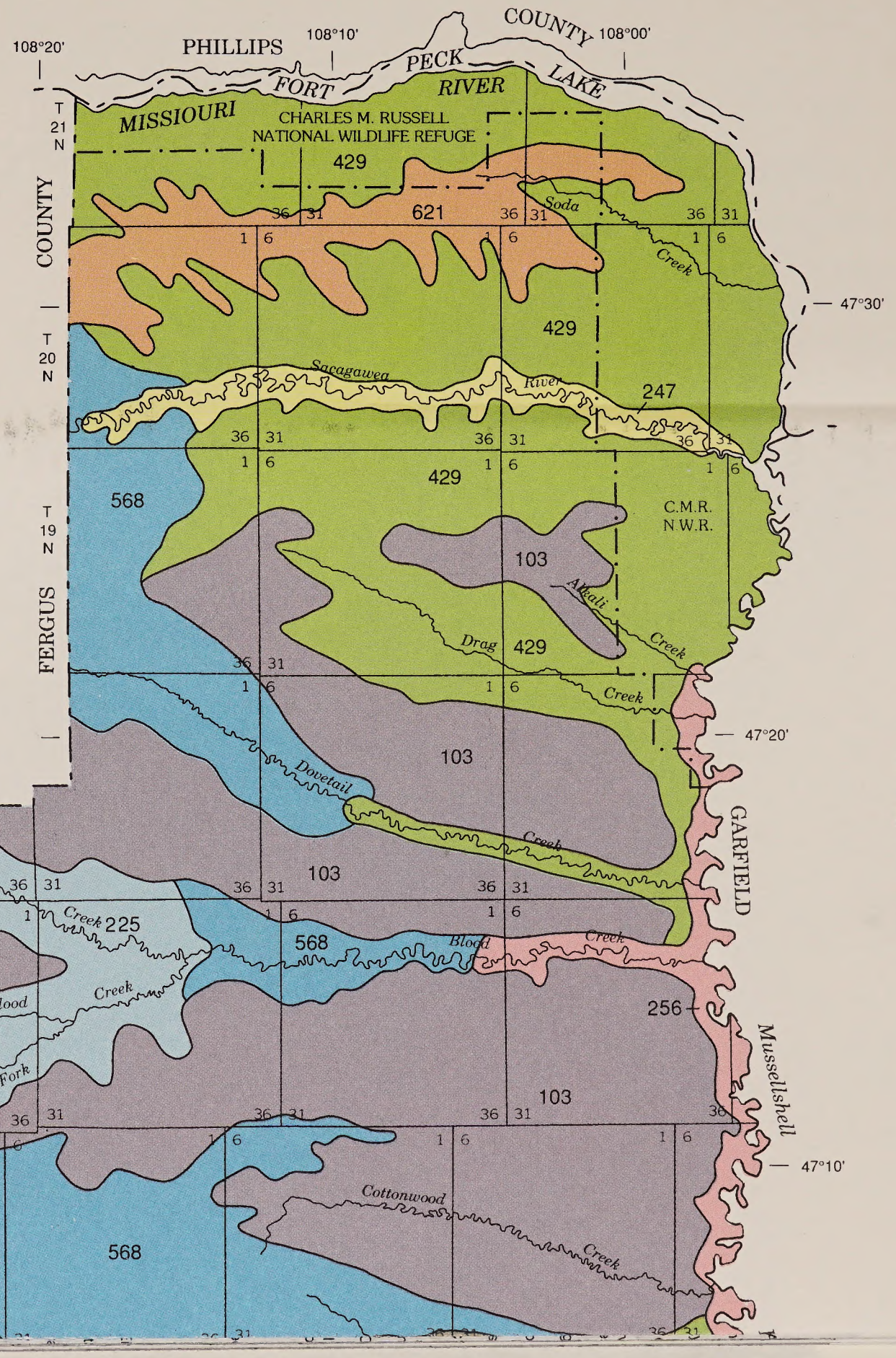
DOMINANTLY ROCK OUTCROP AND GENTLY SLOPING TO STEEP, DEEP TO SHALLOW, MODERATELY COARSE TO MODERATELY FINE TEXTURED SOILS ON TERRACES, FANS, FOOT SLOPES, AND UPLANDS

- 103 Cabbart-Delpoint-Rock outcrop
- 164 Twilight-Evanston-Cabbart
- 590 Twilight-Blackhall-Yamac

DOMINANTLY NEARLY LEVEL TO VERY STEEP, DEEP TO SHALLOW, FINE TEXTURED SOILS ON FANS, TERRACES, FOOT SLOPES, AND UPLANDS

- 415 Amherst-Gerdrum-Neldore
- 429 Bascovy-Neldore
- 560 Volborg-Teigen-Weingart
- 568 Neldore-Gerdrum-Abor

Compiled 1992



SOIL LEGEND

DOMINANTLY NEARLY LEVEL AND GENTLY SLOPING, DEEP, MODERATELY COARSE, MEDIUM, AND FINE TEXTURED SOILS ON FLOOD PLAINS, TERRACES, AND ADJACENT FANS

- 247 Marvan-Vanda-Harlem
- 256 Havre-Harlem-Glendive

DOMINANTLY NEARLY LEVEL TO STRONGLY SLOPING, DEEP TO SHALLOW, FINE TEXTURED SOILS ON FANS, TERRACES, FOOT SLOPES, AND UPLANDS

- 225 Gerdrum-Ethridge-Marvan
- 621 Bascovy-Gerdrum-Neldore

DOMINANTY NEARLY LEVEL AND GENTLY SLOPING, DEEP, MODERATELY COARSE AND MEDIUM TEXTURED SOILS ON FANS, TERRACES, AND UPLANDS

- 145 Crago-Musselshell-Attewan

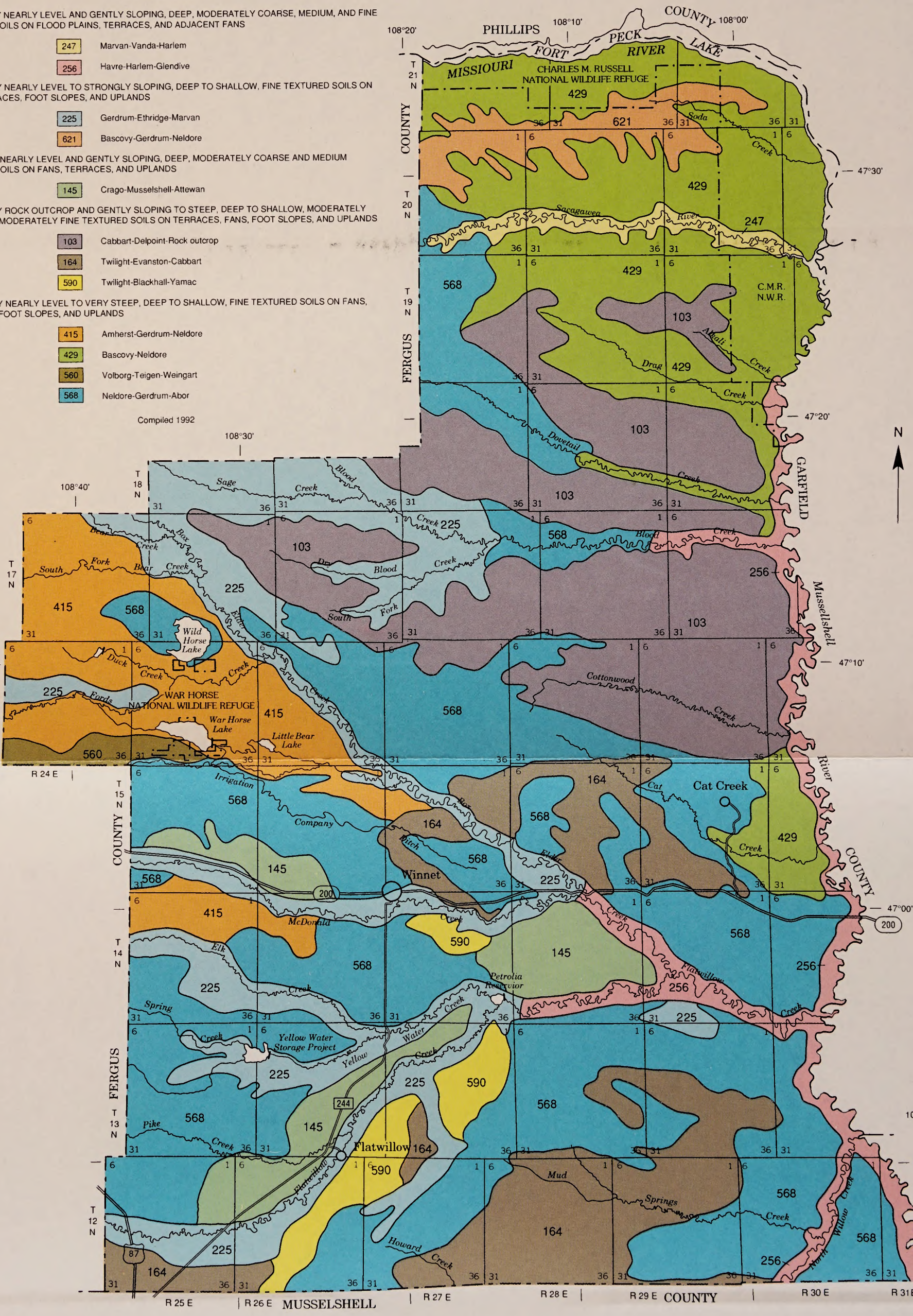
DOMINANTLY ROCK OUTCROP AND GENTLY SLOPING TO STEEP, DEEP TO SHALLOW, MODERATELY COARSE TO MODERATELY FINE TEXTURED SOILS ON TERRACES, FANS, FOOT SLOPES, AND UPLANDS

- 103 Cabbart-Delpoint-Rock outcrop
- 164 Twilight-Evanston-Cabbart
- 590 Twilight-Blackhall-Yamac

DOMINANTLY NEARLY LEVEL TO VERY STEEP, DEEP TO SHALLOW, FINE TEXTURED SOILS ON FANS, TERRACES, FOOT SLOPES, AND UPLANDS

- 415 Amherst-Gerdrum-Neldore
- 429 Bascovy-Neldore
- 560 Volborg-Teigen-Weingart
- 568 Neldore-Gerdrum-Abor

Compiled 1992



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
MONTANA AGRICULTURAL EXPERIMENT STATION
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
UNITED STATES FISH AND WILDLIFE SERVICE

GENERAL SOIL MAP

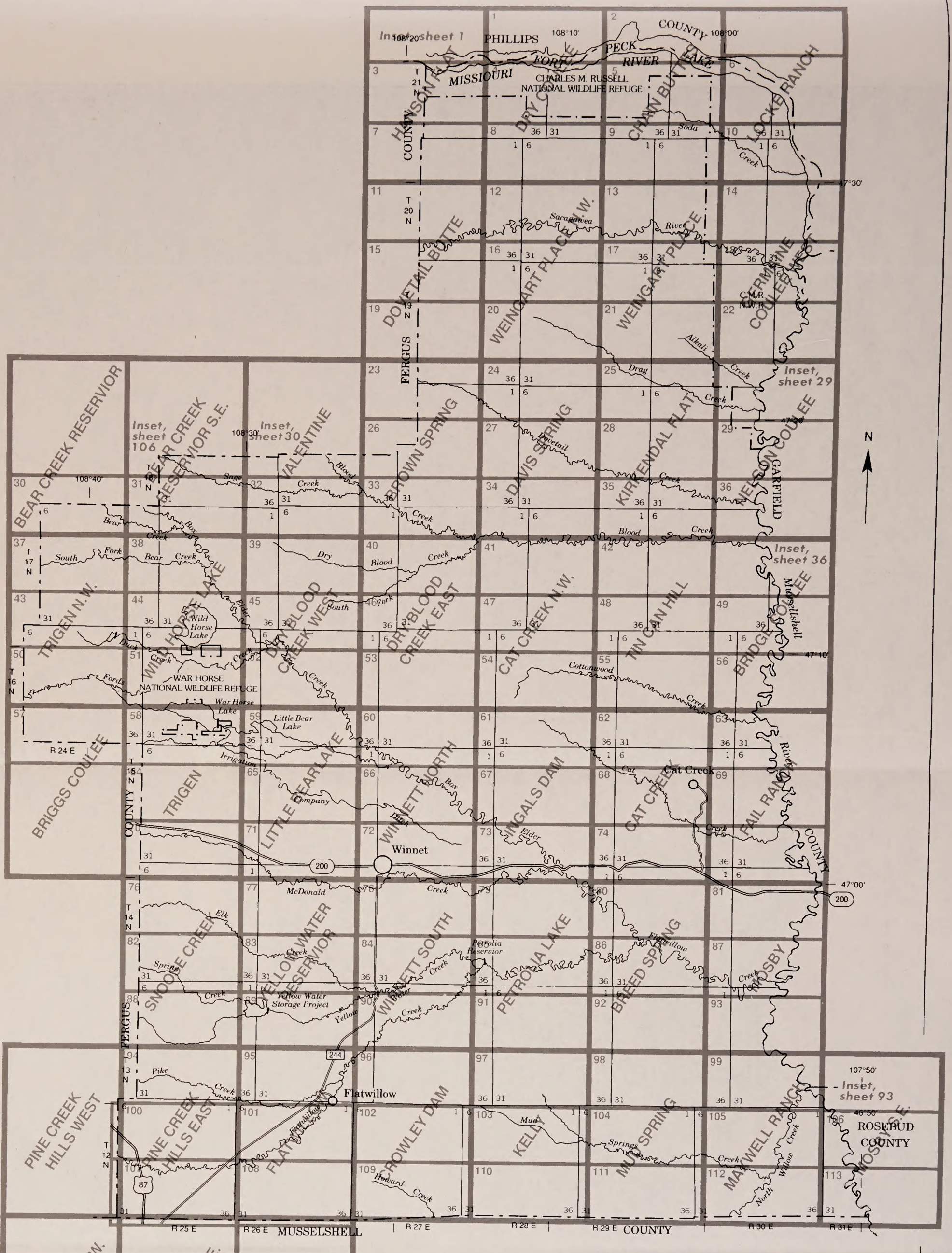
PETROLEUM COUNTY, MONTANA

Scale 1:316,800

1 0 1 2 3 4 5 Mi

1 0 5 10 Km

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS

PETROLEUM COUNTY, MONTANA

Scale 1:316,800

1 0 1 2 3 4 5 Mi

1 0 5 10 Km

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PETROLEUM COUNTY, MONTANA

MONTANA AGRICULTURAL EXPERIMENT STATION
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
UNITED STATES FISH AND WILDLIFE SERVICE

SOIL LEGEND

1 Abor silty clay, 1 to 8 percent slopes
2 Abor-Neldore silty clays, 2 to 8 percent slopes
3 Amherst clay loam, 1 to 6 percent slopes
4 Amherst clay loam, 6 to 25 percent slopes
5 Amherst-Delplain complex, 2 to 15 percent slopes
6 Attewan loam, 0 to 4 percent slopes

7 Badland
8 Bascovy-Neldore silty clays, 2 to 15 percent slopes
9 Bascovy-Neldore-Neldore, moist, silty clays, 6 to 60 percent sloes
10 Blackhall-Rock outcrop-Twilight complex, 8 to 45 percent slopes
11 Busby fine sandy loam, 8 to 15 percent slopes
12 Busby-Blackhall fine sandy loams, 8 to 15 percent slopes
13 Busby-Twilight complex, 2 to 8 percent slopes

14 Cabbart loam, 8 to 15 percent slopes
15 Cabbart-Crago-Delpoint complex, 8 to 35 percent slopes
16 Cabbart-Delpoint loams, 4 to 15 percent slopes
17 Cabbart-Delpoint-Cabbart, moist, loams, 4 to 35 percent slopes
18 Cabbart-Delpoint-Rock outcrop complex, 8 to 45 percent slopes
19 Cabbart-Rock outcrop-Blackhall complex, 8 to 45 percent slopes
20 Cabbart-Yawdim-Delpoint complex, 15 to 35 percent slopes
21 Cabbart-Yawdim-Rock outcrop complex, 4 to 35 percent slopes
22 Cabbart, high precipitation-Cabbart, moist, complex, 15 to 60 percent slopes
23 Cabbart, moist-Blackhall-Delpoint complex, 6 to 60 percent slopes
24 Chinook fine sandy loam, 2 to 8 percent slopes
25 Crago gravelly loam, 0 to 8 percent slopes
26 Crago gravelly loam, 8 to 35 percent slopes
27 Crago-Musselshell-Crago complex, 0 to 4 percent slopes
28 Crago-Musselshell-Attewan complex, 0 to 2 percent slopes
29 Creed-Gerdrum complex, 1 to 6 percent slopes

30 Delpoint loam, 2 to 8 percent slopes
31 Delpoint-Cabbart loams, 2 to 8 percent slopes
32 Delpoint-Cabbart-Yamac loams, 4 to 15 percent slopes

33 Ethridge clay loam, 0 to 2 percent slopes
34 Ethridge clay loam, 2 to 8 percent slopes
35 Evanston loam, 0 to 2 percent slopes
36 Evanston loam, 2 to 8 percent slopes
37 Evanston-Attewan loams, 0 to 2 percent slopes

38 Gerdrum-Bascovy clays, 2 to 15 percent slopes
39 Gerdrum-Creed complex, 1 to 6 percent slopes
40 Gerdrum-Vanda complex, 1 to 6 percent slopes
41 Gerdrum-Vanda-Creed complex, 0 to 8 percent slopes

42 Harlem silty clay, 0 to 2 percent slopes
43 Harlem silty clay, 0 to 2 percent slopes, occasionally flooded
44 Harlem silty clay, saline, 0 to 2 percent slopes
45 Harlem-Havre complex, 0 to 2 percent slopes
46 Harlem-Havre complex, 0 to 2 percent slopes, occasionally flooded
47 Harlem-Havre complex, saline, 0 to 2 percent slopes
48 Havre loam, 0 to 2 percent slopes
49 Havre loam, 0 to 2 percent slopes, occasionally flooded
50 Havre-Glendive complex, 0 to 2 percent slopes
51 Havre-Glendive complex, 0 to 2 percent slopes, occasionally flooded
52 Havre-Harlem complex, 0 to 2 percent slopes, occasionally flooded, channeled
53 Havre-Yamac loams, 0 to 4 percent slopes

54 Kobar-Zatoville silty clay loams, 1 to 6 percent slopes
55 Kremlin loam, 0 to 2 percent slopes
56 Kremlin loam, 2 to 8 percent slopes

57 Marias silty clay, 0 to 4 percent slopes
58 Marmarth fine sandy loam, 1 to 8 percent slopes
59 Marvan silty clay, 1 to 8 percent slopes
60 Marvan-Vanda silty clays, 0 to 8 percent slopes

61 Neldore silty clay, 4 to 25 percent slopes
62 Neldore-Abor silty clays, 4 to 15 percent slopes
63 Neldore-Abor silty clays, 15 to 45 percent slopes
64 Neldore-Bascovy-Rock outcrop complex, 6 to 60 percent slopes
65 Neldore-Neldore, saline, silty clays, 4 to 25 percent slopes
66 Neldore-Rock outcrop complex, 15 to 45 percent slopes
67 Neldore-Volborg silty clays, 4 to 25 percent slopes
68 Neldore-Weingart complex, 2 to 15 percent slopes
69 Neldore-Yawdim complex, 4 to 25 percent slopes
70 Neldore, moist-Bascovy-Neldore, south, silty clays, 6 to 60 percent slopes
71 Nobe-Absher silty clays, 0 to 4 percent slopes

72 Pinebreaks-Neldore, moist, silty clays, 15 to 60 percent slopes

73 Riverwash
74 Rock outcrop

75 Tanna clay loam, 1 to 6 percent slopes
76 Tanna-Weingart complex, 2 to 8 percent slopes
77 Teigen silty clay loam, 1 to 6 percent slopes
78 Twilight sandy loam, 2 to 8 percent slopes
79 Twilight-Blackhall sandy loams, 2 to 15 percent slopes
80 Twilight-Blackhall-Rock outcrop complex, 4 to 25 percent slopes

81 Ustic Torriorthents, 15 to 45 percent slopes
82 Ustic Torriorthents, moderately saline, 15 to 45 percent slopes
83 Ustic Torriorthents, strongly saline, 0 to 8 percent slopes

84 Vaeda silty clay, 0 to 6 percent slopes
85 Vaeda silty clay, 0 to 4 percent slopes
86 Vanda-Harlem-Marvan silty clays, 0 to 4 percent slopes
87 Verson clay loam, 0 to 4 percent slopes
88 Volborg silty clay, moist, 2 to 25 percent slopes
89 Volborg-Volborg, eroded-Julin silty clays, 4 to 25 percent slopes
90 Volborg, eroded-Rock outcrop-Julin complex, 4 to 25 percent slopes

91 Weingart silty clay loam, 1 to 8 percent slopes
92 Weingart-Warhorse complex, 1 to 8 percent slopes

93 Yamac loam, 0 to 2 percent slopes
94 Yamac loam, 2 to 4 percent slopes
95 Yamac clay loam, 0 to 2 percent slopes
96 Yamac clay loam, 2 to 8 percent slopes
97 Yamac-Busby complex, 2 to 8 percent slopes
98 Yamac-Delpoint loams, 2 to 8 percent slopes
99 Yawdim silty clay, 8 to 15 percent slopes
100 Yawdim-Crago complex, 4 to 35 percent slopes
101 Yawdim-Orinoco complex, 4 to 15 percent slopes
102 Yawdim-Orinoco complex, 15 to 35 percent slopes

103 Zatoville silty clay loam, 1 to 6 percent slopes
104 Zatoville-Orinoco silty clay loams, 2 to 8 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES
- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)
- Small airport, airfield, park, oilfield, cemetery, or flood pool (Davis Airstrip; FLOOD POOL LINE)

STATE COORDINATE TICK

LAND DIVISION CORNER (sections and land grants)

ROADS
- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS
- Interstate (173)
- Federal (173)
- State (28)
- County, farm or ranch (1283)

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES
- Without road
- With road
- With railroad

DAMS
- Large (to scale)
- Medium or Small (water)

PITS
- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES
- Farmstead, house (omit in urban area)
- Church
- School
- Indian mound (label) (Indian Mound)
- Located object (label) (Tower)
- Tank (label) (Gas)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE
- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label) (CANAL)
- Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS
- Perennial (water, w)
- Intermittent (int, i)

MISCELLANEOUS WATER FEATURES
- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS (36, 104)

ESCARPMENTS
- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

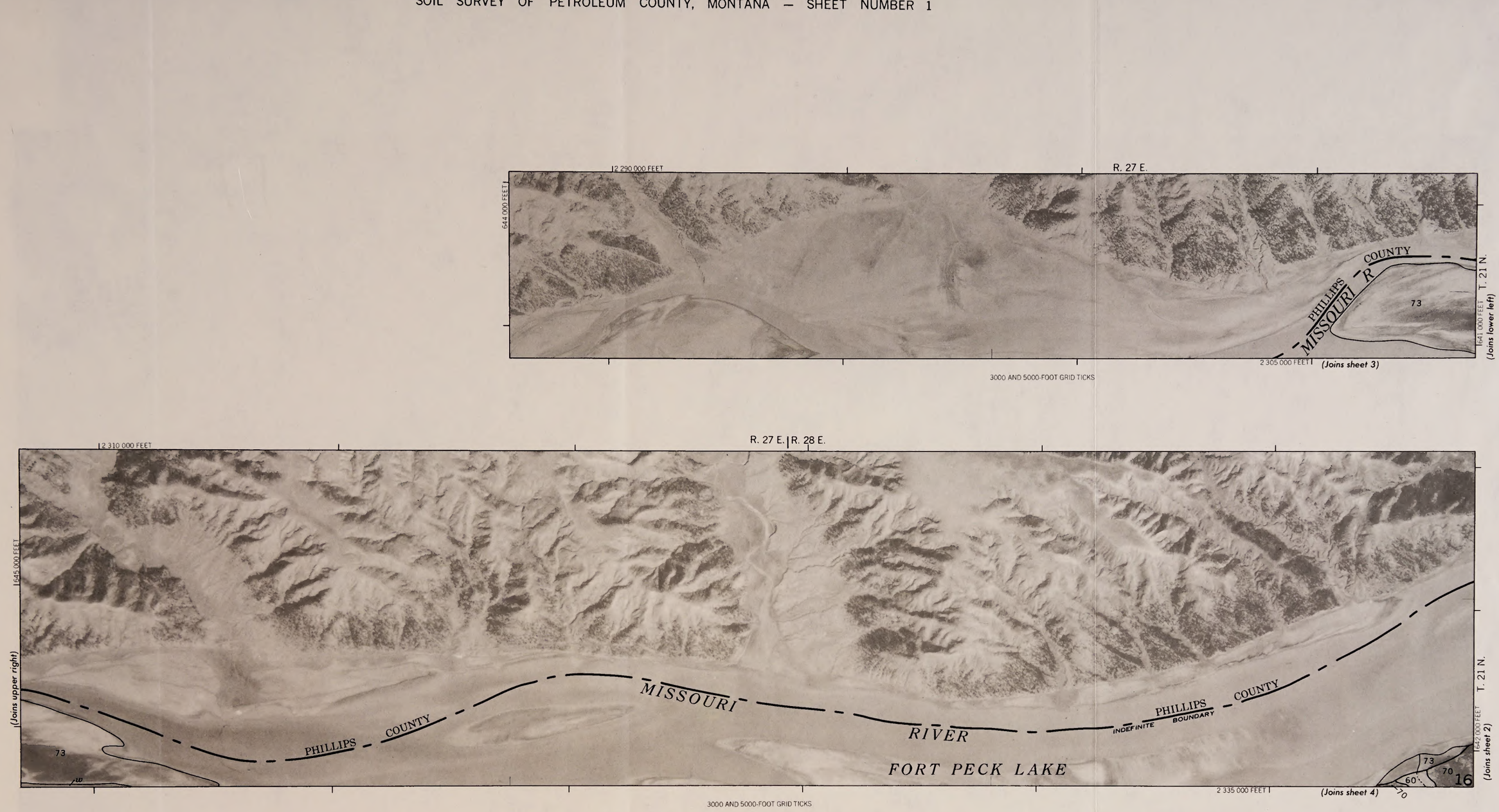
GULLY

DEPRESSION OR SINK

SOIL SAMPLE (normally not shown)

MISCELLANEOUS
- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot

SOIL SURVEY OF PETROLEUM COUNTY, MONTANA — SHEET NUMBER 1



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

1

N

(2)
N

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

3

N

R. 27 E.

2 305 000 FEET

(Joins inset, sheet 1)

PHILLIPS COUNTY

MISSOURI RIVER — INDEFINITE BOUNDARY

FORT PECK LAKE

640 000 FEET

CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

Fisher Coulee

CMRNWR BOUNDARY

FERGUS COUNTY

T. 21 N.

(Joins sheet 4)

630 000 FEET

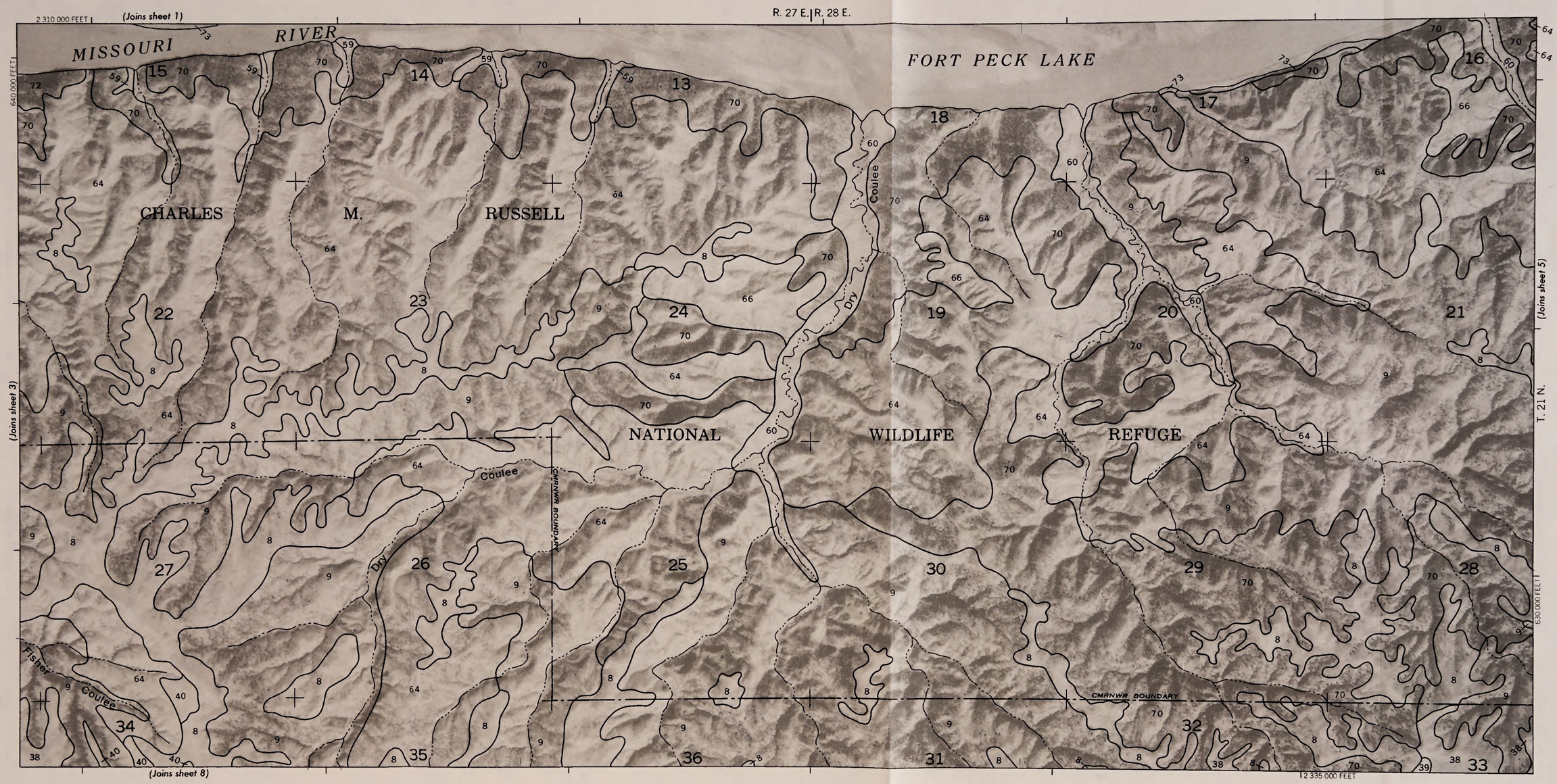
2 280 000 FEET

(Joins sheet 7)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

5

N

R. 28 E. | R. 29 E.

(Joins sheet 2)

2 370 000 FEET

PHILLIPS COUNTY

INDEFINITE BOUNDARY

MISSOURI RIVER

FORT PECK LAKE

640 000 FEET

CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

CMRNWR BOUNDARY

Soda Creek

(Joins sheet 4)

T. 21 N.

620 000 FEET

2 340 000 FEET

(Joins sheet 6)

(Joins sheet 9)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

6

N

R. 29 E.

2 400 000 FEET

1640 000 FEET

T. 21 N.

(Joins sheet 5)

630 000 FEET

2 375 000 FEET

(Joins sheet 10)

FORT PECK LAKE

PHILLIPS COUNTY

INDEFINITE BOUNDARY

MISSOURI RIVER

CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

16 21 22 23 24 25 26 27 28 33 34 35 36

66 70 64 9 38 72 40 8

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 27 E.

2 305 000 FEET

(Joins sheet 3)

625 000 FEET

T. 20 N. | T. 21 N.

(Joins sheet 8)

COUNTY

FERGUS

610 000 FEET

2 280 000 FEET

(Joins sheet 11)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

8

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1.24 000

(10)

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

11

N

R. 27 E.

2 305 000 FEET

(Joins sheet 7)

610 000 FEET

T. 20 N.

(Joins sheet 12)

FERGUS COUNTY

595 000 FEET

2 280 000 FEET

(Joins sheet 15)

Hanson Coulee

Wolf Coulee

Sacajawea River

(Crooked Creek)

Woods Coulee

17 16 15

20 21 22

29 28 27

32 33 34

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

12

N

R. 27 E. | R. 28 E.

2 310 000 FEET

610 000 FEET

(Joins sheet 8)

(Joins sheet 11)

(Joins sheet 13)

T. 20 N.

600 000 FEET

2 340 000 FEET

(Joins sheet 16)

Hanson Coulee

Blacktail Coulee

Sacajawea River

(Crooked Creek)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

13

N

R. 28 E. | R. 29 E.

(Joins sheet 9)

2 370 000 FEET

610 000 FEET

(Joins sheet 12)

T. 20 N.

600 000 FEET

(Joins sheet 14)

Hay Coulee

Carpenter Coulee

Crooked Creek

Sacajawea River

CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

CMRNWR BOUNDARY

2 345 000 FEET

(Joins sheet 17)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

14

N

2 375 000 FEET

(Joins sheet 10)

R. 29 E. | R. 30 E.

610 000 FEET

(Joins sheet 13)

T. 20 N.

CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

FORT PECK LAKE

MISSOURI RIVER

INDEFINITE BOUNDARY PHILLIPS COUNTY

600 000 FEET

2 400 000 FEET

(Joins sheet 18)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

15

N

R. 27 E.

2 305 000 FEET

595 000 FEET

T. 19 N. | T. 20 N.

(Joins sheet 11)

(Joins sheet 16)

(Joins sheet 19)

FERGUS COUNTY

Sacajawea River

Pickerd Coulee

Woods Coulee

32 33 34

5 4 3

8 9 10

1 580 000 FEET

2 280 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

16

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 28 E. | R. 29 E.

T. 19 N. | T. 20 N.

2 365 000 FEET

595 000 FEET

585 000 FEET

2 345 000 FEET

(Joins sheet 13)

(Joins sheet 16)

(Joins sheet 18)

(Joins sheet 21)

Sacajawea River

CMRNWR BOUNDARY

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


18
N
2 375 000 FEET
(Joins sheet 14)
R. 29 E.
R. 30 E.
585 000 FEET
T. 19 N.
T. 20 N.
(Joins sheet 17)
PHILLIPS COUNTY
MISSOURI RIVER
INDEFINITE BOUNDARY
GARFIELD COUNTY
FORT PECK LAKE
MUSSELSHELL RIVER
Sacajawea
River
CHARLES M.
RUSSELL
NATIONAL
WILDLIFE
REFUGE
34
35
36
31
32
1
2
3
6
7
10
11
12
(Joins sheet 22)
575 000 FEET
2 400 000 FEET
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

R. 27 E.

2 305 000 FEET

(Joins sheet 15)

1575 000 FEET

(Joins sheet 20)

T. 19 N.

FERGUS COUNTY

Pickerd Coulee

Dovetail Butte

Lane Coulee

Connolly Coulee

Coulee

17 16 15 20 21 22 29 28 27

1565 000 FEET

2 280 000 FEET

(Joins sheet 23)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

(20)

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

SOIL SURVEY OF PETROLEUM COUNTY, MONTANA — SHEET NUMBER 21

21

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

22

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

(23)

N

R. 27 E.

2 305 000 FEET

(Joins sheet 19)

T. 18 N.

T. 19 N.

1 560 000 FEET

(Joins sheet 24)

FERGUS COUNTY

1 540 000 FEET

2 280 000 FEET

(Joins sheet 26)

Connoly

Dovetail

Dovetail Cr

Dovetail

Coulee

Creek

water

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

(24)

N

R. 27 E. | R. 28 E.

(Joins sheet 20)

2 315 000 FEET

560 000 FEET

555 000 FEET

2 340 000 FEET

T. 18 N. | T. 19 N.

(Joins sheet 23)

(Joins sheet 25)

(Joins sheet 27)

Lane

Coulee

Dovetail

Davis

Creek

West

School

Section

Gordon

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

25

N

R. 28 E. | R. 29 E.

(Joins sheet 21)

2 370 000 FEET

565 000 FEET

CHANNEL BOUNDARY

Drag Creek

T. 18 N. | T. 19 N.

555 000 FEET

2 345 000 FEET

(Joins sheet 24)

(Joins inset, sheet 29)

(Joins sheet 28)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

2 280 000 FEET

R. 26 E. | R. 27 E.

(Joins sheet 23)

545 000 FEET

FERGUS COUNTY

FERGUS COUNTY

Carter

Coulee

DUNN

RIDGE

T. 18 N.

535 000 FEET

(Joins inset, sheet 30)

(Joins sheet 33)

(Joins sheet 27)

2 310 000 FEET

SCALE 1:24 000

N

R. 27 E. | R. 28 E.

(Joins sheet 24)

2 340 000 FEET

1 545 000 FEET

(Joins sheet 26)

(Joins sheet 28)

T. 18 N.

1 535 000 FEET

2 315 000 FEET

(Joins sheet 34)

water

Fisher Coulee

Dovetail Coulee

Davis Coulee

Creek

West School Section

Dovetail Coulee

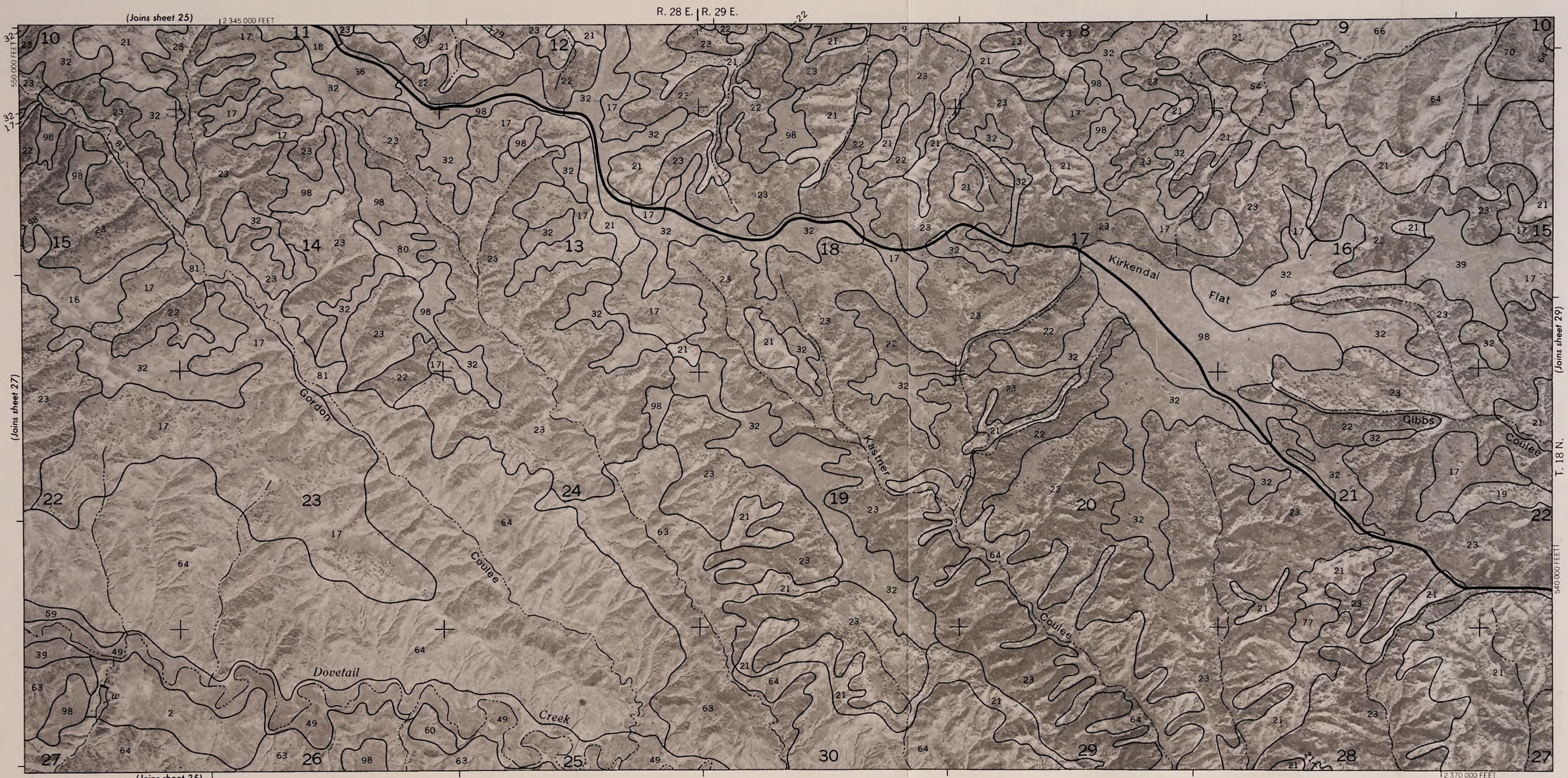
Creek

DUNN RIDGE

SCALE 1:24 000

28

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

(Joins lower right)

2 385 000 FEET

R. 29 E. | R. 30 E.

1550 000 FEET

CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

CMRNWR BOUNDARY

CMRNWR BOUNDARY

RIVER

MUSSELSHELL

Coulee

Gibbs

GARFIELD COUNTY

2 375 000 FEET

(Joins sheet 36)

(Joins sheet 22)

2 385 000 FEET

R. 29 E. | R. 30 E.

1565 000 FEET

CHARLES M. RUSSELL NATIONAL WILDLIFE REFUGE

Alkali Creek

MUSSELSHELL RIVER

CMRNWR BOUNDARY

Drag Creek

GARFIELD COUNTY

T. 18 N. | T. 19 N.

(Joins sheet 25)

555 000 FEET

2 375 000 FEET

(Joins upper left)

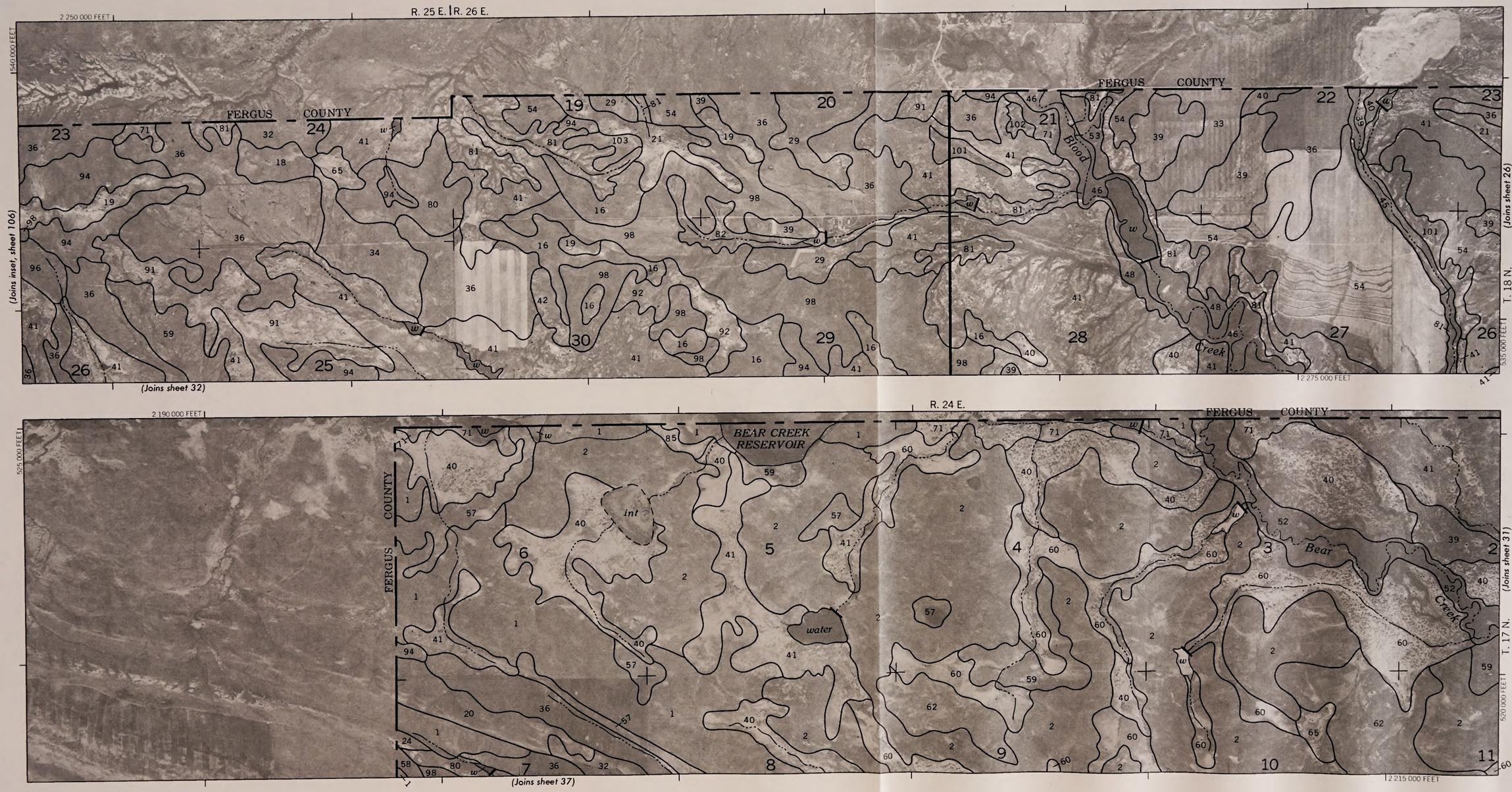
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

30

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 24 E. | R. 25 E.

2 245 000 FEET

(Joins inset, sheet 106)

530 000 FEET

T. 17 N. | T. 18 N.

(Joins sheet 32)

FERGUS COUNTY

Sage Creek

Box Elder Creek

Elder Creek

Bear Creek

Box Elder C.

(Joins sheet 30)

520 000 FEET

2 220 000 FEET

(Joins sheet 38)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

32

N

2 250 000 FEET

(Joins inset, sheet 30)

R. 25 E. | R. 26 E.

T. 17 N. | T. 18 N.

530 000 FEET

520 000 FEET

(Joins sheet 31)

(Joins sheet 33)

(Joins sheet 39)

2 275 000 FEET

Sage Creek

Blood Creek

water

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

R. 26 E. | R. 27 E.

(Joins sheet 26)

2 310 000 FEET

530 000 FEET

T. 17 N. | T. 18 N. (Joins sheet 32)

(Joins sheet 34)

520 000 FEET

2 280 000 FEET

(Joins sheet 40)

Blood Creek

Carter Coulee

Dog Butte

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

34

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

35

N

R. 28 E. | R. 29 E.

(Joins sheet 28)

2 370 000 FEET

535 000 FEET

T. 17 N. | T. 18 N.

(Joins sheet 34)

(Joins sheet 36)

520 000 FEET

2 345 000 FEET

(Joins sheet 42)

Dovetail Creek

Kastner Coulee

DUNN RIDGE

Blood Creek

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 24 E.

(Joins sheet 30)

2 215 000 FEET

515 000 FEET

505 000 FEET

2 190 000 FEET

T. 17 N.

(Joins sheet 38)

(Joins sheet 43)

FERGUS COUNTY

South Fork Bear Creek

water

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

38

N

2 220 000 FEET

(Joins sheet 31)

R. 24 E. | R. 25 E.

1 515 000 FEET

(Joins sheet 37)

(Joins sheet 39)

T. 17 N.

1 505 000 FEET

2 245 000 FEET

(Joins sheet 44)

South Fork Bear Creek

Box Elder Creek

Box Elder Creek

water

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 25 E. | R. 26 E.

T. 17 N.

(Joins sheet 32)

(Joins sheet 38)

(Joins sheet 40)

(Joins sheet 45)

2 275 000 FEET

515 000 FEET

505 000 FEET

2 250 000 FEET

Dry

Blood Creek

water

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

(40)

N

26 E. | R. 27 E.

T. 17 N.

12 280 000 FEET

515 000 FEET

505 000 FEET

12 310 000 FEET

(Joins sheet 33)

(Joins sheet 39)

(Joins sheet 41)

(Joins sheet 46)

Blood Creek

Dry Blood Creek

South Fork Dry Blood Creek

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 27 E. | R. 28 E.

(Joins sheet 34)

2 340 000 FEET

515 000 FEET

(Joins sheet 40)

(Joins sheet 42)

T. 17 N.

T. 16 N.

505 000 FEET

2 315 000 FEET

(Joins sheet 47)

Blood Creek

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 28 E. | R. 29 E.

2 345 000 FEET

(Joins sheet 35)

1515 000 FEET

(Joins sheet 41)

(Joins sheet 48)

T. 17 N.

510 000 FEET

(Joins inset, sheet 36)

2 370 000 FEET

Blood Creek

Coulee

Camelbratten

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

R. 24 E.

(Joins sheet 37)

2 215 000 FEET

500 000 FEET

(Joins sheet 44)

T. 16 N. | T. 17 N.

1 490 000 FEET

2 190 000 FEET

(Joins sheet 50)

FERGUS COUNTY

Duck Creek

Duck Creek

intermittent

water

int

w

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

2 220 000 FEET

(Joins sheet 38)

R. 24 E. | R. 25 E.

500 000 FEET

(Joins sheet 43)

(Joins sheet 45)

T. 16 N. | T. 17 N.

1 430 000 FEET

2 245 000 FEET

(Joins sheet 51)

R. 24 E. | R. 25 E.

War Horse Lake

WAR HORSE NWR BOUNDARY

NWR BDRY

water

int

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

R. 25 E. | R. 26 E.

2 275 000 FEET

(Joins sheet 39)

500 000 FEET

(Joins sheet 46)

T. 16 N. | T. 17 N.

(Joins sheet 44)

490 000 FEET

2 250 000 FEET

R. 25 E. | R. 26 E.

(Joins sheet 52)

South Fork Dry Blood Creek

Box Elder Creek

Box Elder Creek

Fords Creek

water

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 26 E. | R. 27 E.

2 285 000 FEET

(Joins sheet 40)

T. 17 N. | T. 16 N.

1500 000 FEET

1490 000 FEET

2 310 000 FEET

(Joins sheet 45)

(Joins sheet 47)

(Joins sheet 53)

Dry Blood Creek

South Fork

water

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

R. 27 E. | R. 28 E.

(Joins sheet 41)

2 340 000 FEET

500 000 FEET

T. 16 N. | T. 17 N.

(Joins sheet 46)

(Joins sheet 48)

490 000 FEET

2 315 000 FEET

R. 27 E. | R. 28 E.

(Joins sheet 54)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

(Joins sheet 42) 2 345 000 FEET

R. 28 E. | R. 29 E.

500 000 FEET

(Joins sheet 47)

Tin Can Hill

Biggett

Coulee

Raundel

Haley

Coulee

Coulee

(Joins sheet 49)

T. 16 N. | T. 17 N.

(Joins sheet 55)

R. 28 E. | R. 29 E.

1 490 000 FEET

2 370 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

(Joins inset, sheet 36)

R. 29 E. | R. 30 E.

2 400 000 FEET

505 000 FEET

(Joins sheet 48)

T. 16 N. | T. 17 N.

1 490 000 FEET

2 375 000 FEET

R. 29 E. | R. 30 E.

(Joins sheet 56)

Raundel Coulee

Biggett Coulee

MUSSELSHELL RIVER

GARFIELD COUNTY

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 24 E. | R. 25 E.

T. 16 N.

2 245 000 FEET

2 220 000 FEET

485 000 FEET

475 000 FEET

(Joins sheet 44)

(Joins sheet 50)

(Joins sheet 52)

(Joins sheet 58)

WAR HORSE NWR BOUNDARY

WAR HORSE NATIONAL WILDLIFE REFUGE BOUNDARY

WAR HORSE NATIONAL WILDLIFE REFUGE

War Horse Lake

Duck Creek

Fords Creek

Fords

Creek

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

2 250 000 FEET

(Joins sheet 45) R. 25 E. | R. 26 E.

41

Box Elder Creek

Forks Creek

Box Elder Creek

485 000 FEET

T. 16 N.

1475 000 FEET

2 280 000 FEET

(Joins sheet 51)

(Joins sheet 53)

(Joins sheet 59)

SCALE 1:24 000

2 MILES

2 KILOMETERS

N

R. 26 E. | R. 27 E.

(Joins sheet 46)

2 310 000 FEET

1 485 000 FEET

T. 16 N.

(Joins sheet 52)

(Joins sheet 54)

1 475 000 FEET

12 285 000 FEET

(Joins sheet 60)

water

Shale Coulee

Brush Creek

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 28 E. R. 29 E.

T. 16 N.

2 370 000 FEET

2 345 000 FEET

1485 000 FEET

1475 000 FEET

(Joins sheet 48)

(Joins sheet 54)

(Joins sheet 56)

(Joins sheet 62)

Cottonwood Creek

Jackson Coulee

Cottonwood Creek

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

2 375 000 FEET

(Joins sheet 49)

R. 29 E. | R. 30 E.

1485 000 FEET

T. 16 N

(Joins sheet 55)

MUSSELSHELL RIVER

Haley Coulee

Deep Coulee

Cottonwood Creek

GARFIELD COUNTY

1480 000 FEET

(Joins sheet 63)

2 400 000 FEET

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

R. 24 E.

(Joins sheet 50)

2 215 000 FEET

470 000 FEET

T. 16 N.

(Joins sheet 58)

FERGUS COUNTY

FERGUS COUNTY

460 000 FEET

2 190 000 FEET

water

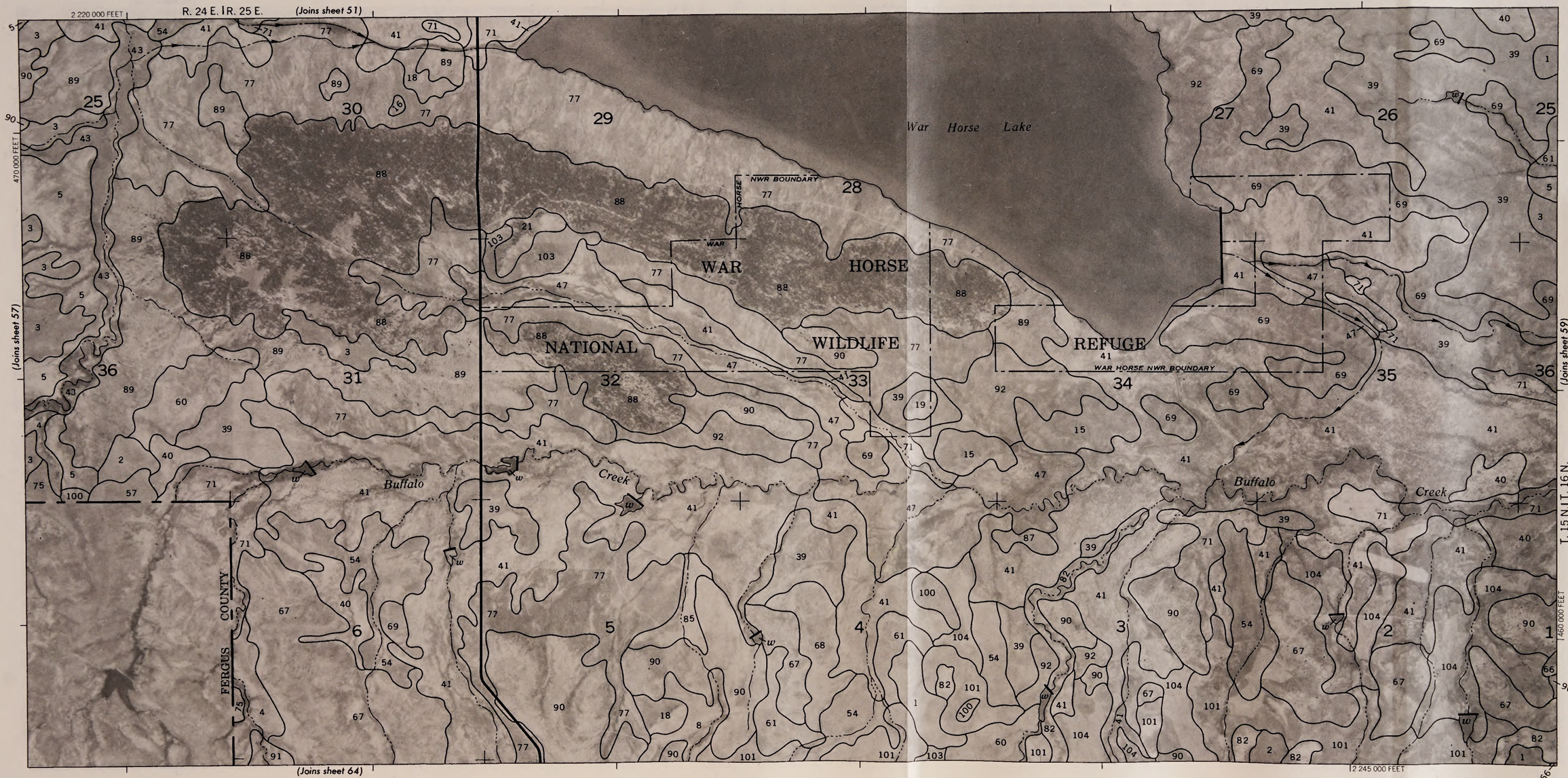
SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

58

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

59

N

R. 25 E. | R. 26 E.

T. 15 N. | T. 16 N.

(Joins sheet 52)

2 280 000 FEET

1470 000 FEET

1460 000 FEET

2 250 000 FEET

(Joins sheet 58)

(Joins sheet 60)

(Joins sheet 65)

Little Bear Lake

water

Box Elder Creek

Buffalo Creek

Dry Creek

25 30 29 28 27 26

36 31 32 33 34 35

1 6 5 4 3 2

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

60

N

(Joins sheet 53)

R. 26 E. | R. 27 E.

2 285 000 FEET

1470 000 FEET

(Joins sheet 59)

T. 15 N. | T. 16 N.

(Joins sheet 61)

1460 000 FEET

(Joins sheet 66)

2 310 000 FEET

Shale Coulee

Box Elder Creek

Buffalo Creek

Chokecherry Coulee

Feldt Coulee

Brush Creek

water

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 27 E. | R. 28 E.

(Joins sheet 54)

2 340 000 FEET

Jackson Coulee

Cat Creek

Brush Creek

water

(Joins sheet 60)

(Joins sheet 62)

T. 15 N. | T. 16 N.

1 470 000 FEET

460 000 FEET

2 315 000 FEET

(Joins sheet 67)

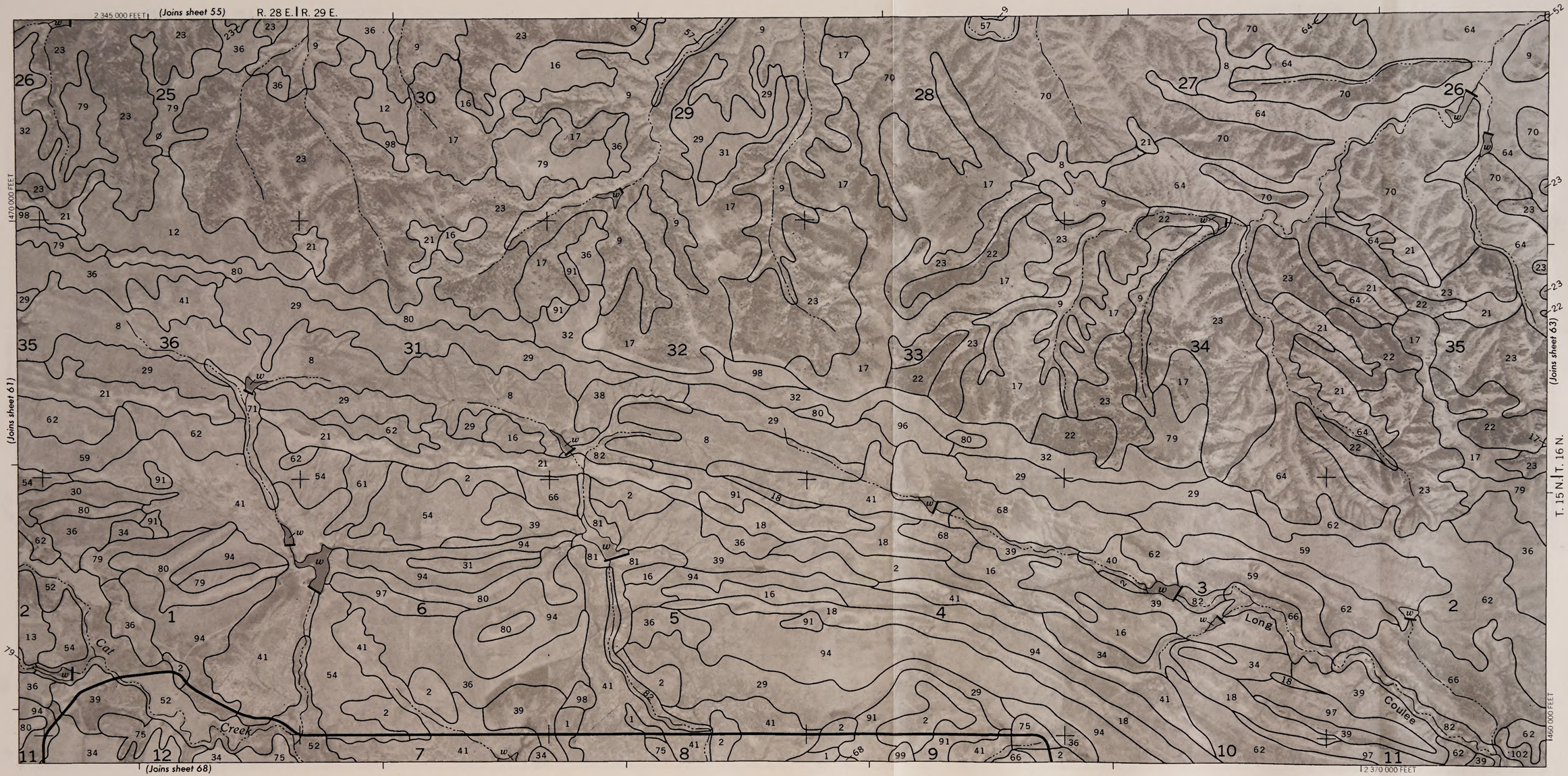
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

62

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

63

N

R. 29 E. | R. 30 E.

(Joins sheet 56)

2 400 000 FEET

475 000 FEET

T. 15 N. | T. 16 N.

(Joins sheet 62)

Cottonwood Creek

MUSSELSHELL RIVER

GARFIELD COUNTY

water

Long Coulee

460 000 FEET

2 375 000 FEET

(Joins sheet 69)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

64

N

2 220 000 FEET

455 000 FEET

(Joins sheet 58)

R. 25 E.

T. 15 N.

(Joins sheet 65)

1 445 000 FEET

2 245 000 FEET

FERGUS COUNTY

(Joins sheet 70)

Dry Creek

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

R. 25 E. | R. 26 E.

(Joins sheet 59)

2 280 000 FEET

1 455 000 FEET

(Joins sheet 64)

(Joins sheet 66)

T. 15 N.

445 000 FEET

2 250 000 FEET

(Joins sheet 71)

Dry Creek

Whites Coulee

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

R. 26 E. | R. 27 E.

(Joins sheet 60)

2 285 000 FEET

1455 000 FEET

(Joins sheet 65)

(Joins sheet 67)

T. 15 N.

Box Elder Creek

Chokecherry Coulee

Coulee

Akins

Feldt Coulee

Brush Cr.

Box Elder Creek

(Joins sheet 72)

12 310 000 FEET

1445 000 FEET

SCALE 1:24 000

2 MILES

2 KILOMETERS

N

R. 27 E. | R. 28 E.

(Joins sheet 61)

2 340 000 FEET

(Joins sheet 66)

T. 15 N.

(Joins sheet 68)

455 000 FEET

Brush Creek

Box Elder Creek

Coulee

Springs

Bull

445 000 FEET

2 315 000 FEET

(Joins sheet 73)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

68

N

R. 28 E. | R. 29 E.

(Joins sheet 62)

2 345 000 FEET

(455 000 FEET)

(Joins sheet 67)

(Joins sheet 69)

T. 15 N.

Cat Creek

Bull Springs Coulee

Cat Creek

102 Creek

Cat Creek

(Joins sheet 74)

2 370 000 FEET

(445 000 FEET)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 29 E. | R. 30 E.

(Joins sheet 63)

2 400 000 FEET

460 000 FEET

T. 15 N.

(Joins sheet 68)

WEST DOME
CAT CREEK OIL FIELD

MOSBY DOME
CAT CREEK OIL FIELD

MUSSELSHELL RIVER

Long Coulee

Cat Cr

GARFIELD
COUNTY

445 000 FEET

2 375 000 FEET

(Joins sheet 75)

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

70

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

71

N

R. 25 E. | R. 26 E.

(Joins sheet 65)

2 280 000 FEET

1440 000 FEET

(Joins sheet 70)

(Joins sheet 72)

T. 14 N. | T. 15 N.

430 000 FEET

2 250 000 FEET

(Joins sheet 77)

Whites Coulee

McDonald Creek

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

72

N

(Joins sheet 66)

R. 26 E. | R. 27 E.

2 285 000 FEET

1440 000 FEET

(Joins sheet 71)

(Joins sheet 73)

T. 14 N. | T. 15 N.

1430 000 FEET

2 310 000 FEET

(Joins sheet 78)

Winnett

McDonald Creek

McDonald Creek

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

R. 27 E. | R. 28 E.

(Joins sheet 67)

12 340 000 FEET

1440 000 FEET

(Joins sheet 72)

(Joins sheet 74)

T. 14 N. | T. 15 N.

430 000 FEET

2 315 000 FEET

(Joins sheet 79)

Box Elder Creek

McDonald Creek

water

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

2 345 000 FEET

(Joins sheet 68)

R. 28 E. | R. 29 E.

1440 000 FEET

(Joins sheet 73)

T. 14 N. | T. 15 N.

Gorman Coulee

Cat Creek

(Joins sheet 75)

1430 000 FEET

(Joins sheet 80)

2 370 000 FEET

SCALE 1:24 000

2 MILES

2 KILOMETERS

N

R. 29 E. | R. 30 E.

(Joins sheet 69)

2 405 000 FEET

1 440 000 FEET

1 430 000 FEET

12 375 000 FEET

T. 14 N. | T. 15 N.

(Joins sheet 74)

(Joins sheet 81)

Cat Creek

Cat Creek

MUSSELSHELL RIVER

GARFIELD COUNTY

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

2 220 000 FEET

425 000 FEET

R. 25 E.

T. 14 N.

(Joins sheet 70)

(Joins sheet 77)

(Joins sheet 82)

2 245 000 FEET

415 000 FEET

FERGUS COUNTY

Elk Creek

Elk Creek

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

77

N

R. 25 E. | R. 26 E.

(Joins sheet 71)

2 280 000 FEET

T. 14 N.

(Joins sheet 76)

(Joins sheet 78)

415 000 FEET

425 000 FEET

2 250 000 FEET

(Joins sheet 83)

McDonald Creek

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

78

N

(Joins sheet 72)

2 285 000 FEET

R. 26 E. | R. 27 E.

Winnett

McDonald Creek

McDonald Creek

1425 000 FEET

(Joins sheet 77)

(Joins sheet 84)

(Joins sheet 79)

T. 14 N.

1415 000 FEET

2 310 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 27 E. | R. 28 E.

2 340 000 FEET

(Joins sheet 73)

McDonald Creek

Box Elder Creek

1425 000 FEET

(Joins sheet 80)

T. 14 N.

1415 000 FEET

2 315 000 FEET

(Joins sheet 78)

(Joins sheet 85)

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

80

N

2 345 000 FEET

(Joins sheet 74)

R. 28 E. | R. 29 E.

T. 14 N.

(Joins sheet 81)

425 000 FEET

415 000 FEET

2 370 000 FEET

(Joins sheet 79)

(Joins sheet 86)

Box Elder Creek

Gorman Coulee

Box Elder Cr

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

R. 29 E. | R. 30 E.

(Joins sheet 75)

2 405 000 FEET

1425 000 FEET

T. 14 N.

(Joins sheet 80)

415 000 FEET

2 375 000 FEET

(Joins sheet 87)

water

RIVER

MUSSELSHELL

GARFIELD COUNTY

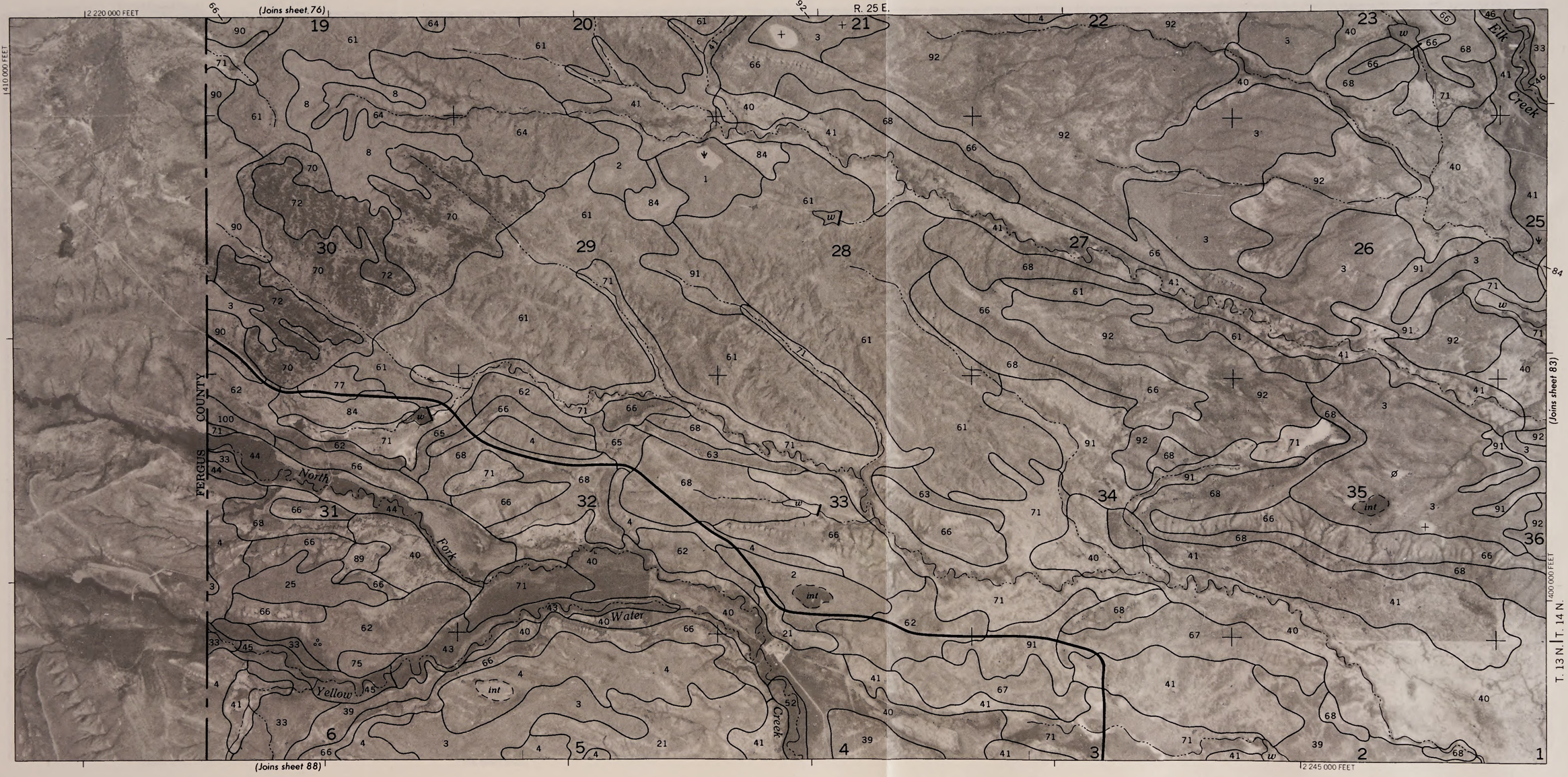
SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

82

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 25 E. | R. 26 E.

(Joins sheet 77)

2 280 000 FEET

1410 000 FEET

(Joins sheet 82)

(Joins sheet 84)

T. 13 N. | T. 14 N.

1400 000 FEET

NWR BOUNDARY

WAR HORSE NATIONAL WILDLIFE REFUGE

Elk Creek

2 250 000 FEET

(Joins sheet 89)

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

84

N


(Joins sheet 78)
2 285 000 FEET
R. 26 E.
R. 27 E.
1410 000 FEET
(Joins sheet 83)
(Joins sheet 85)
Elk Creek
Petrolia Lake
Flatwillow Creek
T. 13 N.
T. 14 N.
400 000 FEET
2 310 000 FEET
(Joins sheet 90)
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
1
2
3
4
5
6
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

R. 27 E. | R. 28 E.

(Joins sheet 79)

2 340 000 FEET

410 000 FEET

(Joins sheet 84)

(Joins sheet 86)

T. 13 N. | T. 14 N.

400 000 FEET

2 315 000 FEET

(Joins sheet 91)

Box Elder School

Petrolia Lake

Flatwillow Creek

Flatwillow

Johnson Coulee

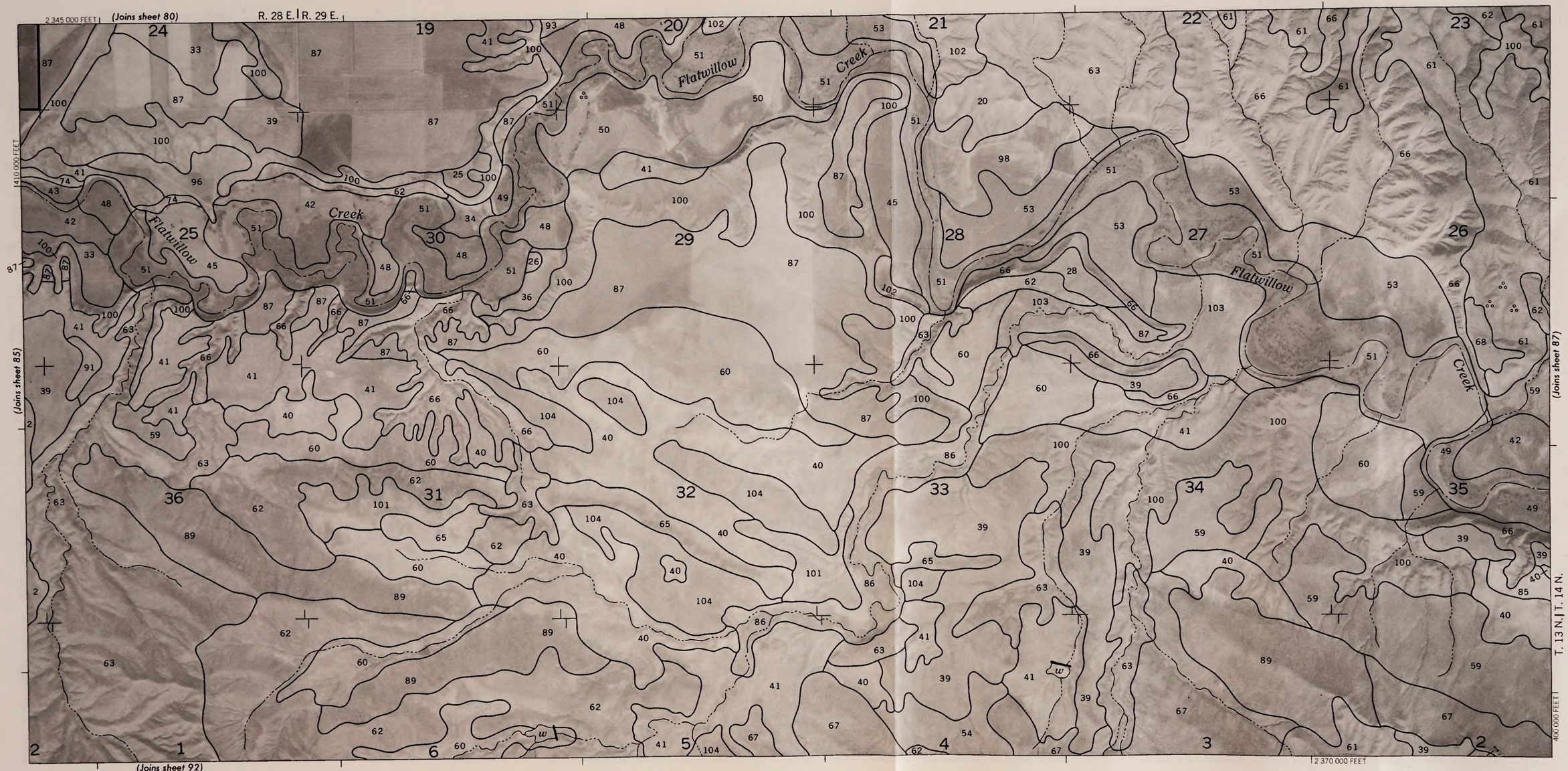
SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

86

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


87
N
R. 29 E.
R. 30 E.
(Joins sheet 81)
2 405 000 FEET
410 000 FEET
(Joins sheet 86)
T. 13 N.
T. 14 N.
400 000 FEET
2 375 000 FEET
(Joins sheet 93)
GARFIELD
COUNTY
MUSSELSHELL
RIVER
Flatwillow
Creek
Flatwillow
Creek
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
35
36
1
2
4
5
6
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

88

N

2 220 000 FEET

395 000 FEET

R. 25 E.

T. 13 N.

(Joins sheet 82)

(Joins sheet 89)

(Joins sheet 94)

FERGUS COUNTY

Yellow Water Creek

Snoose Creek

NWR BOUNDARY

water

385 000 FEET

2 250 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

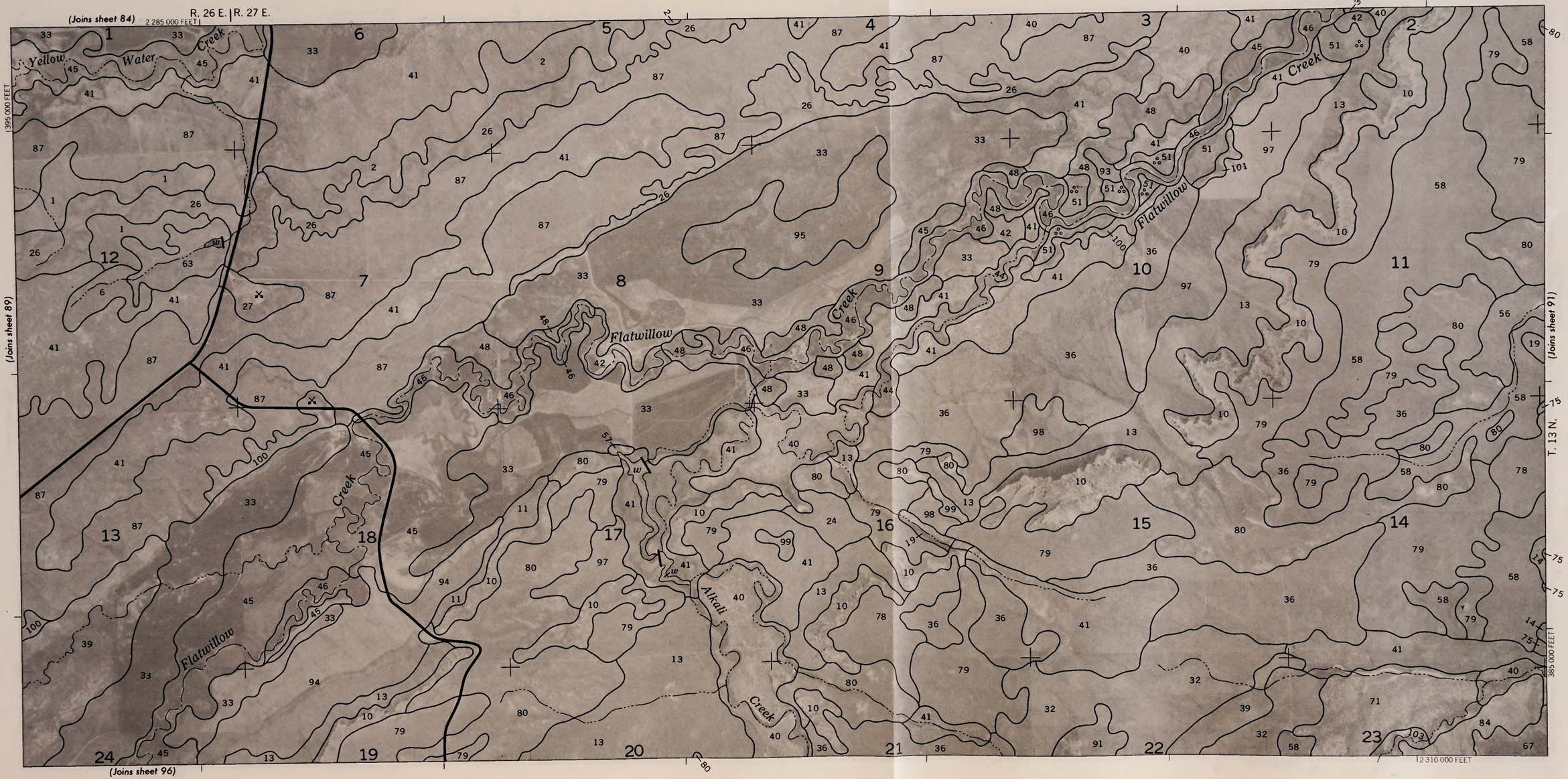
SCALE 1:24 000

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


90
N
(Joins sheet 84)
R. 26 E.
R. 27 E.
2 285 000 FEET
395 000 FEET
Yellow Water Creek
Flatwillow Creek
Flatwillow
Flatwillow Creek
Alkali Creek
Flatwillow Creek
Alkali Creek
(Joins sheet 89)
(Joins sheet 91)
(Joins sheet 96)
T. 13 N.
385 000 FEET
2 310 000 FEET
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

R. 27 E. | R. 28 E.

2 340 000 FEET

(Joins sheet 85)

395 000 FEET

T. 13 N.

385 000 FEET

2 315 000 FEET

(Joins sheet 90)

(Joins sheet 92)

(Joins sheet 97)

Johnson Coulee

Johnson Coulee

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 28 E. | R. 29 E.

2 345 000 FEET

(Joins sheet 86)

395 000 FEET

(Joins sheet 91)

T. 13 N.

(Joins sheet 93)

385 000 FEET

Coulee

Anderson

North Magimnis Creek

(Joins sheet 98)

2 375 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

93

N

R. 29 E. | R. 30 E.

(Joins sheet 87)

12 405 000 FEET

395 000 FEET

GARFIELD COUNTY

MUSSELSHELL RIVER

Anderson

Coulee

Bar

Circle

(Joins sheet 92)

T. 13 N.

T. 12 N.

385 000 FEET

2 380 000 FEET

R. 31 E.

2 413 000 FEET

373 000 FEET

370 000 FEET

2 407 000 FEET

ROSEBUD COUNTY

(Joins sheet 99)

(Joins sheet 106)

3000-FOOT GRID TICKS

SCALE 1:24 000

2 MILES

2 KILOMETERS

94

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

95

N

R. 25 E. | R. 26 E.

(Joins sheet 89)

2 280 000 FEET

380 000 FEET

(Joins sheet 94)

(Joins sheet 96)

T. 12 N. | T. 13 N.

370 000 FEET

2 255 000 FEET

(Joins sheet 101)

R. 26 E. | R. 27 E.

Pike Creek

Flatwillow Creek

Flatwillow

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

96

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

97

N

R. 27 E. | R. 28 E.

2 340 000 FEET

(Joins sheet 91)

380 000 FEET

(Joins sheet 96)

(Joins sheet 98)

370 000 FEET

T. 12 N. | T. 13 N.

2 315 000 FEET

(Joins sheet 103)

R. 28 E. | R. 29 E.

Johnson

Coulee

Rattlesnake Butte

Mud Creek

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

98

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

100

N

R. 25 E. | R. 26 E.

2 250 000 FEET

365 000 FEET

(Joins sheet 94)

(Joins sheet 101)

T. 12 N.

350 000 FEET

2 220 000 FEET

(Joins sheet 107)

PIKE CREEK

HILLS

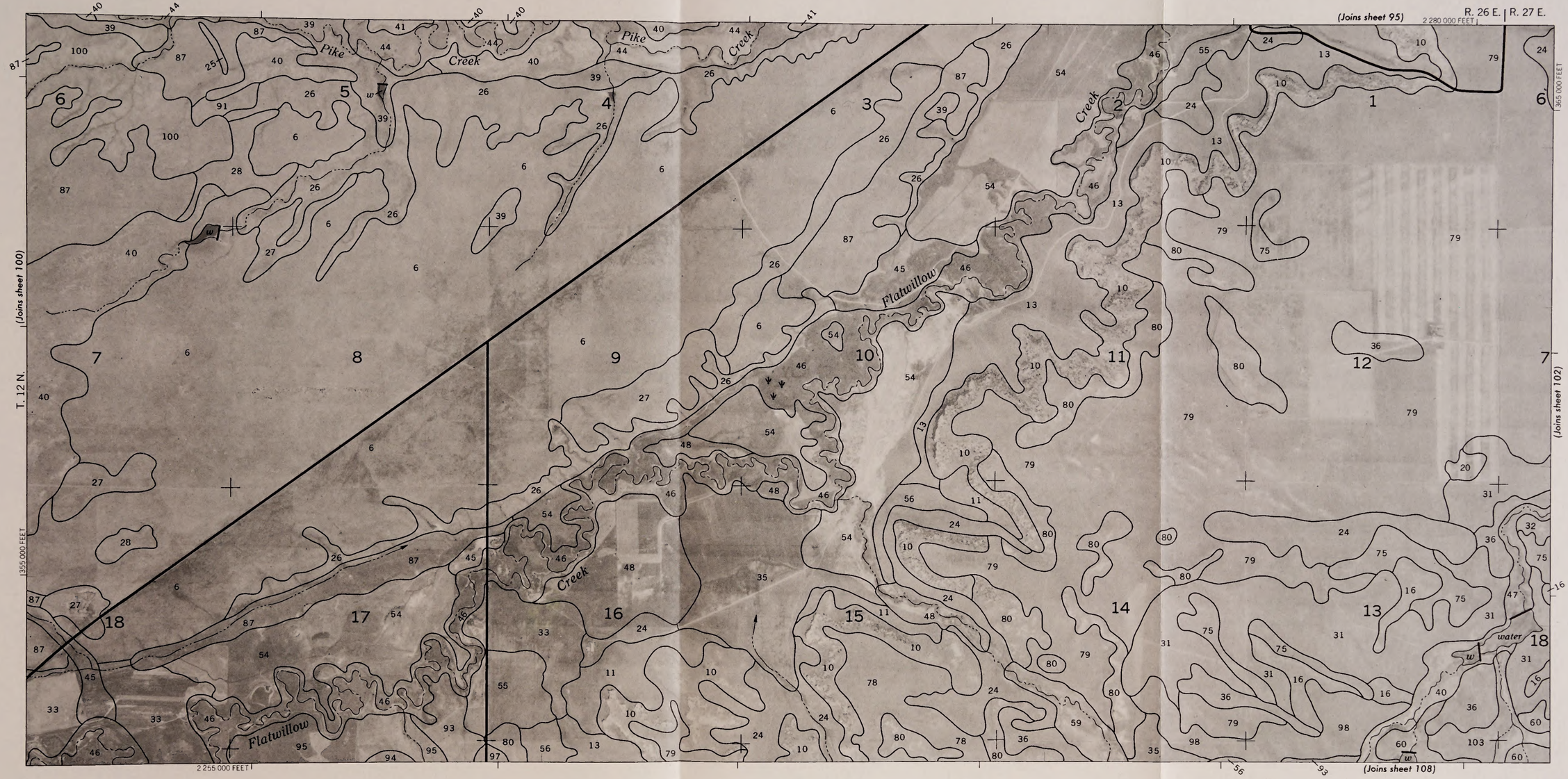
water

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

102

N

R. 27 E. | R. 28 E.

(Joins sheet 96)

2 285 000 FEET

365 000 FEET

(Joins sheet 101)

T. 12 N.

(Joins sheet 103)

355 000 FEET

2 310 000 FEET

(Joins sheet 109)

CROWLEY DAM

Alkali Creek

water

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

R. 28 E. R. 29 E. (Joins sheet 97)

2 340 000 FEET

T. 12 N. (Joins sheet 102)

(Joins sheet 104)

365 000 FEET

355 000 FEET

2 315 000 FEET

(Joins sheet 110)

Mud Creek

Mud Creek

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

104

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

105

N

R. 30 E.

(Joins sheet 99)

2 405 000 FEET

365 000 FEET

(Joins sheet 104)

T. 12 N.

(Joins sheet 106)

355 000 FEET

2 380 000 FEET

(Joins sheet 112)

Willow Creek

North Willow Creek

Magimis Creek

Mud Creek

Mud Creek

North Willow Creek

Willow Creek

water

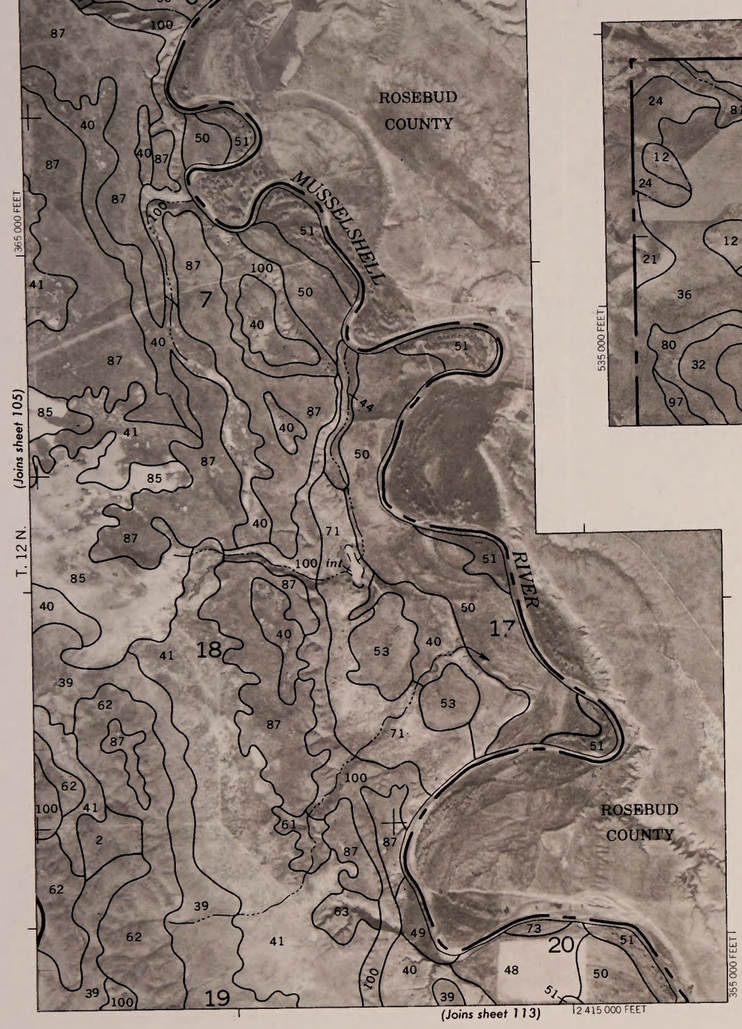
1 3/4 1/2 1/4 0 1 2 MILES

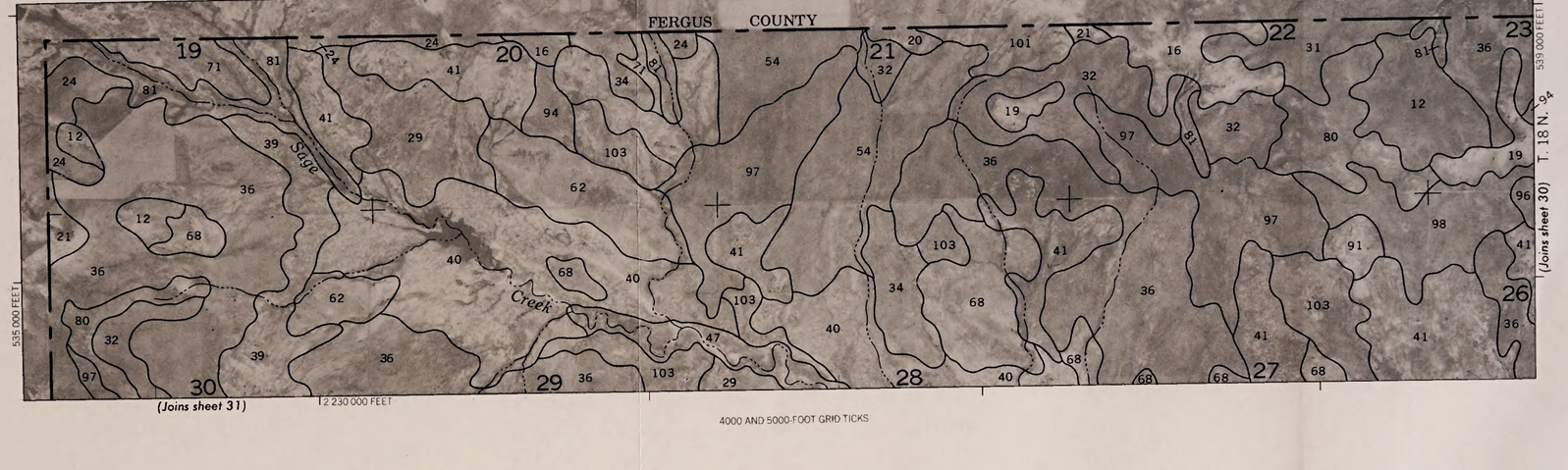
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

106

N





1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

(108)

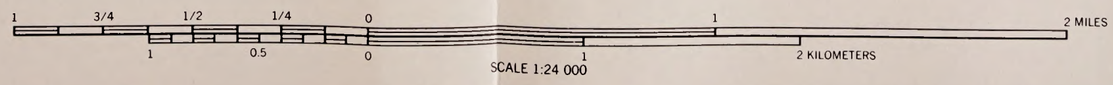
N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000


R. 27 E.
2 310 000 FEET
R. 28 E. (Joins sheet 102)
T. 12 N.
(Joins sheet 108)
(Joins sheet 110)
350 000 FEET
340 000 FEET
2 285 000 FEET
Creek
Alkali
Howard
Coulee
MUSSELSHELL COUNTY
MUSSELSHELL COUNTY
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36


1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

110

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

112

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

PETROLEUM COUNTY, MONTANA NO. 112

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies.
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey from 1975 and 1977 aerial photo –
Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey from 1975 aerial photo –

N

30 E. | R. 31 E.

(Joins sheet 106)

2 435 000 FEET

350 000 FEET

(Joins sheet 112)

T. 12 N.

ROSEBUD COUNTY

MUSSELSHELL RIVER

MUSSELSHELL COUNTY

340 000 FEET

2 410 000 FEET

19 20 29 30 31 32 33

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS